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Edited by
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Volume One

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Preface

These proceedings represent the work of contributors to the 7th European Conference on Entrepreneurship and Innovation (ECIE 2012), hosted this year by Escola Superior de Gestão e Tecnologia, Instituto Politécnico de Santarém, Portugal. The Conference Chair is Professor Ilídio Tomás Lopes and the Programme Co-Chairs are Dr. Carla Vivas and Dr. Fernando Lucas, all from the School of Management and Technology, Polytechnic Institute of Santarém, Portugal

The opening keynote is given by Professor Dr Soumodip Sarkar from the University of Évora, Portugal on the topic "Innovation and its Dynamics- An Integrated Model". The second day will be opened with a keynote from Dr Heather Fulford from the Robert Gordon University, Scotland. Heather will address "The Entrepreneurship Classroom: A meeting of minds and hearts?"

ECIE continues to develop and evolve. Now in its 7th year the key aim remains the opportunity for participants to share ideas and meet the people who hold them. The scope of papers will ensure an interesting two days. The subjects covered by the papers illustrate the wide range of topics that fall into this important and growing area of research.

With an initial submission of 221 abstracts, after the double blind, peer review process there are 85 academic papers, 16 PhD papers and 3 work-in-progress papers published in these Conference Proceedings. These papers represent research from Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Czech Republic, Finland, France, Germany, Greece, India, Iran, Ireland, Italy, Japan, Lebanon, Lithuania, Malaysia, Mexico, New Zealand, Poland, Portugal, Romania, Russia, Saudi Arabia, Slovenia, Spain, Sri Lanka, Sweden, Switzerland, The Netherlands, Tunisia, Turkey and the UK.

I hope that you enjoy reading these Proceedings.

Dr. Carla Vivas and Dr. Fernando Lucas
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Biographies

Conference Chair



Professor Ilídio Tomás Lopes is Director of the School of Management and Technology. In addition to his role as director, he teaches in several master programs and develops his own and school research activities. He has a PhD in Management, with a thesis about intangibles identification, measurement and valuation. Dr Lopes is a member of international editorial boards and supervisor of master and PhD students. Currently, he is also an associate researcher at CCIM – Coimbra Centre for Innovative Management.

Programme Chairs



Dr. Carla Vivas is Sub director of School of Management and Technology. She is a student of a Phd Program in Management (specialization in economic management and decision sciences), working on a thesis about international strategies in the Portuguese wine industry. Dr Vivas is also a Professor at the School of Management and Technology where she teaches Management, Operations Management, Logistics and Strategic Management.



Dr. Fernando Lucas is the Coordinator of the recently created Unit Support for Employability and Entrepreneurship at the Polytechnic Institute of Santarem. His activities at the School of Management and Technology have been focused on Strategic Management and more recently also on Entrepreneurship and Innovation. Presently, he leads the Pedagogic Council. Before joining to IPS, he had a professional diverse experience, focusing on the management of international businesses and management information systems, after more than a decade of management in an industrial domain, when he also joined the management team of the national sector association.

Keynote Speakers



Dr Heather Fulford is Reader in Entrepreneurship and Academic Director of the Centre for Entrepreneurship at Aberdeen Business School, Robert Gordon University, Scotland. Her research interests include entrepreneurship education and education resources, the language of entrepreneurs, social enterprise start-up and social entrepreneurship education. She is currently supervising a number of doctoral students in aspects of entrepreneurship, entrepreneurship education and social entrepreneurship. She delivers courses at postgraduate and undergraduate level on new venture creation. Dr. Fulford is a visiting Fellow at Loughborough University, a Member of the British Computer Society, and a Fellow of the Chartered Institute of Linguists.



Prof. Dr. Soumodip Sarkar received his PhD in Economics from Northeastern University, Boston in 1995. He is currently Dean of Graduate Studies at the University of Évora, Portugal where he is also the coordinator of the Program in Entrepreneurship and Innovation and a professor in the Department of Management. He is also a researcher at CEFAGE-UE and his research interests are innovation, entrepreneurship and international business.

Mini Track Chairs



Dr Claire Auplat researcher in ecopreneurship, innovation and strategy, has worked on the co-industrial and institutional emergence of nanotechnologies for the last decade, firstly at Rice University (US), then at Sciences Po's chair of sustainable development (France) and at Imperial College business school (UK), and now at Novancia Business School (France). Claire is a member of the French Research Council (ANR) specialist committee on eco-innovation (ECOTECH). Her areas of interest cover public policy and entrepreneurial dynamics, innovation and sustainable development.



Prof. Dr. Alexander Brem received his Diploma in Business Administration and PhD from the University of Erlangen-Nuremberg in 2004 and 2007, respectively. From 2004 to 2007, he was Senior Research and Teaching Assistant at the Chair of Industrial Management, University of Erlangen-Nuremberg, where he currently works as Assistant Professor. Moreover, he is Founder and Partner of VEND Consulting GmbH, Nuremberg. His current research interests include idea

and innovation management and strategic management in SMEs. He is a Reviewer and editorial board member of various international journals such as Technovation and International Journal of Innovation Management. You can find out more about Alexander from www.idee-innovation.de (site in German)



Dr Aurélie Delemarle is an assistant professor at ESIEE Paris Group in innovation management. She is a researcher at LATTS and IFRIS. Her research focuses on the breakthrough innovations, market framing and S&T dynamics. Standardisation is at the core of her work (nanotechnologies, asynchronous design, ITRS Roadmap). She is a member of the French delegation at the ISO committee (TC 229) and actively participates to 2 task groups. As public policy also plays an important role in supporting the development of innovations, Aurelie also integrates this aspect in her work focusing on their role in supporting the development of breakthrough innovations.



Dr Sandra Fielden is a Senior Lecturer in Organisational Psychology in the Manchester Business School at the University of Manchester. She was editor of Gender in Management: An International Journal for the last 11 years, and received an Outstanding Service award in 2010. Sandra has been co-chair of the 'Gender and Management' track at the British Academy of Management and European Academy of Management and was a founder member of the 'Gender in Management' special interest group. She is co-editor of 'International Research Handbook of Successful Women Entrepreneurs', 'International Handbook of Women and Small Business Entrepreneurship' and 'Minorities in Entrepreneurship'.



Dr Alexandros Kakouris is a part time lecturer in entrepreneurship and innovation at the University of Athens. He holds a Ph.D. in Physics and a M.Sc. in Adult Education. He has been involved in entrepreneurship research since 2006, involved mainly with educational issues. His special interest concerns fostering of entrepreneurship and innovation to science graduates and support of youth entrepreneurship through counselling. He also specialises in nascent entrepreneurship and virtual business planning.



Dr. Jun Li is a Senior Lecturer in Entrepreneurship and Innovation at the Essex Business School of University of Essex, UK. He is currently President of the Chinese Economic Association (UK/Europe) and Co-Editor of the Journal of Chinese Entrepreneurship. He teaches and researches in the areas of entrepreneurship and policies, innovation management, and Chinese entrepreneurship. His recent publications include Financing China's Rural Enterprises (Routledge), and papers in internationally leading journals in entrepreneurship and innovation.



Dr Maria Theresia Semmelrock-Picej is a senior researcher at the Alpen-Adria Universität Klagenfurt, biztec, Austria. Her research topics are innovation-oriented information-technology based customer knowledge management, information and knowledge management, cooperation management, related measurement issues and gender aspects.



Professor Milan Todorovic is a Professor of Entrepreneurship and Innovation, Corporate Entrepreneurship and Operations Management at Union Nikola Tesla University in Belgrade, Serbia. He holds an MBA from Melbourne Business School and has extensive international experience across diverse industries and government enterprises encompassing lecturing, management consulting, business development, directorships and successful management of global, mission critical business systems for leading international companies.



Dr Marianne Tremaine is a senior lecturer at Massey University, New Zealand and part of the indigenous Kai Tahu tribe. She specialises in cross-cultural communication, women and leadership, equal employment opportunity and managing diversity.



Dr Doan Winkel is an Assistant Professor of Entrepreneurship at Illinois State University. He received his Ph.D. from the University of Wisconsin – Milwaukee. His research has been published in the New England Journal of Entrepreneurship, the Journal of Occupational and Organizational Psychology, and the Journal of Vocational Behavior. His current research interests include the impact of entrepreneurship education, innovative teaching methods in entrepreneurship, and work-life balance.

Biographies of Presenting Authors

Saiful Abu Hasan Sazalli finished his degree from University Technology Malaysia major in Quantity Surveying in year 2003. Later, he had worked for QS Consultant in Malaysia. In 2006, he did his Masters of Project Management at University of Putra Malaysia. He is currently pursuing his PhD in Northumbria University, studying The Functional System of IBS in Malaysia.

Dr. Mohammed AlSudairi is currently working as an Associate Professor in College of Business Administration for MIS Department and the Vice-Rector of Business Development at King Saud University at Riyadh, KSA. His interested areas include IT, E-Business, E-Commerce, Information Systems Strategy and ERP. He has publications in reputed journals and conferences.

Christos Apostolakis holds an MA in Business Administration from Bournemouth University, an MA in Public Admin & Public Policy from the University of York, and a Ph.D. from De Montfort, UK He is currently working as a lecturer in Strategy at Bournemouth University Business School while at the same time he is the school's PG Management Programme Coordinator. Current research interests revolve around strategy & social entrepreneurship.

Afsaneh Bagheri is a post doctorate fellow at the Faculty of Educational Studies, University Putra Malaysia. She has recently obtained her PhD in educational Administration with concentration on entrepreneurship education and published papers on developing students' entrepreneurial leadership competencies, entrepreneurial leadership learning model development, entrepreneurial self-efficacy, entrepreneurial intention, entrepreneurial learning and teachers' entrepreneurial self-efficacy.

Claudia Gabriela Baicu is anAssociate Professor, Phd at Spiru Haret Univesity, Bucharest, Romania (Faculty of Marketing and International Affairs). The scientific field of interest is international financial activity, more precisely: international banking, financial innovation and its role in the context of the global financial crisis, tendencies on international markets, the change factors in financial sector, regulatory framework of international banking, regulatory arbitrage.

Claudia Erni Baumann is a Research Associate and PhD student at the ETH Swiss Federal Institute of Technology Zurich. She works at the Chair of Technology and Innovation Management. She holds MScin Sports and Physical Education and a M.A. inBusiness Administration with specialisation in Information, Media and Technology Management.Her research interests include chance encounters, knowledge creation, innovation, learning and sports economics.

Cella-Flavia Buciumanhas a bachelor in Automation and Computer Science and a Master degree in Business Administration and Marketing. She joined the university as an assistant professor in 2008. In 2010 she enrolled for a PhD in Engineering and Management at Politehnica University of Timisoara. Her academic interests include agile methodologies and measuring performance systems.

Luísa Carvalho is a Professor of Economics, Entrepreneurship and Innovation at the Department of Economics and Management, Business School – Setúbal Polytechnic Institute – Portugal since 1999. Luisa is a Researcher in CEFAGE – University of Evora- Portugal. Luisa has a Phd in management, McS in economics. Also a author of several publications in national and international journals and book chapters.

Piotr Chwastyk is a researcher and lecturer at The Opole University of Technology. His field of research are innovation processes especially cost estimation in processes planning of innovation. He received PhD title in 2006. He is a member of the Polish Society of Production Management, and since 2006 a member of the board.

Ileana Ciutacu is a PhD student at the Bucharest Academy of Economic Studies' Institute for Doctoral Studies, Economics Department. Since 2007 she's been a member of The Center for Complex Studies in Bucharest, Romania, and in present is conducting a doctoral stage at Università degli Studi di Messina.

Valdner Daízio Ramos Clementino is a Brazilian economist and university professor of the Collegiate of Management at Federal University of Vale do São Francisco, currently performing,at the Department ofManagement, Universityof Évora, Portugal, doctoral thesisfocused onInnovation, with specific focus onthe vitiviniculture sector in the São Francisco Valley, Brazil.

Ana Cordeiro holds a master in Industrial Engineering. Ana is a Ph.D. student, Invited lecturer at the Production and Systems Department, School of Engineering, University of Minho, since 2010. Lecturing activities on Economics Engi-

neering and Cost Analysis, at undergraduate and post-graduate courses. Also works as consultant at entrepreneurship and business management.

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Maria de Lurdes is a lecturer of Management at Estoril Higher Institute for Tourism and Hotel Studies (Portugal). She holds a M.Sc. in H.R. Policies and is presently attending aPh.D Program at Universidade de Évora under the supervision of Professor Sarkar. Her current interests include strategic HRM, organizational learning, human capital and intrapreneurship.

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Stefano De Falco received the M.S. degree in electrical engineering from the University Federico II of Naples in 1999 and the Ph.D. degree in electrical engineering in 2003.He now coordinates a Technology Transfer Office of University of Naples

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Lavinia Sidonia Delcea is currently a Ph.D. student in Economics with the research theme "Local Budgetary Policies and Economic Development". I Also a member of the Department of Economics within the University of Oradea, where I prepared seminars of "Macroeconomics" and "Techniques of turism operations".

Dr Carine Deslee from the University of Lille has been studying Participative Innovation in the context of the SNCF company during her phD under the direction of Pr Desreumaux. Her other research interests are concerning innovation, strategic changes, eco-innovations, the management of waste and the role of managers in various contexts.

Biagio Di Franco is a PHD Student, Politehnica University, Faculty of Management in Production and Transportation, Romania. Master Degree in Management of Innovations Polytechnics of Mons, Belgium. Master Degree in Management of Transports University of Brussels, Belgium. Master Degree in International Trade, University of Brussels, Belgium. Degree in Sciences of Management - Catholic University of Mons, Belgium.

Thomas Domboka is a Doctoral researcher with Leeds Metropolitan University, Zimbabwean born settled in the UK since 2002. He is a professional administrator and company secretary with several years' experience in business as company director and entrepreneur. In 2006 helped start a business that offers private education to migrants from Africa and other developing countries.

Diane Duparc is a PhD Candidate and Teaching Assistant in Management, Paris 1 Panthéon-Sorbonne University, Paris, France. She is interested in topics such as intellectual capital, networks, innovation and knowledge-based economy.

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Cristina Fernandes (PhD in Management) She is Lecture at Instituto Superior de Línguas e Administração de Leiria (ISLA)and PolitechnicInstitut f Bragança and NECE- Research Centre in Business Sciences, University of Beira Interior

(UBI).She research interest is about KIBS and Regional Competitiveness. She has published several papers in international journals.

Paula Fernandes (Ph.D in Applied Economics and Regional Analysis, 2005) is Professor of Management in the Polytechnic Institute of Bragança (IPB) - Portugal. Her research interest include: Artificial Neural Network, Tourism, Entrepreneurship, Marketing Research, and Applied Research Methods. Participation in 4 international projects I&D and more than 60 publications in proceedings and scientific journals with referee.

Ana Ferreira obtained her master degree in Biomedical Engineering in October of 2009. Since 2010, is a PhD student with a FCT grant at University of Minho in the Industrial and Systems Engineering Programme, developing research in the application of numerical methods for the efficiency and cost optimization of energy systems.

Isabel Ferreira: Licenciatura in Public Administration by University of Minho, Portugal. She has a Master in Public management by University of Aveiro, Portugal. PhD Student in University of Minho (Doctoral Programme in Technology and Information Systems), Portugal. She is also a teacher in Management School of Polytechnic Institute of Cávado and Ave (IPCA), Portugal.

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Stelian Florica and I've graduated "Politehnica" University of Timisoara, Mechanical Faculty, section: Machine construction technology (French language). After this, I studied Master: Integrated Engineering at same University. Now I'm PhD. Student at "Politehnica" University of Timisoara, and the research is in the field: development and integrated collaborative conception of products in PLM platforms.

Denis Frydrych Denis is currently a PhD in Management candidate in the Entrepreneurship and Innovation Group of the University of Edinburgh Business School. He completed his BA in International Business from Munich Business School, Germany. He obtained aMSc in Management (specialism in Entrepreneurship) with Distinction from Cass Business School, London, UK.

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Francisco González Bree is an Academic Director Master in Business Innovation Deusto Business School CMO at Anboto (named the World´s best Startup 2010). BSBA Saint Louis University; MBAEdinburgh University, MBIDeusto Business School, PDP ESADE and Doctorate candidate (DBA) Kingston Business School. MCIM Chartered Marketer from CIM and he has collaborated as tutor for ESADE.

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Corina Grigore is a PhD candidate in Economics, with background in Economics and Business Administration. In 2011 she graduated with a dual MPA degree in Public and Economic Policy from the LSE and Sciences Po. She studied in the UK, France, Hungary and Romania. Her interests: economic development, economic governance, innovation policy and social responsibility.

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Emhamad Hamad is a PhD researcher at Nottingham Trent University. He was a public sector employee, 1985-2005 and has been a Faculty member of the Collage of Economics, Omar Al Mukhtar University-Libya since 2005. He was a Coordinator of the Faculty of Economics, Al-Qubbah, 2006, Head of the department of Business Administration, Omar Al- Mukhtar University, 2007.

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Jukka Huhtamäki, M.Sc. (Hypermedia) is a researcher, a teacher, and a founding member of Stanford's Innovation Ecosystems Network. His research interests include visual social media analytics, methods of streamlining social network and information visualization, user and information modeling, and development of methods and implementation technologies for social, adaptive and distributed hypermedia.

Maroun Jneid is a PHD candidate at UniversitéParis8 with13 years of professional experience in software projects-management and engineering process activities and 11 years of experience in software engineering activities lecturing in the Antonine University'sFaculty of Engineeringas well as its NorthCampus director for the last 4 years.Entrepreneur of an ITManagement Consulting company

Magdalena Jurczyk-Bunkowska studied production management at Warsaw University of Technology, where she received a PhD title in 2004. Currently, she works at Opole University of Technology as a researcher and lecturer. She was a member of Polish Academy of Science. Now, her fields of research and interest are innovation management especially operational approach covering innovation process planning.

Alexandros Kakouris studied Physics at the University of Athens (1990). He also received a Ph.D. in Physics from the same University (1997) and a postgraduate certificate on "Distance Education" from the Hellenic Open University (1999). He has been the coordinator of the Career Office at the University of Athens since May 2004, he presently teaches innovation and entrepreneurship at the same university. His research interests concern entrepreneurship education.

Jussi Kantola is new product development professor at University of Vaasa Finland. His prior employers include KAIST Korea, Tampere University of Technology Finland, University of Turku Finland, Romac International US and ABB Finland. His first PhD (IE) is from University of Louisville USA 1998, and second PhD (Industrial management) from Tampere University of Technology 2006.

Glykeria Karagouni is a Mechanical Engineer and a Lecturer at the Department of Wood and Furniture Design and Technology of TEI of Larissa. She holds a MSc at Modern Industrial Management and works on her PhD on Production Technologies, Knowledge-Intensive Entrepreneurship and Innovation in Low-Tech Sectors. Her current research interests are in technological and entrepreneurial strategy and knowledge management.

Malte Kaufmann holds masters of economics degree from the University of Heidelberg and is currently an external Ph.D. student of the Academy of Economic Studies in Bucharest, Romania. He is founder and CEO of KAUFMANN REAL ESTATE and member of the governing body of the Chamber of Commerce, Rhein-Neckar.

Panayiotis Ketikidis is the Vice Principal for Research, Innovation and External Relations of The University of Sheffield International Faculty, City College and the Chairman of the Management Committee and Academic Director of the Doctoral Programme at the South East European Research Centre (SEERC) with over 25 years of experience in management, education and research.

Peter Kiryushin is finishing his Ph.D. research in Environmental Economics at Moscow State University and as Master in Environmental Science, Policy and Management in Lund University, Sweden. He is involved in the comparative study on academic entrepreneurship and commercialization of cleantech innovations in Scandinavia and Russia.

Ipek Kocoglu has earned her B.S. degree in 2008, in Manufacturing Systems Engineering at Sabanci University, Turkey, her M.Sc. degree in 2010 in Science and Technology Strategies at Gebze Institute of Technology (GIT), Turkey, and she is currently a Ph.D. student in Faculty of Management, at the GIT where she is also working as a research assistant.

Thomas Kollen is an Assistant professor at the Department of Management, Gender and Diversity Management Group, Vienna University of Economics and Business (WU). Doc Team Fellow of the Austrian Academy of Sciences. Visiting scholar at Goethe University Frankfurt, Germany. Research focus: Nationalisms in organizations, existentialist approaches to organization studies and management research, issues affecting homosexual entrepreneurs and employees.

Hanno Kortleben graduated from the PFH Private University of Applied Sciences Göttingen, Germany in February 2012 at the top of his class. He holds a M.Sc. and B.Sc.in General Management.Hanno is now working as a research assistant at the department of Entrepreneurship and Finance for Prof. Dr. Bernhard H. Vollmar.

Stefan Lagrosen holds a Ph.D. in business administration from Stockholm University. He is currently active as a professor of marketing and quality management at University West, Sweden. His main research interests are quality management in public services, international aspects on quality management, health and fitness marketing and the use of internet in marketing.

Yvonne Lagrosen holds a Ph.D. in quality management from Chalmers University of Technology. She is currently active as an associate professor of quality management at University West, Sweden. Her main research interests are organizational learning and quality management with relations to health and fitness, creativity, entrepreneurship, values/core values, and brain functioning.

Hans Landström, PhD in Industrial Management, holder of the Chair in Entrepreneurship at Lund University, Sweden. He is founder of Sten K. Johnson Centre for Entrepreneurship and responsible for courses in entrepreneurship at Lund University. His research interest includes entrepreneurial finance, informal and institutional venture capital, entrepreneurial learning and teaching, and the history of entrepreneurship research.

Zaidatol Akmaliah Lope Pihie is a lecturer at the Faculty of Educational Studies, Universiti Putra Malaysia. Her areas of specification are entrepreneurship education, leadership and educational management as well as teaching methodology. She has conducted many researches on the areas and published several articles and books in her field of specialization.

Ladislav Ludvík, Associate professor at VŠB-Technical University, Faculty of Economics of Ostrava, department of Business Administration. In the research area he deals with the problems of entrepreneurial environment, trends and development of entrepreneurship. For example he participated in work on ex-ante analysis for preparing of operational programme in the Czech Republic.

María Jesús Luengo PhD, is Associate Professor at Department of Management Evaluation and Business Innovation, at the University of the Basque Country, Spain. She has managed some research projects and she has contributed to scholar area with articles and books. Her current work focuses on knowledge management, intellectual capital and innovation in the regional areas and political quality in the EHEA.

Carla Susana Marques has a Ph.D. in Business and teaches Innovation and Entrepreneurship to undergraduate, master and doctoral students at the University of Trás-os-Montes e Alto Douro (UTAD), Portugal, and researcher at the Centre for Transdisciplinary Development Studies (CETRAD). Her main research interests are innovation, entrepreneurship education and women entrepreneurship.

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Cristina Moisa is a Ph.D. Candidate at the Bucharest Academy of Economic Studies, Romania. She develops her doctoral research in the Research Center for Business Administration, Head Professor Marieta Olaru, Ph.D. Her main areas of interest are the performance models in the automotive industry and the economic, ecologic and social development.

Bala Mulloth is an assistant professor of entrepreneurship and innovation management at Central European University (CEU) Business School. His PhD from Polytechnic Institute of New York University (NYU-Poly) dealt with the rise and practice of social entrepreneurship in New York City's clean technology sector. His main research focus is in entrepreneurship and innovation.

Estera Laura Nemoianu is a third year PhD Student in marketing at the Bucharest Academy of Economic Studies. Her research interests include: sustainable marketing, eco-innovation, corporate social responsibility and sustainable business practices.

Alcina Nunes is an Assistant Professor on the Department of Economics and Management of the School of Technology and Management of the Polytechnic Institute of Bragança, Portugal. With a PhD in Mathematical Economics and Econometric Models her current research interests and publications concern the econometric evaluation of public policies, microeconometrics and entrepreneurship.

Sandra Nunes is a Professor of Analysis of Statistical Data; Statistic; Quantitative Methods and Mathematics, Department of Economics and Management, Business School – Setúbal Polytechnic Institute – Portugal since 1995. Researcher in CMA – Faculty of Sciences an Technology, New University of Lisbon- Portugal. She has a Phd in Mathematics -Statistics, McS in Actuarial Sciences.

María Obeso PhD, is Assistant Professor at Department of Business Administration at the University of Cantabria, Spain. She has been Visiting Scholar in Business School at the University of Bedfordshire, UK. Her current work focuses on knowledge management and organizational behaviour.

Manuel Oliveira was born in London and has worked for several multinational companies including the consultancy firm Accenture. Manuel is currently finishing a PhD in Industrial Engineering and Management at the University of Porto (DEGI-FEUP). Manuel lectures at the University of Aveiro and at the University of Porto and is an INESC TEC researcher.

Dorel Mihai Paraschiv is projector of international relations, as well as a professor of international business and negotiations at the Bucharest Academy of Economic Studies. He has a vast research experience in the following topcs: international economic relations, sustainable development, social responsibility and strategy.

Ing. Jindra Peterkova, Ph.D.Assistant professor at VŠB-Technical University, Faculty of Economics of Ostrava, department of Business Administration. Her scientific focus includes contemporary concepts of business economics, innovations and management. She guarantees and teaches Management simulation game and Company strategy courses. She gained a lot of practical experiences at concrete companies.

Ioana Pop Cohuţ -Ph.D in Economics, senior lecturer of Economy of commerce, Development policy, Department of Economics, Faculty of Economic Sciences, University of Oradea, Romania. Her research interests include Tertiary economy and Business administration. She published numerous articles in prestigious journals and is involved in R&D projects.

Adalberto Rangone Master's degree in Economics at the University of Oradea (Romania) Has pursued the professional license as Mediator in business controversy.□ From 2011 at present day: PhD student in Economics at the University of Oradea (Romania) and at the University of Pescara (Italy). Professional experience:□ 2011: Finished the training as chartered accountant

Carla Riverola is a research assistant at La Salle Innova Institute – Ramon Llull University. She has a Computer Science Degree and Master of Science in IT Management at La Salle – Ramon Llull University in Barcelona. Her research interest is focused on the areas of Entrepreneurship intentions and Innovation life cycle.

Cristina Rodrigues holds a Ph.D. in Industrial and Systems Engineering. Assistant Professor in the Department of Production and Systems, School of Engineering at the University of Minho and is responsible for disciplines of applied statistics in undergraduate and master engineering courses. She is also a researcher fellow at Algoritmi R&D Centre.

Fernando Romero holds a Ph.D. in Science and Technology Studies from the University of Manchester. He is an Auxiliary Professor at the Production and Systems Engineering Department, in the University of Minho. He publishes regularly in the area of Industrial Innovation and Innovation Systems. His recent interests lie on the relations between university and industry.

Ted Sarmiento is Senior Lecturer at the Business School of Leeds Metropolitan University, Leeds, England and is currently researching small business 'success' factors as part of a DBA programme. A keen cyclist taking part in Cyclo-Cross, Time Trial and Sportive events Ted also has a small business interest in a holiday let in Northumberland.

Henk Schout MA, MCC. Programme manager of the Centre for Innovation & Entrepreneurship. He realizes innovative entrepreneurship projects at regional SMEs in the greenhouse horticultural industry. He developed an undergraduate entrepreneurship programme and his research fields are drivers of entrepreneurial ambition and the influence of leadership on innovative capacity. He has a background in corporate communication.

Sabina Seran is a PhD Student at the Politehnica University of Timisoara, and has a double diploma in Communication and PR and in Public Administration (2008) and an MBA (2010) with the specialty Marketing. Mrs SERAN has written on several aspects of prosumer collaboration tools and innovation strategies.

Dmitriy Shishkin Lecturer on "Entrepreneurship", "Start-up & business development" in State National Research Polytechnic University of Perm. Head of Small-Scale Business Sector in Advanced Training Institute. Consulting services & managing educational activities for entrepreneurs. Managing regional projects for youth entrepreneurship & private enterprise development. PhD student. Research theme "Development of entrepreneurial activity".

Ângela Silva is an Assistant Professor at Lusíada University, on Vila Nova de Famalicão. She obtained the PhD in Industrial Engineering and Systems in 2008 at the University of Minho. The research area focuses on the implementation of operations management tools on industrial environment.

Cândida Silva is a PhD student of the Doctoral Program of Technology and Information Systems, Master in Management and Industrial Engineering, and Graduate in Informatics and Systems Engineering. Cândida Silva is Assistant at the Management and Industrial Studies School, of the Polytechnic Institute of Oporto, and she is also President of the Student Chapter of the Association for Information Systems, of the University of Minho.

Sandra Silva is Assistant Professor at Faculty of Economics, Porto University (FEP). She holds a PhD in Economics from FEP. She published a pedagogic book on macroeconomics and articles related with evolutionary economics, innovation and economic growth (published in international journals as JEE). Current research interests are on evolutionary economics, innovation, growth, poverty, inequality.

Aelita Skaržauskienė has degree of Doctor of Social Sciences from ISM, University of Management and Economics in Vilnius, Lithuania. In her work dr. A. Skaržauskienė applies both knowledge of management and modern leadership-correlated disciplines such as Business dynamics, Systems thinking, Chaos and complexity theories. Dr. A. Skaržauskienė was the couch in the Self-managing teams building project in European Parliament together with DEMOS Group Belgium.

Zsuzsanna Katalin Szabó, Vice-Dean of the Faculty of Economics, Law and Administrative Sciences of Petru Maior University, Tirgu Mures, Romania; PhD in Mathematics, publish research papers and books in the field of entrepreneurship education SMEs. Founding member **A**ssociation of **E**conomic **F**aculties in **R**omania,

Kambiz Talebi is an associate professor of Entrepreneurship Faculty, University of Teharan, Iran. Kambiz has had a number of papers published in International Conferences, and 9 published in ISI journal. Also has been an Editor of 5 books

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Modelling the Style in Entrepreneurial Learning From Experience

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Abstract: Entrepreneurial learning is fundamentally experiential. According to Minniti and Bygrave (2001), entrepreneurs essay their options based on observations of real parameters of the market. In this way, they "learn" a market situation, react and modify their decisions relying on gradually verified expectations. Experiential learning has also been described by Kolb as a sequential process amongst certain learning modes. Due to individual differences, practitioners exhibit preferences in the way that they learn experientially – i.e. the learning style conception. Hence, entrepreneurial performance may not depend on mere information but on learning asymmetries. In this work, we extend the evolutionary model of Minniti and Bygrave to simulate the effect of an underlying "style" in observing and conceptualising market data and events. Comparative examples for different styles are illustrated and discussed. The results indicate different efficiency in adaptation between individuals of different style. Implications pertain to evolution of small firms which operate in fluctuating niche markets. They also concern innovating firms that aim to enter new markets with unknown parameters beforehand. The present article is a first attempt for a more concise modelling of entrepreneurial learning from experience.

Keywords: entrepreneurial learning, experiential learning, numerical modelling, innovation, individual differences, adaptation

1. Introduction

Learning from experience is considered the base for everyday business venturing as entrepreneurs have to react on changing markets (e.g. Minniti and Bygrave 2001, Politis 2005). Entrepreneurs decide to systematically observe selected market features relevant to their entrepreneurial options. The information they receive about the market is considered crucial for their entrepreneurial success. For instance, participation in networks (e.g. Birley1985, Hoang and Antoncic 2003) is considered an essential activity for entrepreneurs as to receive information relevant to their ventures. Thus, depend on the agreement/disagreement of what really happens with what they were expecting to happen, entrepreneurs are thought to adjust their options and decisions accordingly. This is a form of practical informal learning within the context of learning from experience. Not only successful crosschecks but also failures in business expectations are sources for learning, reconsideration of options and strategic modification of alternative actions (e.g. Shepherd 2003, Politis and Gabrielsson 2007). Through learning from experience, an entrepreneur gradually "learns" a situation in the market and it is expected to intentionally align his/her initiatives (or investments) accordingly. Apparently, adaptation in the market is a genuine entrepreneurial virtue for successful start-ups (Bhidé 2000, Kruijne 2007).

Effects of experiential learning become more crucial in the studies of the small firms which are more person-centric. Small firm owners are responsible to "understand" and "follow" the niche markets they pursue. SMEs usually lack the costs for extensive marketing surveys about their products or services. But even larger corporations with availability in marketing methods have to "learn from the market" step by step, especially when they introduce innovations. Innovations open new markets not entirely known beforehand. For instance, von Hippel (1986) addressed the role of *lead users*, i.e. a population in the marketplace able to provide feedback in the very initial promotion phase of innovative products. The innovating firm "learns" from lead users and accepts amendments for the very new product which will significantly increase its subsequent market share. Moreover, experiential learning processes support the pursuit of changing markets. In this work, we focus on the evolution of small firms since organisational learning from experience is more complex compared to personal, own-management of businesses. Due to the lack of a general entrepreneurship theory (Bygrave and Hofer 1991, Fiet 2001), the study of situated empirical responses due to market observations are central in understanding the origin and evolution of small firms.

Minniti and Bygrave (2001) developed a numerical model for entrepreneurial learning from experience. According to their iterative model, the entrepreneur examines and alters his/her options

(possibilities) according to his/her market observations. We assume that for each alternative possibility there is a corresponding factor (an index) in the market which validates or rejects the expectation. The person acts and observes the evidence whilst the deviation between expectation and evidence leads him/her to reconsider his/her possibilities, or in other words the difference induces experiential learning. Through the iterative process (i.e. a trial and error method), the entrepreneur reaches an asymptotic coincidence with the real market condition. The person accumulates new experience upon his/her existing one, i.e. in a constructivist perspective, in order to eliminate unexpected facts. In the present work we utilise Minniti and Bygrave's model but we also extend the modelling in order to include a personal "style" of an entrepreneur. Different "styles" are due to individual differences amongst small-firm owners who confront with the same market situation.

In general, the "style" – to be incorporated – is any *specific* way in which a person creates own-meaning from data observations. The personal "style" supposes that the same information may lead to different knowledge and further cognitive structures. In the context of experiential learning, Kolb (1984) was first to introduce the learning style. Four distinct styles correspond to the different learning modes of Kolb: the diverging, the assimilative, the converging and the accommodative one (Kolb 1984). Despite entrepreneurial learning may need an "entrepreneurial style" (yet to be developed), we will adopt Kolb's learning style for the present analysis. The influence of the learning style in the context of entrepreneurial opportunities has been discussed by Corbett (2005, 2007) and Dimov (2007). Both authors found that mere information asymmetries may hardly explain the discovery of entrepreneurial opportunities process. They alternatively suggest learning asymmetries as a more coherent cause for opportunity identification. Learning asymmetries are due to different learning styles which intervene to convert information into knowledge and further action. Corbett (2005) discussed the relation of Kolb's styles with specific phases of opportunity recognition and elaboration. Dimov (2007) found that MBA students of different learning styles exhibit different attitude to pursue opportunities originating from the same piece of information. When domain-specific knowledge is provided in accordance with the learning style, the possibility to pursue opportunities maximises. Else, the increase of domain-specific knowledge leads to ordinary information overload and impedes action.

The aim of the present work is to modify Minniti and Bygrave's model in order to simulate the learning style effect in entrepreneurial learning form experience. In the next section, the formulation of the mathematical model is presented. In section 3, some indicative simulation results are illustrated whilst in section 4 the model and further implications are discussed. Finally, section 5 encompasses the concluding remarks.

2. The insertion of "style" in Minitti and Bygrave (2001) model

Minniti and Bygrave's iterative model is path-dependent with feedback, stochastic and non-linear. Due to the feedback provided by the interaction with the market some decision patterns are self-reinforced. The model enables learning from failure because failure, although not desired, is informative.

The evolution of the Minitti and Bygrave (2001) model, with learning style (L), is described by:

$$C_{t+1} = \frac{S_{t+1}}{S_t + \mathrm{Y}_t}(C_t + Lu_t) \qquad (1)$$

where *L* is a vector which represents the effect of a learning style, *C and u* are the personal confidence level vector and the experience vector (i.e. market evidence) respectively. *S* is the sum of C_i and Y is the component sum of the vector Lu_t. For L=(1,1,..,1), Equation (1) reduces to the Minniti and Bygrave algorithm. When an entrepreneur considers *N* options, acts and observes the consequences of them in the market, assume that m_1 of them suit the divergent style, m_2 the assimilative, m_3 the convergent and m_4 the accommodative one, with $m_1 + m_2 + m_3 + m_4 = N$. Then, vector L has the form:

$$L = \left(\overbrace{a, a, ..., a}^{m_1}, \overbrace{\beta, \beta, ..., \beta}^{m_2}, \overbrace{1-a, 1-a, ..., 1-a}^{m_3}, \overbrace{1-\beta, 1-\beta, ..., 1-\beta}^{m_4} \right) \qquad (2)$$

Where $0 \le a, \beta \le 1$ constants which define Kolb's learning style. Thus, the term Lu_t represents a "myopic" view of the market evidence due to the learning style.

A description of the four learning styles of Kolb and their match with the learning environment of entrepreneurial courses can be found in Kakouris (2009). In brief, *diverging* style learners are imaginative and emotional and tend to see concrete situations from many points of view; *assimilating* style learners organize information into logical forms and are more interested in theorising than in applying; converging style learners tend to find solutions to problems and to cope with technical tasks; while *accommodating* style learners tend to try different experiments to solve a problem and they involve themselves in new experiences.

An example for different style information can be the following. Consider an entrepreneur who runs a business in the clothing sector. He/she may choose to observe data and facts: (a) from the clothing market in his country or (b) from another sector in his country (e.g. technology market). Parameters (a) facilitate convergent thinking (i.e. problem solving) whilst parameters (b) facilitate the diverging one (i.e. examine alternative views). An entrepreneur with convergent learning style is expected to underestimate parameters (b) over (a) whilst another one with divergent style is expected to do the opposite. In this case, if market signals rise in the convergent domain, the former entrepreneur will derive the promising results earlier.

Including the learning style in the Minniti and Bygrave model, the equation with the probability term becomes:

$$p_{t+1} = p_t + \alpha_t \left(Lu_t - Y_t p_t \right) \qquad (3)$$

where $\alpha_t = 1/\left(S_t^{\delta} + Y_t \right)$ with δ the rate at which the step size falls off. p is the vector that describes the entrepreneur's confidence levels according to his point of view that depends not only on his/her experiences but from his/her learning style too. The final form of Equation (3) becomes:

$$p_{t+1} = p_t + \alpha_t f\left(p_t\right) + \alpha_t \varphi_t \left(p_t\right) \quad . \qquad (4)$$

The weighted average expected payoff, $\alpha_t f\left(p_t\right)$, is now dependent on the vector *L*:

$$f\left(p\right) = \Sigma_j L\left(j\right) \psi\left(j\right) \left[u\left(j\right) - p\right] p\left(j\right) \quad . \qquad (5)$$

and the random vector φ_t, which represents noise, is defined as:

$$\varphi_t \left(p_t\right) = Lu_t - Y_t p_t - f\left(p_t\right) \qquad (6)$$

Using the iterative method of Equations (1) to (6), we simulate the evolution of entrepreneurial learning from experience for different learning styles in the next section.

3. Simulation results

Let us consider the example of Figure 1. We suppose that an entrepreneur examines 80 different options which can be attributed to the four learning style features of Kolb (e.g. 20 options for each learning style as shown in Figure 1). Hence, options and respective market observations 1–20 correspond to the diverging learning style, 20–40 to the assimilative one, 40–60 to the converging one and 60–80 to the accommodative one.

The initial self-confidence levels (i.e. the distribution of probability amongst alternative options) of the entrepreneur are shown with the solid curve. For the present example, we chose normal distributions of confidence levels as the simplest ones. It is shown that the entrepreneur promotes option 10 with a confidence level of ~8% which is a divergent thinking parameter. On the other hand, market evidence shown by the dashed curve maximises for option 50 (~8%) which is related to convergent thinking. Running the evolutionary model we aim to find when the entrepreneur will realise and promote his 50th

option due to evidence from the market (i.e. experience) with a consequent abandonment of his 10th one.

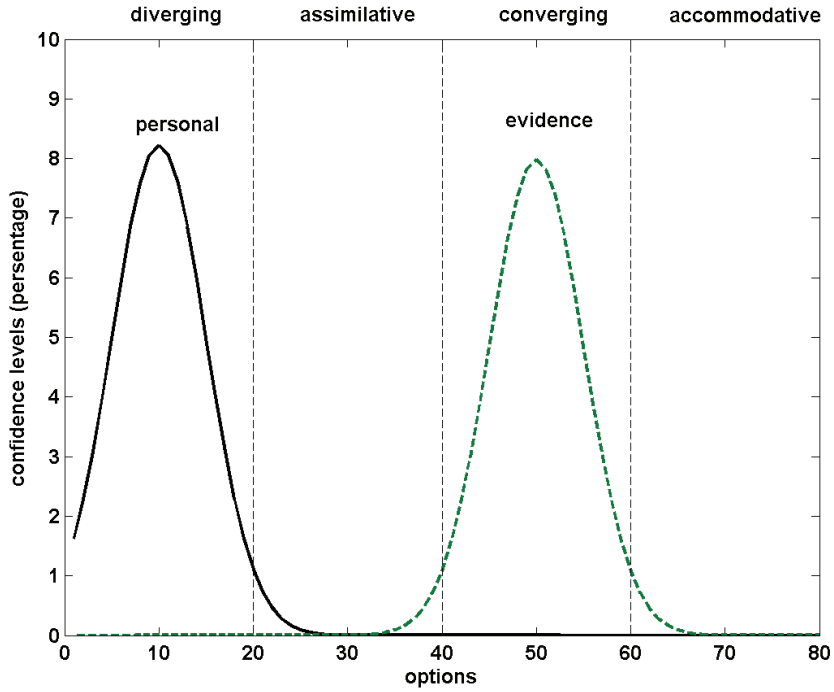


Figure 1: Distribution of confidence levels: (a) personal (solid curve) and (b) evidence in the market (dashed curve). We assume 80 options considered by an entrepreneur with 20 different options for each learning style domain. The initial entrepreneur's confidence lies in the diverging style domain whilst evidence in the market occurs in the convergent one

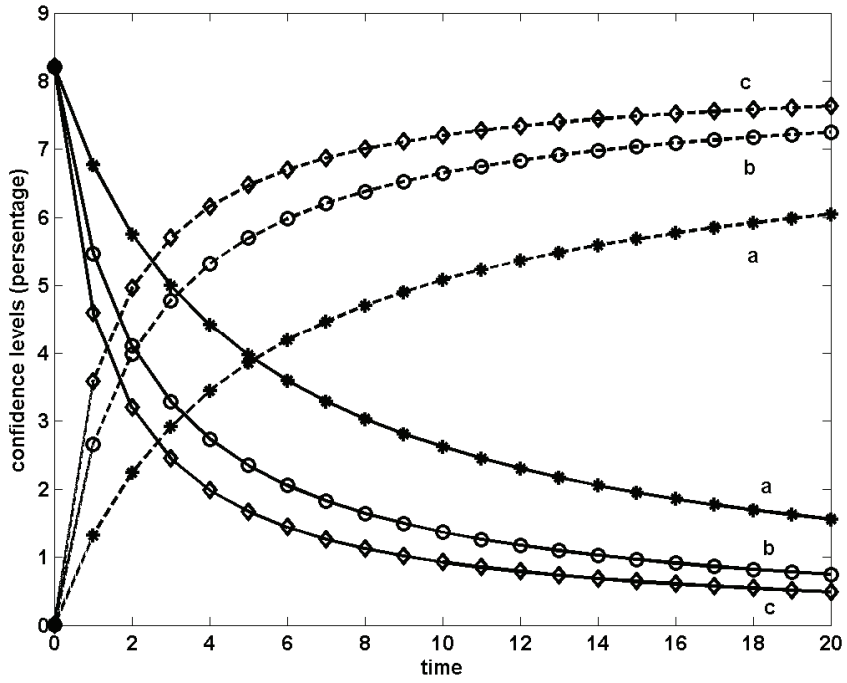


Figure 2: Evolution of personal confidence level for the 10th option (solid curves) and 50th option (dashed curves) of Figure 1 for three different style entrepreneurs: (a) divergent (α=0.8, β=0.5, asterisks), (b) fully adaptive (α=0.5, β=0.5, circles) and (c) convergent (α=0.2, β=0.5, diamonds)

The result for a fully adaptive entrepreneur (*α=0.5, β=0.5*) is shown by the (b) curves (with circular markers) in Figure 2. The fully adaptive learner has no predominant learning style and corresponds to the Minniti and Bygrave (2001) individual. Solid curves in Figure 2 show the evolution of the self-confidence level for the 10th option of the entrepreneur (i.e. the most promising for the entrepreneur without interaction with the market) while dashed curves show the evolution for the 50th option (i.e. the most favoured by the market). The fully adaptive person gives the same confidence (~4%) for the two options after two time-steps. He also attains an asymptotic confidence (i.e. equilibrium) for the 50th option of ~7% (~1% for the 10th respectively) after 20 time-steps.

An entrepreneur with converging learning style (*α=0.2, β=0.5*) attains the asymptotic values for his options more rapidly compared with the fully adaptive. The convergent one, shown by curves (c) with diamond markers in Figure 2, attains equal confidence (~4%) for the two options in almost 1.5 time-steps. He also attains a slightly higher asymptotic value (~7.5%) for the 50th option much earlier. Practically, after the 10th time-step the convergent has reached equilibrium. The result is due to the market evidence distribution which promotes an option in the converging style domain (dashed curve in Figure 1).

Let now consider an entrepreneur with diverging learning style (*α=0.8, β=0.5*). The evolution of confidence levels are shown by the curves (a) with asterisk markers in Figure 2. The diverging entrepreneur attains equipartition of self-confidence much later (more than 5 time-steps) compared to the previous cases. He also reaches a significantly less asymptotic value (~5.5%) for the most favoured option in 20 time-steps. The “resistance” of the diverging entrepreneur to abandon his initial (diverging) 10th option due to market evidence is much higher compared with the rest two.

The present example illustrated a symmetrical case for entrepreneurs who are expected to empirically change their options (confidence on alternatives) due to the interaction with the market. Converging style situations correspond to supply-driven opportunities in the market whilst diverging ones correspond to demand-driven opportunities (Dimov 2007). As the increase of self-confidence for an entrepreneurial option is expected to lead to intentional action, the present simulation results are in agreement with Dimov’s (2007) findings.

4. Discussion and implications

Learning from experience is fundamental in business venturing. The model of Minniti and Bygrave (2001) simulates decision making of a rational entrepreneur who interacts with a market. The entrepreneur has an initial conception about his/her options; however, he/she is keen to learn from experience. The model supposes that the entrepreneur can change his/her options without calculating the costs for such a change (e.g. transactional costs). Krrznerian alertness has also to be considered for a more consistent simulation of entrepreneurial decision making (e.g. Parker 2007). However, new entrepreneurial knowledge and insight are expected to build upon prior knowledge and experience (Shane 2000). Thus, experiential learning models provide an initial base for simulating the evolution of small firms.

The adoption of the learning style from Kolb’s (1984) theory complements existing decision making models by introducing individual difference features in the analysis. Such a consideration advances the effectiveness of the models to deal with SMEs and innovating firms where many decisions depend upon leading individuals. Corbett (2005, 2007) discussed effects of the learning style in the organisational context. The way to build effective entrepreneurial teams within an organisation is not straightforward; however, learning styles underlie the process and the distribution of liabilities. Recently, Gemmell, Boland and Kolb (2011) discussed “entrepreneurial ideation” in the context of social creativity for innovating firms. Hence, the adoption of learning style is expected to have implications in the organisational context.

The introduction of a personal “style” inducing “myopic” view on the market evidence in Minniti and Bygrave’s model may not explicitly refer to a learning style. An entrepreneurial style may be more appropriate; however there is poor development of such a style so far. Many personal attributes and traits are related to business venturing in literature; however, they have to be integrated in a concise framework. The adoption of other “styles” enables further quantitative analyses.

Another consideration pertains to the number of options which a real entrepreneur considers and crosschecks. We expect an increase of options to elongate the time interval for an entrepreneur to act

and check the consequences. This will be a next step of the present analysis in order to discuss empirical laws similar to Pareto 80-20 law. An adjustment of the time-step with the number of options is required. We expect that such an amendment will create larger differences in the way that different style entrepreneurs adapt and follow unknown situations in the market. Implications concern marketing methods in which the corporation receives feedback for a new product.

Finally, the present analysis has implications in theory of planned behaviour models (Ajzen 1991). Such models are utilised in the study of entrepreneurial intention formation due to underlying beliefs of potential entrepreneurs. Once an intention is formed, control beliefs intervene in the induction of consequent entrepreneurial behaviour – i.e. a start-up. The set of control beliefs intervenes in the induction of action because they relate to the self-confidence levels of the developed intention. Through iterative interaction with the market and relevant feedback, especially in the initial phase of a new firm, some of the control beliefs may alter due to experiential learning. Quantitative results, similar to the present ones, may enhance the aforementioned models.

5. Conclusions

In the present work we presented an extension of Minniti and Bygrave's (2001) numerical model for entrepreneurial learning from experience. Kolb's learning style was introduced as a "distortive lens" on market data. The consequence of such a "myopic" view is: entrepreneurs of different learning styles to recognise and adapt to a market situation in different timescales. Simulation results show that the learning style affects both the time of adaptation and the "intension" (i.e. the probability of self-persuasion upon a possibility) of market-verified expectations. These results are in accordance with previous research in literature and encourage us for further research on the role of individual differences in entrepreneurial learning from experience in order to represent small business venturing as a learning process (e.g. Cope 2005). Learning from failure and adaptation processes will be in the core of future study as they are especially important in technological entrepreneurship.

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References

Ajzen, I. (1991) "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50, No. 2, pp 179–211.

Bhidé, A. (2000) *The Origin and Evolution of New Businesses*, Oxford University Press, Oxford.

Birley S. (1985 "The role of networks in the entrepreneurial process", *Journal of Business Venturing*, Vol. 1, pp. 107–117.

Bygrave, W.D. and Hofer, C.W. (1991) "Theorizing About Entrepreneurship". Entrepreneurship Theory and Practice, Vol. 16, No. 2, pp 13–22.

Cope, J. (2005) "Toward a dynamic learning perspective of entrepreneurship", *Entrepreneurship Theory and Practice*, Vol. 29, pp. 373–398.

Corbett, A.C. (2005) "Experiential learning within the process of opportunity identification and exploitation", *Entrepreneurship Theory and Practice*, Vol. 29, No. 4, pp. 473–491.

Corbett, A.C. (2007) "Learning asymmetries and the discovery of entrepreneurial opportunities", *Journal of Business Venturing*, Vol 22, No. 1, pp. 97–118.

Dimov, D. (2007) "From Opportunity Insight to Opportunity Intention: The Importance of Person-Situation Learning Match", *Entrepreneurship Theory and Practice*, Vol. 31, No. 4, pp. 561–583.

Fiet, J.O. (2001) "The theoretical side of teaching entrepreneurship"*, Journal of Business Venturing*, Vol. 16, No. 1, pp 1–24.

Gemmell, R. M., Boland, R. J. and Kolb, D. A. (2011) "The Socio-Cognitive Dynamics of Entrepreneurial Ideation", *Entrepreneurship Theory and Practice*, to appear.

Hoang, H. and Antoncic, B. (2003) 'Network-based Research in Entrepreneurship', *Journal of Business Venturing*, Vol. 18, No. 2, pp.: 165–187.

Kakouris, A. (2009) "Online platforms for entrepreneurship education: an instructional design approach", paper read in 4th European Conference on Entrepreneurship and Innovation, edited by J. Braet, Academic Conferences Limited., Reading, UK, pp 230–235.

Kolb, D.A. (1984) *Experiential learning experience as a source of learning and development*, Prentice Hall, New Jersey.

Kruijne, C. (2007) "Teaching entrepreneurs continuous adaptation", paper read in 2nd European Conference on Entrepreneurship and Innovation, Academic Conferences Limited, Reading, UK, pp. 91–98.

Minniti, M., and Bygrave, W. (2001) “A dynamic model of entrepreneurial learning”, *Entrepreneurship Theory and Practice*, Vol. 25, No. 3, pp 5–16.

Parker, S. C. (2007) “Learning about the unknown: How fast do entrepreneurs adjust their beliefs?”, *Journal of Business Venturing*, Vol. 21, pp. 1–26.

Politis, D. (2005) “The Process of entrepreneurial learning: a conceptual framework”, *Entrepreneurship Theory and Practice*, Vol. 29, No. 4, pp 399–424.

Politis, D. and Gabrielsson, J. (2007) “Entrepreneurs’ attitudes towards failure – An experiential learning approach”, in Zacharakis, A. et al. (Eds.), *Frontiers of Entrepreneurship Research 2007*, Babson College, Wellesley, MA.

Shane, S. (2000) “Prior knowledge and the discovery of entrepreneurial opportunities”, Organization Science, Vol. 11, No. 4, pp. 448–469.

Shepherd, D. A. (2003) “Learning from business failure: Propositions about the grief recovery process for the self-employed”, *Academy of Management Review*, Vol. 28, pp. 318–329.

von Hippel, E. (1986) “Lead Users: A Source of Novel Product Concepts”, Management Science, Vol. 32, 791–805.

Service Design Systems Driven Innovation Approach for Total Innovation Management

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Abstract: The increasing innovation potential of integrating distinct disciplines has a considerable impact on the innovation process. This development affects the way in which technology management and technology intelligence should be carried out. As a consequence, the integration of external information sources becomes important. This raises a question of how technology intelligence network comprising external information sources should be designed. One of the solutions propounded by economists is the capability of producing a standard equilibrium model. Our effort will be to address this unique challenge of achieving equilibrium through proposed total service innovation model. The New Growth theory asserts that the power of ideas is an unlimited resource in economic activity. The Architectural Innovation is broad enough to include service innovation. Thus it is a form of Total Innovation Management Methodology to introduce the workings of the best practitioners. The effort of this paper presents a methodological approach to achieve Total Service Innovation Management.

Keywords: service blueprint, service design systems management methodology, service innovation, service innovation integration, total service innovation management

1. Introduction

The contribution of market orientation to new product/service performance has been examined by a number of academics under Open Innovation (Schuh et al. 2008), which include direct and indirect contribution. It means market oriented firms are inclined to produce service innovation first, which in turn leads to new service performance (Cheng and Krumwiede 2012).

Though regulatory and market barriers exist, General Agreement on Trade in Services (GATS) highlights that service activities will soon become the most interesting part of the world trade. Service Providers therefore can start benefiting from economy of scale opening up toward international trade, thus leading to the emergence of first examples of global-scale service companies (Maffei, Mager and Sangiorgi 2005). Thus service can become the major driving force within the contemporary economy. The four key areas of practice contributing to service innovation are: (1) Technology (2) Customers (3) Organisations and (4) Networks (Furseth, Cuthbertson and Reynolds 2010).

The idea to develop Total Service Innovation Management was inspired by the thoughts of systems, economic theories, web services environment and observations from some leading companies such as Microsoft, IBM, Oracle and HP etc. The Total Innovation Management (Xu et. al. 2007) paradigm was developed and popularized by Institute of Management Science & Strategy of Zhejiang University and a group of scholars in American advisory company of Stanford University (Zaipul).

Despite the dominance of services in modern economies, and their rapid growth worldwide, little attention is being paid to produce the unique challenge of management of obtaining the integrated view on the service chain with total service innovation management capability of handling idea to service intelligence. So our effort is to keep the customer as the centre of innovation, an indicator for service improvement and an ideal litmus test for the suitability of a new design.

2. Research questions

Our research is targeted at two basic questions:

- How transformation of traditional economies can be facilitated into the knowledge-based service economies, and
- How a blue-print of theoretical model and underlying theories that supports the theoretical framework for service innovation can be designed.

3. Purpose

Globalisation and new business models are required to be designed to breakdown traditional enterprise boundaries. It is required to close the gap between public and private service standards

existing between different architectural components while trying to provide end-to-end solutions. In order to make businesses to respond to a new generation of applications, it is required to describe the Service Design Systems Driven Innovation Approach, which is a customer-focused approach for service innovation and service improvement. The approach is targeted at addressing many of the challenges in service design and innovation. It gives an opportunity to academic community to debate on various issues raising the innovation and economy level issues at the start towards type of project selection, business modeling, semantic extension to service bus, realization through web services objects, accountability, transparency and finally the decision making throguh service chain integration.

4. Methodology

Service Design has recently gained much attention among practitioners and scholars. Firms are increasingly investing in service designs and involving design firms in their innovation process for services development and business performance (Veraganti 2008). Thus Service Design Systems Management Methodology (Schuh et al 2008) has been adopted for developing theoretical framework considerations because it helps companies in better assessing the needs of the participants for innovation. It is also called Service Design Systems Driven Innovation (SDSDI), an approach where the methodology aims at radically changing the emotions and symbolic content of services, i.e. their meanings and languages through a deep understanding of broader changes in society, culture and technology (Veraganti 2008). Along with the awakening to the domination of services in the world economies, there is a growing emphasis on business practice towards creating meaningful, memorable customer experiences. It suggests that there is a need for innovative methods and R&D practices for services.

5. Proposed theoretical framework for service design driven innovation and its components

The Theory of Architectural Innovation (Henderson and Clark 1990) is broad enough to include service innovation, especially when one considers subservices as comparable to components of product systems (Manasharamani 2005). For example, the sub-categories of architectural innovation include service bundling and unbundling innovations (Gallaouj 2002). Architectural innovations, which bundle or unbundle existing service products include: (1) the integration services, consisting of offering formulas or contracts in which the service provider commits to treat a bundle of problems or operations on behalf of the client which were previously dealt with by separate formulas or contracts; (2) inversely, the separation of services by isolating a type of service or a subset of operations which previously formed part of an integrated service, offering it as a new service sold separately or as an option (Gadrey, Gallouj and Weinstein 1995). The goal of architectural innovation is to achieve enterprise efficiency, effectiveness and change management (Offermann 2009).

6. The preferred IT integration model

The preferred IT integration model should target at having an application neutral view as against an application specific view (Offermann 2009).

7. Components of proposed total innovation management framework

A broad outline of our proposed framework includes something similar to Wheelwright and Clark's (1992) Framework that focuses on Project Strategy (Wheelwright and Clark 1993); A product level Enterprise Service Bus; A hypothetical consideration of Public Expenditure Management System (Campos and Pradhan 1997) in addition to Domain Plug-In and Development Plug-In as a part of architectural innovation-based total service innovation management (See Figure 1).

7.1 Vision

Globalisation will have a positive impact on economic science as it involves the analysis of the dynamic growth as opposed to static efficiency (Gangopadhyay and Chatterji 2005). In a period of dynamic growth, people with vision desire to achieve results. They take initiative and think about how to achieve targets. Vision is required to achieve great things; Vision is a vivid mental image of the idealized description of a desired outcome of a business (Awamleh and Gardner 1999); Vision provides purpose, direction and motivation to an enterprise. It is this vision that provides the context and direction for the methodology (Sarkis, Presley and Liles 1995).

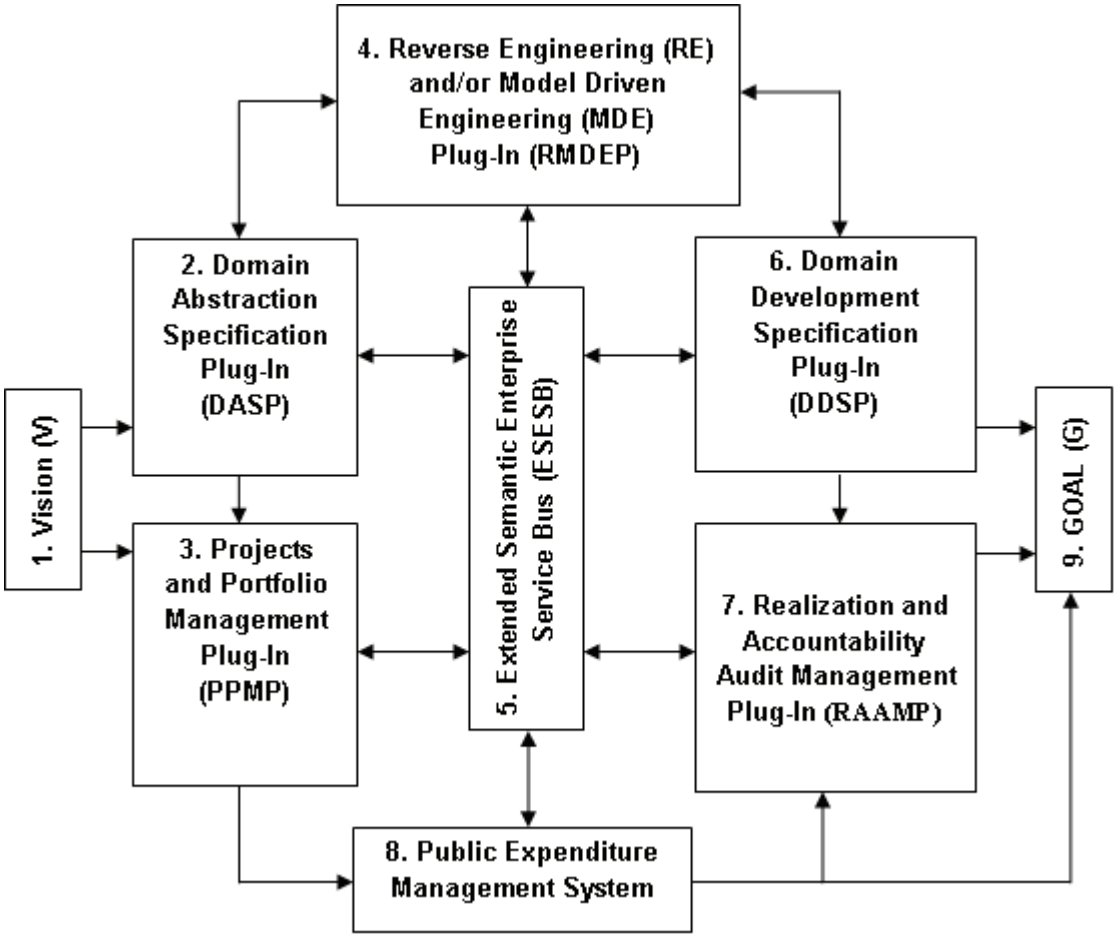


Figure 1: Proposed total service innovation management framework (based on Plug and Play Architecture Principle)

7.2 The domain abstract specification, plug-in/service design, idea generation, and concept development

It is the plug-in, which is assumed to facilitate the capability of specifying the Servicing Domain Considerations in an abstract way. It has four component specifications viz. (1) Environment Abstract Specification (2) Context Abstract Specification (3) Dimension Considerations Specification and (4) Factor Considerations Specification.

7.2.1 Environment abstraction

Neuberger (1971) argues that while comparing economic systems, decisions-making process ought to be based on the following factors:

- What is the locus of decision making?
- What motivates a decision maker to reach a particular decision?
- What information is needed to reach a decision? and
- What mechanism coordinates the decisions of several decision makers?

Neuberger (1971) rather elaborating the choices of economic systems of capitalism (market-based economy) and socialism (planning-based economy) (Burawoy and Lukacs 1985), argues that the crux of decision making lies in choosing between complete decentralization and administrative or manipulative decentralization rather than between centralization and decentralization (p. 21). It can be argued that a mixed economy can be adopted as Hofstede (1999, p. 43) calls it a Middle Way. This kind of middle way is expected to be suitable for the National Agenda of Integration with in its national boundaries.

Globally, the environmental requirements are also undergoing a phenomenal change. Improved interoperability, ease of use, functional re-usability and on-demand computing are some of the newly-introduced features (Mohan 2003).

7.2.2 Context

Decision making under the influences of environment requires understanding of the current economic situation of an entity/nation, its competitors, its suppliers and the type of its targeted customers. The act of decision making happens, consciously or unconsciously, on the perception of the circumstances surrounding the particular choice to be made, the goal to be pursued, the alternatives that are at our disposal, the information that is available and the incentives that are linked with the targets. Authors of this paper call this situation as CONTEXT (Neuberger 1971). Innovation can be studied in various contexts. Therefore, a wide range of approaches exists to conceptualize and define innovation and the ecosystem in which it operates.

7.2.3 Dimensions

There is no generally acceptable theory of motivation. We can only understand it as a range of motivational variables like income, hunger, thirst, the desire for natural or social security etc.,. Consequently, there are two important objectives to be achieved:

- Adopt a system to provide the participants with not only material benefits but also satisfiying their ego and sense of self-respect.
- Remold the value structure of the participants in such a way as to replace the low-value selfish motives, particularly with respect to material benefits (as per Mao Tse-tung's value system). Authors of this paper call the individual entity level perceptions of these motivations as dimensions. Dimensions include the grouping of the factors as mentioned in the Factors section. People, Places and Time are three generic dimensions.

7.3 Projects and portfolio management plug-in

Projects offer an enormous opportunity for achieving competitive advantage and respect for a corporation. An appropriate customer with an appropriate project along with managing risks and uncertainties as challenges and barriers is more appropriate to our theoretical framework and to customer/user Wheelwright and Clark (1992) 's project model.

Many of today's problems are in search of rapidly-developed, innovative solutions. Taking calculated risk, low concurrent engineering practices to accelerate cycle times, focusing the core business area, looking for reusable solution patterns, proactive management with small agile teams etc. are found some of the important critical success factors for Rapid Innovative Solutions (Lane, Boehm, Bolas, Madni, and Turner, 2010).

7.4 Enterprise architecture (enterprise middleware)

According to Gartner business value model, the business value lies in focusing the customer-oriented and technologically sophisticated business strategy. This business value can be derived from the synergic combination of three complimentary disciplines: (1) Enterprise Strategy and Planning (2) Enterprise Portfolio Management and (3) Enterprise Architecture (Buchanan; Gartner).

The strategic business value lies in developing standard interfaces and business componentization. So, the correct design of architecture approach would be to adopt an open, unified architecture with standards-based protocols that doesn't rely on technology lock-in; single standard set of APIs for interface to multiple carrier networks; single gateway for accessing multiple capabilities. A service provider having partnership with application providers, horizontal services providers and system integrators would produce a total solution (Sprint 2004). Carlson's Diversification Operating Model (Ross 2007) and Dynamic Architecture Model Aligning to Innovation Development in Governance (Wager et al. 2005) can be potential source of references

Use of Enterprise Service Bus as a standards-based integration platform combines messaging, web services, data transformation and intelligent routing (Chappell 2004). Dynamic adaptation (Wager et al. 2005) can be enabled in ESB-based service infrastructures to support self-adaptation in SOA (Gonzalez and Ruggia 2010). A prerequisite for employing the ESB to integrate applications and

services in an organisation is a specification of a workflow structure modeling or Business Process Modeling, tasks, actions, flow of information artifacts and messages between the communicating applications. To enable interoperability of possibly heterogeneous capabilities, knowledge and capacities of each of the alliance partners, a common shareable knowledge model is used for enriching the defined business process with semantic information (Bednar, Furdik, Lukac and Sabol 2009). For this purpose, a cloud can be constituted by a Common Cloud Management Platform (CCMP) implementation and an arbitrary number of cloud services can be delivered and managed by it (IBM CCRA Team 2011). Thus the Information Technology has the capability to produce plug and play business process modules to achieve speed to market and strategic business agility-based business objective where the business process components are made reusable and manageable (Ross, Weill and Robertson 2006). Semantic extension makes it much more effective.

7.5 Abstractions (domain abstract consolidations and development abstract specifications)

7.5.1 Reverse engineering

To create an innovation, a product might require undergoing **r**everse engineering process (Hentschel, C. 2009). It can cause the following two types of innovation

- Incremental Innovation, and
- Radical Innovation.

Senior manager's intentions and social context lead to the adoption of certain CASE tools, and influence the conditions under which these tools are used such as planned impact or contingent impact. Use of CASE tools in the context of reverse engineering can lead to certain changes to the existing social context and may even bring about changes in manager's strategy (Orlikowski 1991).

7.5.2 Model-driven engineering

Model-Driven Engineering (MDE) is a software development methodology which focuses on creating models, or abstractions, closer to some particular domain concepts than algorithmic ones. It aims at increasing productivity by maximizing compatibility among systems, simplifying the process of design, and promoting communication among individuals and teams working on the system. One objective of MDE is to apply model transformation and composition automatically via supporting tools. In this context, "Models" are rigorously defined specifications. Some activities or steps of development process can be automated or semi-automated (Chen 2009).

7.5.3 Enterprise modeling

Strategy: The basic strategy that drives the model and helps it offer solutions consists of four essential steps:

- Look-in-the-box for internal service design,
- Look-out-of-the-box for environment design such as service distribution, interoperability, integration and deployment,
- Look-above-the-box for best practices, governance, business imperatives and business requirements, and
- Look-below-the-box for separation of concerns, granularity management, loose coupling (Methodologies Inc.).

Architecture: Model Driven Architecture (MDA) is an open standard designed to facilitate rapid application development in a platform independent manner. Models can be built at a high level of abstraction by using MDA based tools, transformed into models and code targeting a specific platform or domain. At the abstraction level of a platform-independent business component model, services are visible only at a very high level. When the model is mapped to a particular platform, code will be generated by dynamic invocation that makes calls to the native services of those platforms (Soley 2000).

7.5.4 Service metamorphosis

Service Metamorphosis is having the capability of service transformation into its various forms viz., environment, platform and software at various abstraction levels. Any service that transforms a service must offer best practices, methodologies, disciplines, languages, tools, score card, time frame and a process. It should support both forward and backward transformation.

7.5.5 Blue print

It is a modeling framework that encapsulates the abstractions and realizations of modeling practices, modeling environments, modeling disciplines, modeling artifacts and solution entities (Methodologies Inc).

One of the key service design principles is the metadata-based stateless service design (Erradi, Kulkarni, Anand and Padmanabhuni 2005) which is used in order to minimize resource consumption by differing the management of state information when necessary(SOA principles.com; Wiki,SOA). It means that exchanged messages should be self-contained with sufficient information and metadata (like links to persisted data) to allow the destination service to establish the message context (Erradi et al. 2005).

7.6 Benchmarking of policies and rules with automated service bus (ASB)

The Automated Service Bus (ASB) Concept implementation can bring significant benefits such as (1) simple aggregation of components and services according to the project needs based on a common abstract infrastructure for communication between tools and systems (2) improved coordination between tools that were not designed to work through access to data and relevant changes in other tools (3) Legal recording and systematic closing of open loops in engineering team processes. In advanced stages of an ASB implementation, global view on tools and systems in automation system lifecycle for optimization of the engineering and operation processes like analysis of cross-linked data from several sources; securing access to data in automation systems can be brought (Biffl, Schatten and Zoitl 2009). Table 1 provides direction to design a development project type by adopting appropriate web services type to different innovation customer types. The purpose of ASB in this context is assumed to support all customer types.

Table 1: Matching projects and customers with web services design and development

Sl. No.	Customer Type	Project Type	Web Services Type
1.	Innovators	-	Greenfield
2.	Early Adopters	Break through	Top Down
3.	Early Majority	Platform	Bottom Up
4.	Late Majority	Derived	Meet-in-the-Middle
5.	Laggards	-	-

7.6.1 Bindings

The concept of binding deals with (a) technical aspects of binding and (b) economic, artistic and cultural values of bindings. While technological aspect deals with the technical concept of static and dynamic bindings, economy, arts and culture bindings take place through automation of economy through web service abstractions and encapsulation based on service metamorphosis principle and using SOA Meta-model (Wiki-SOA and the Linthicum Group 2007).

7.7 Realization and accountability management plug-in

7.7.1 Concretizations

Concretization approach allows modeling and developing large complex systems. Concretization is the step of developing the system in a concrete environment by realizing its functionalities according to the specification for a specific platform (Chen 2009). Transformations are expressed in Collaborative Component Based Model (CCBM) Approach to transfer model expertise into concrete applications. This approach achieves black-box reuse of models and pre-serves them. Every collaboration model specifies requirements that other models must fulfill in order to participate in collaboration in terms of collaboration operations (Stereotypes) and collaboration templates (a variant

of UML sequence diagrams). The operations invoked in a collaboration template define implicit constraints for models of collaboration partners (Occello et al. 2007).

7.7.2 Accountability

Accountability relates to the ability to explain how resources are assigned and utilized. In order to identify the connected responsibilities, we must assess the performance realized against objectives and standards. Then accountability is based on the social, moral and ethical dimensions and it is necessary to give explanations to different stakeholders, not just for superior referents alone (Farneti and Bestebreur 2004). Balanced Score Card can be adopted as managerial tool for result-oriented accounting as well as substantial application of the accountability principle (Farneti and Bestebreur 2004, p. 22).

The result-oriented budgeting should take into account a critical but constructive attitude with regard to the internationalization of concepts in the organisation too (Farneti and Bestebreur, 2004, p. 18). The KPIs must focus on achieving effectiveness and efficiency of the Innovation Management Projects (Wagter et al 2004). Sound project management can only enable a business owner (program) to realize intended benefits (Desloges and Mornan 2006).

7.8 Administrative reforms on financial perspective with public expenditure management system

The agendas of the public-sector management reform are (1) To promote efficiency and effectiveness of information flows and incentives in order to multiply accountability, efficiency and innovation over long term (UNPAN000760PDF 1995). (2) To treat private organizations and other government agencies as entities that should work under the principle of corporate social responsibility while working for Total Innovation Management projects initiated by the government organisations.

7.9 Goal and alignment

Creating synergies between innovation and socio-economic policies plays a pivotal role during endeavors expended towards attaining sustainability and integration. This requires enterprises to play an important role of achieving the innovation concept during the whole sequence from idea to commercialization in the market. It requires having cognizance of difference between the latest trends in innovation theory and rationale of different policy areas. It also provides an analytical framework for the study of the phenomena of co-evolution of technology, institutions and organisations. Thus our innovation system is a set of elements and relations, which interacts with and lays groundwork for services and new technology (Lundvall 1992). The primary objective of the innovation concept must lay emphasis on the central role of knowledge-based competition evolving from the concept of knowledge-based economy. This is what the Kingdom of Saudi Arabia is striving at and endeavoring for. The more rapid the innovation, the greater the mobility of the capital and the better the means of communication which will subsequently result in an accelerated movement of the capital, and, consequently, much stronger competitive conditions will be created in the market. Pure cost strategies have no longer remained sufficient and reliable means to attract clientele in today's strong global competition. Rather the ability to be innovative and seize new market opportunities ahead of others by developing, absorbing and applying new knowledge is the key to being efficiently competitive. The sum of the framework conditions and market forces make up the selection environment for the companies. This selection environment determines which companies and technologies survive and come to dominate the market as well as govern the speed and direction of the technology change and innovation (Anderson 2004).

8. Conclusion

Total Service Innovation Management (TISM) can show that societies can break free from existing practices and technologies by engaging in co-evolutionary steering. TSIM perhaps makes the best transition management and evaluation model that constitutes the third way that policy scientists have been looking for all the time. Realizing the potential of service innovation is important for societies to be successful in achieving sustainability and integration through the core concept of Plug and Play Business in an integrated set of ICT tool. This supports innovators in turning their ideas into businesses by forming virtual enterprises for inter-organizational collaboration (Jacobsson and Davidsson 2006).

References

Anderson, M. M. (2004) "An Innovative System approach to Eco-innovation-Aligning policy rationales", *The Greening of Policies – Interlinkages and Policy Integration Conference*, 3-4 December, Berlin, Germany.

Anh, Jones, Nhat and Chuc (2009) "Capitalising on Innovation for Exports by the SME Sector", Working Paper Series No. 2009/15, *Development and Policies Research Center* (DEPOCEN), 216 Tran Quang Khai Street, Hanoi, Vietnam.

Awamleh, R. and Gardner, W. L. (1999) "Perceptions of leader charisma and effectiveness: The effects of vision content, delivery and organisational performance", *The Leadership Quarterly*, Vol. 10, Iss. 3, pp. 345-373.

Bednár, P. et al. (2009) "Design of a Semantic Service Bus for Networked Enterprises" AMIF2009 - Ambient Intelligence Forum 2009 [online] http://web.tuke.sk/fei-cit/furdik/publik/amif09_spike.pdf

Biffl, S., Schatten, A. and Zoitl A. (2009) "Integration of heterogeneous engineering environment for the automation systems lifecycle", *Proceedings of 7th IEEE International Conference on Industrial Informatics*, INDIN2009, June 23-26, Cardiff, UK, pp.576-581, IEEE.

Buchanan, R. D. "The business value of enterprise architecture key initiative webinar", Gartner Webinar, Accessed from WWW on December 25, 2012 and available [online] http://www.gartner.com/it/content/744300/744317/businessvalueofeawebinar10_29_richardbuchanan.pdf

Burawoy, M. and Lukacs, J. (1985) "Mythologies of work: A comparison of firms in state socialism and advanced capitalism", *American Sociological Review*, Vol. 50, pp. 723-737.

Campos, J. E. and Pradhan, S. (1997) "Evaluating public expenditure management systems: an experimental methodology with an application to the Australia and New Zealand reforms", *Journal and Policy Analysis and Management*, 16, 423-445.

Cebon, P. (2010) "Corporate Governance and Innovation – like problems: Comparing innovation governance and agency theory", *Proceedings of the Pacific Rim Innovation Conference*, 21-22 January, University of Melbourne, Australia. Available [online] www.ipria.org/events/conf/.../Cebon%20Governance%201.0.pptx

Chappell, D. A. (2004) *Enterprise Service Bus: Theory in Practice*, First Edition. O' Reilly Media Inc., USA.

Chen, A. (2009/2010) *A Multi-Dimensional Compositional Approach for Business Process Semantic Engineering*, A Doctoral Thesis, Thesis No, 4192, Submitted to Faculty of Sciences, University of Geneva, Geneva.

Cheng and Krumwiede (2012) "The role of service innovation in the market orientation – new service performance linkage", *Technovation*, Vol. 32, Iss.7-8, Pages 487-497.

Desloges, C. and Mornan, B. (2006) "Benefits Realization: Government of Canada Experience", A presentation to the OECD, 6 February, E-Government Expert Meeting: Cost and Benefit Analysis, Paris, France.

Erradi, A. et. al. (2005) "Designing Reusable Services: An Experimental Perspective for the Securities Trading Domain" In Chung, J., Feuerlicht, G. and Webber, J. (Eds.), Brittenham, P. (2005), *Proceedings of the First International Workshops on Design of Service-Oriented Applications*, December, 2005, IBM Research Report, Amsterdam, The Netherlands.

Farneti, F. and Bestebreur, T. (2004) "Accountability in local governments: trends, initiatives and effects of the implementation of result-oriented accounting", *Proceedings of Annual conference of the European Group of Public Administration*, 1-4 September, Ljubljana, Slovenia.

Feldmann, M. (2004) *The significance of innovation, Rotman School of Management,* University of Toronto, Canada.

Gadrey, J., Gallouj, F. and Weinstein, O. (1995) "New models of innovation: how services benefit industry", *International Journal of Service Industry Manage*ment, Vol. 6 No. 3, pp. 4-16.

Gallaouj, F. (2002) *Innovation in the Service Economy: The New Wealth of Nations*, Edward Elgar Publishing, UK.

Gangopadhyay, P. and Chatterji, M. (2005) *Economics of Globalisation*, Ashgate Publishing.

Henderson, R. M. and Clark, K. B. (1990) "Architectural Innovation: The Reconfiguration of Existing Product technologies and the Failure of Established Firms", *Administrative Science Quarterly*, 35(1), pp. 9-30.

Gonzalez, L. and Ruggia, R. (2010) "Towards dynamic adaptation within an ESB-based service infrastructure layer" In *Proceedings of the 3rd International workshop on Monitoring, Adaptation and Beyond* (MONA '10), ACM, New York, NY, USA, pp. 40-47.

Hentschel, C. (2009) "Attribute-Domain Matrix: A Reverse Engineering Method for Innovation", *Creativity and Innovation Management*, Vol. 18, Iss. 2, Ps. 81-89.

Hofstede, G. (1999) "Problems Remain, But Theories will change: The Universal and the Specific in 21st-Century Global Management", *Organisational Dynamics*, summer, 34-43.

Maffei, S., Mager, B. and Sangiorgi, D. (2005) *Innovation through service design from research and theory to a network of practice. A User's driven perspective*, Joining Forces, University of Art and Design, Helsinki, Sep. 22-24, 2005.

IBM CCRA Team (2011) "Cloud Computing Reference Architecture: Cloud Gets Real", IBM [online] http://share.confex.com/share/117/webprogram/Session9261.html

Jacobsson, A. and Davidsson, P. (2006) "An Analysis of Plug and Play Business Software, Project E-Society: Building Bricks" In *Proceedings of IFIP International Federation for Information Processing*, Volume 226, pp. 31-43

Lane, J. A., Boehm, B., Bolas, M., Madni, A. and Turner, R. (2010) "Critical Success Factors for Rapid, Innovative Solutions" In Münch, J., Yang, Y. and Schäfer W. (Eds.), *ICSP 2010 Proceedings*, LNCS 6195, pp. 52–61, Springer-Verlag Berlin Heidelberg.

Lundvall, B. (Ed.), 1992, *National Systems of Innovation*, London, Pinters Publishers.

Manasharamani, V. (2005) *Towards a theory of service innovation: An Inductive Case Study Approach to evaluating the Uniqueness of Services*, Master Thesis, Submitted to A. P. Sloan School of Management, Massachusetts Institute of technology, USA.

Mohan, C. (2003), "Transaction Processing and Distributed Computing in the Internet Age", A Power Point Presentation done on March, 16, 2003 [online] https://www.qbic.almaden.ibm.com/u/mohan/TPandDCinInternetAge.pdf

Neuberger, E. (1971) "Chapter 2: Classifying Economic Systems Excerpted part from Comparative Economic Systems in Perspectives in Economics" In Alan A. Brown, Egon Neuberger and Lacolm Palmatier (Eds.), *Economists Look at their fields of study*, McGraw-Hill Book Company, New York, pp. 252-266.

Occello, A. et. al. (2007) "Making Domain-Specific Models Collaborate" *In 7th OOPSLA Workshop on Domain-Specific Modeling* (DSM'07), October 21-22, Montréal, Canada, pp. 79-86.

Orlikowski, W. J. (1991) "Radical and incremental innovations in systems development: An empirical investigation of CASE tools", CISR WP No. 221, Sloan WP No. 3283, Centre for Information Systems Research, Sloan School of Management, MIT, USA.

Methodologies Corporation, "Chief Principles of Service-Oriented Modeling", [online] http://www.modelingconcepts.com/pdf/Strategy_and_Approach.pdf

Offermann, P., Hoffmann, M. and Bub, U. (2009) "Benefits of SOA: Evaluation of an Implemented Scenario against Alternative Architectures", *Proceedings of 13th Enterprise Distributed Object Computing Conference Workshops*, EDOCW 2009, pp. 352-359, IEEE

Porter, M. (1990) *The competitive advantage of Nations*, McMillan, London.

Ramadani V. and Gerguri S. (2011) "Innovation: Principles and Strategies", *Advances in Management*, Vol.4, (7): 7-12, Indora, India.

Ross, J., Weill, P. and Roberson, D. (2006) *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*, HBS Press.

Ross, J. W. (2007) "Enterprise Architecture as Strategy", Power Point pdf, Chief Architects Forum, Centre for Information Systems Research, MIT Sloan School of Management, USA [online] http://semanticommunity.info/@api/deki/files/6830/%3DJeanneRoss01082007.pdf

Sarkis, J., Presley, A. and Liles, D. H. (1995) "The management of technology within an enterprise engineering framework". *Computers and Industrial Engineering*, Vol. 28, Iss. 3, pp. 497-511.

Schuh et. al. (2008) "Designing Technology Intelligence Networks in the context of open innovation" [online] http://webintec.ceram.fr/euromot2008/conftool/uploads/358/1-EuroMOT_2008_ENGLISH_V13.pdf

Soley, R. (2000) "Model Driven Architecture", White paper, Object Management Group, pp. 1-12, Sprint (2004), Sprint's Heritage Innovation: Sprint Business Mobility Framework, available [online] http://www.esri.com/industries/locationservices/docs/6_sprint.pdf

Spohrer, J., et. al. (2007) "Steps toward a Science of Service Systems", Vol. 40, Iss. 1, *IEEE Computer Society*, p. 71-77,

UNPAN000760PDF (1995) "Financial Management for Improved Public Management and Development", Twelfth Meeting Of Experts on the United Nations Programme in Public Administration and Finance, 31 July-11 August 1995, New York.

Veland, R and Shqipe, G. (2010) "The Impact of Innovation into the Economic Growth", PRA Paper 22270, University Library of Munich, Germany.

Veraganti, R. (2008) "Design, Meanings and Radical Innovation: A Met model and Research Agenda", *Journal of Product and Innovation Management*, Vol. 2 Iss. 5, pp. 436-456.

Wagter, R. et. al. (2005) *Dynamic Enterprise Architecture: How to make it work?*, Sogeti, John Wiley and Sons, p. 257 pages

Wiki SOA, "Service Oriented Architecture", [online], http://en.wikipedia.org/wiki/Service-oriented_architecture

Wheelwright, S. C. and Clark, K. B. (1993) *Managing New Product and Process Development: Text and Cases*, Harvard Business School, The Free Press, New York, NY.

Xu, Q. et. al. (2007) "Total Innovation Management: a novel paradigm of innovation management in the 21st century" *The Journal of Technology Transfer*, Vol. 32 No. 1-2, p. 9-25, Springer Publication.

Zaipul, A., "Total Innovation Management, A new paradigm and innovation management", A Power Point Presentation at Institute of Product Design & Manufacturing, (IPROM) Universiti Kuala Lumpur [online] http://zaipul.wikispaces.com/file/view/Total+Innovation+Management.PPT

A Resource-Based View Model in Achieving Entrepreneurial Innovation for Canadian Universities

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Abstract: Entrepreneurial universities have emerged as a consequence of survival in a global competitive environment. It is for this reason innovation becomes so important within the context of entrepreneurship. The principal aim of this paper is to discuss how well entrepreneurial innovation could be applied and produce significant and sustainable results in Canadian Universities. This is attempted via the implementation of a resource-based view approach which allows for specific strategic dimensions to be investigated. Methodology-wise the paper relies upon a qualitative research approach that includes interviews with university students and members of staff as well as secondary data regarding development of entrepreneurial activity and innovation within universities in Canada. It is anticipated that a quantitative approach could be used for a follow-up work which can test capacity for generalisation of this paper's findings. Current research outcomes verify that Canadian universities could support technology and knowledge transfer which can be potentially useful for industry plus that entrepreneurial innovation is increasingly integrated in their culture.

Keywords: entrepreneurial innovation, resource-based view approach, Canadian Universities

1. Introduction

Entrepreneurial universities have emerged as a consequence of surviving in a global competitive environment. In this respect, universities have been experimenting with a series of cultural, educational, institutional and legislative challenges (Guerrero and Urbano, 2012). Moreover, it is the creative and innovative side of entrepreneurship that attracts students today in taking relevant university courses with the intention to start their own business at some point in the future (Hamidi et al, 2008). At the end of the day, innovation can contribute to growth, competitive advantage and the possibility of leapfrogging competition (Lynch, 2012).

This paper investigates the notion of entrepreneurial innovation and how it applies to the context of Canadian universities. It is an initial attempt to utilise a strategy-based theoretical tool, the resource-based view approach in investigating and explaining innovation with regard to entrepreneurial activities at university level. The reason behind this attempt lies upon the desire to see how entrepreneurship can align with a traditional area of management, as strategy is and produce useful outcomes for a core policy area, the area of higher education.

2. Entrepreneurial innovation

It has been widely accepted that an entrepreneurial society needs knowledge-based entrepreneurship in order to enforce economic growth, employment creation and competitiveness for the context this knowledge applies (Guerrero and Urbano, 2012). To this extent, educational institutions and specifically universities have placed important emphasis on the value of knowledge on entrepreneurship and this is evident by the growing interest on entrepreneurship courses (Aldrich and Yang, 2012). Higher education institutions worldwide, in particular the ones in the Western countries, have gone a long way regarding the type and quality of education they have been offering on entrepreneurship. It seems that there is need to go well beyond learning. This would lead to a process whereby knowledge and understanding are developed via the transformation of experience within a realistic environment (Apostolakis, 2011).

In this respect, entrepreneurial universities could become a tool that not only provides a workforce and added value but also improves the participating individual's values and attitudes (Guerrero and Urbano, 2012). Having said this, university activities such as conduct of research need to be closer defined in relation to industry requirements in order to reflect and enable academics to engage with other sectors (especially the private one) in new ways (Boardman, 2009). Someone would also add that while knowledge-based entrepreneurship can include corporate, e-learning and human capital

management it is also very possible to include other opportunities in education such as how well lessons from previous experiences can be utilised in a way that is beneficial for these universities (Sandler, 2010). In this respect, innovation in entrepreneurship is an important area that needs to be explored further.

In attempting to define entrepreneurial innovation Hindle (2009: 75) contends that "*innovation is the combination of an intensive process and an entrepreneurial process to create new economic value for defined stakeholders*". Moreover, he believes that most definition issues with innovation and entrepreneurship are "correctable" because innovation is a dual process: it is about invention – the creation or discovery of new knowledge – and how this can be implemented. Further on, with regard to implementation of this entrepreneurial type of innovation recent research in academic and employee entrepreneurship has identified the key role of knowledge spillovers in the formation of new ventures and subsequent growth of industries and regions (Agarwal *et al*, 2007). It seems as if innovation although not easy to be defined remains a critical educational element in promoting entrepreneurship.

Snadler (2010) argues that universities are amongst the most successful organisations in providing entrepreneurial education in a distinct and rigorous way reflecting real-life needs as well. Perhaps the most critical factors that one could claim refer to attitudes towards entrepreneurship that are developed amongst academics and students. The principle explanation for this is that university constitutes a unique entity and its attitudes against entrepreneurship are defined by a number of factors e.g. type of education, teaching methodologies, role models and reward systems (Guerrero and Urbano, 2012).

The question then that comes up is: What sort of theoretical approach is necessary in order to establish development of entrepreneurial innovation within a university context? The aim of the next section attempts to answer this question: to shed light on which might be a preferable approach appropriate for the occasion. A resource-based view is qualified in taking this explanatory role, as it can be seen below.

3. A resource-based view model for entrepreneurial innovation

System perspectives on organisational resources recognise that resources are normally incorporated in a system of assorted resources and that the contribution of a resource to creation of value depends on the rest of them in the same system (Sanchez, 2003). Additionally, the strategy field recognises the significant influence of organisational characteristics on performance. This recognition is incorporated in what it is called "the resource-based view" of an organisation's strategy. This is a renewed version of a focus on the so-called idiosyncratic characteristics of an organisation that contribute to its competitive advantage (Nham and Hoang, 2011; Warren, 2008). According to Barney and Hesterly (2012: 84) resource-based view is "*a model of firm performance that focuses on the resources and capabilities controlled by a firm as sources of competitive advantage*". In this context, resources are defined as all those tangible and intangible assets which are controlled by an organisation and utilised for its strategic purposes. In addition, capabilities can be defined as the part of these resources that can be used in order for the organisation to take full advantage of its overall resources. Moreover, Rumelt (2011) asserts that there are exogenous changes that can drive the performance of an organisation normally by use of innovation. This consists of exploitation of a wave of change which normally establishes new grounds for the organisation's performance. There has been a series of reasons that explain the development of the resource-based view. Lynch (2012) for example refers to the disturbing organisational performance that couldn't align with the applicability of strategy approaches towards achievement of competitive advantage. He emphasises on all these factors than keep an organisation at an individual company level rather than being depended on the corporate level or on the cyclicality of the industry. Another major issue required to be explained is the ability by an organisation to identify these resources that can offer a return potentially linked with exploiting the firm's resources and capabilities. The VRIO framework has been developed in order to question each source and define its validity. In answering this question it is necessary to answer the questions about rarity, imitation and organisational capability as elements that indicate operation by an organisation in such a manner that it could exploit the full potential of its resources (Barney and Hesterly, 2012; Lynch, 2012; Nham and Hoang, 2011). In Barney's analysis an organisation's resources should meet the above mentioned conditions in order to sustain its competitive advantage:

- Organisational resources must be valuable and strategically useful in a way that can be used to exploit opportunities; they can also provide other qualities such as lower cost or differentiation in products or services;
- They must be rare in the sense that they are not commonly possessed by competing organisations; this would mean that this organisation can generate either superior margins or superior sales volumes;
- Organisational resources must be imperfectly imitable by competitor organisations this meaning that they have been created or acquired via unique conditions; in practical terms this would mean an as long as possible rent stream accruing to the resource;
- Organisational resources must not be replaceable by this meaning that no equivalent valuable, rare, and imperfectly imitable resources are available that could perhaps be used instead of this organisation's resources (Barney and Hesterly, 2012; Sanchez, 2003).

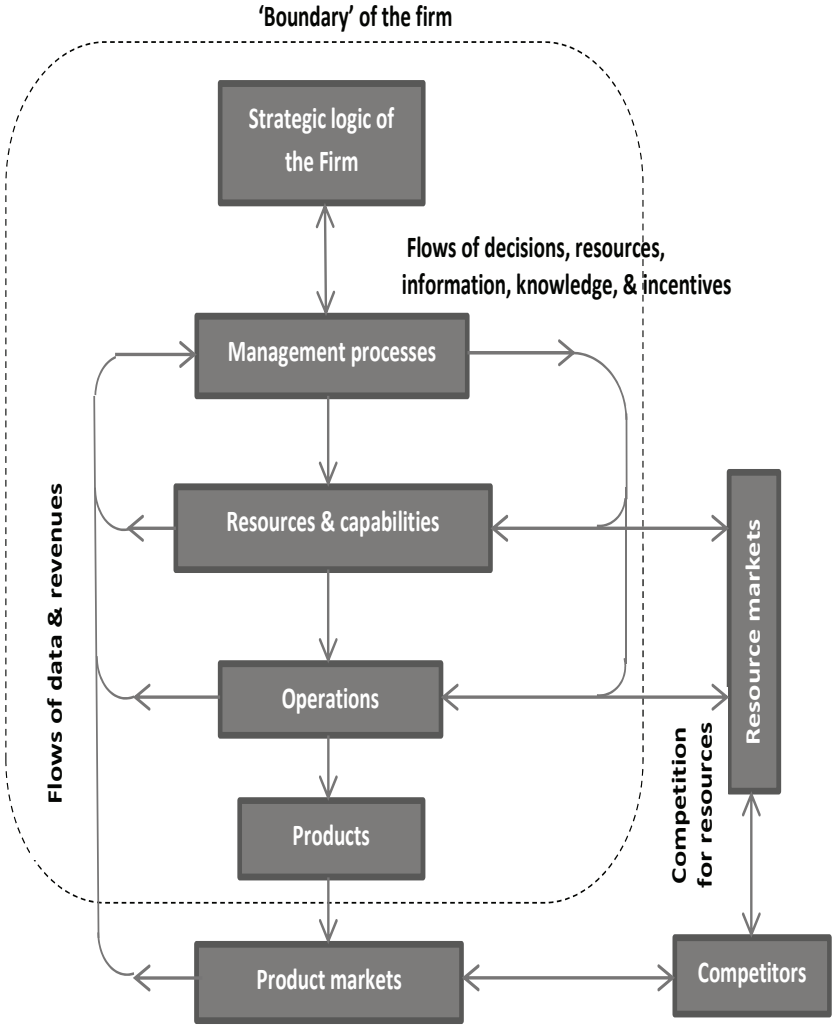
Attempting to complete the usefulness of the resource-based view approach someone would regard it as representing the strengths and weaknesses of an organisation. In supplementary way, the external environment (industry, local society, etc) could perhaps play the space for forming opportunities and threats for the organisation. In this respect, an informal environment of a SWOT analysis could perhaps be formed (Nham and Hoang, 2011). In summarising this part of the paper, resource-based view primarily seeks to emphasise that a possession of strategically useful, heterogenous, and not replicated by competitors resources constitutes the resource position of the firm among rivalry firms (Wernerfelt, 1984). Having said that, living in times of 'destructive mutations', when organisations have a relatively easy access to generic technologies, knowledge base and demand opportunities for companies to hold unique resources within a firm's internal boundaries are limited. As a result, the effective use of strategic, but not core, resources opens up an alternative ways for organisations to be distinctive (Sanchez, 2003).

Considering the resource-based view approach as a focal point, Sanchez (2003) argues that an open system of resource stocks and flows would support efficient leverage of an organisation's capabilities through the convergence and ongoing interaction among resources, capabilities and control principles. This system refers primarily to management processes used including determination on how an organisation regards opportunities and threats from both its internal and external environments. In this respect, management processes drive the building up of and leveraging of resources and capabilities, which in return affect creation and sustainability of an organisation's operations and product. In essence these processes determine achievement of competitive advantage (Figure 1). There are two particular aspects that interest this paper: a) the way resources are embedded in the system of an organisation especially their link with other resources and how they contribute to creating competitive advantage; b) how these resources affect management processes within the organisation such as decisions about their allocation in completing particular task or the manner these decisions are communicated in the context of an organisation.

How this model could then support creation of entrepreneurial innovation in a specific organisational context? Bhide (2003) argues that planning and a comprehensive analytic approach are terms not always known to all entrepreneurs. Although there are some astute entrepreneurs out there who spend a lot of time in analysing and strategising extensively this doesn't constitute the norm. This is because entrepreneurs believe that initial analyses should be tested and modified where possible. The other reason is that by the time an opportunity is investigated fully, it may no longer exist. Finally, it is lack of resources that makes entrepreneurs unable in many cases to integrate analysis into action and vice versa. It is this lack (or not) of resources that interests this paper and to what extent it can be linked and support innovation in a specified implementation context. Having said this, it could be argued that both entrepreneurship and the resource-based view adopt the same unit of analysis – the resource – taking into account the different expressions of this resource according to the organisation in consideration (Alvarez and Busenitz, 2008; Akio, 2005).

In this context, the role of knowledge and technology needs to be emphasised as a means of tools that are fed by an organisation's resources. According to Easterby-Smith and Prieto (2008) knowledge is provided as a key organisational source and therefore being supported by technology it contributes to development of an organisation's competitive advantage. In this way, Lynch (2012) adds that the role of knowledge and technology needs to be clarified and explained in a way that can sustain this advantage too. In a more specified manner, Parker (2010) argues that knowledge

spillovers can generate positive effects for entrepreneurs although this might create some difficulties to the process of knowledge creation to the organisational bodies that generate them.



Source: Sanchez, 2003, p. 362.

Figure 1: View of the organisation as an "open system"

To this extent, entrepreneurial innovation derives as a consequence of exploring heterogeneous resources by an entrepreneur. As it was mentioned above it is logical to represent entrepreneurship within the resource-based view approach (Akio, 2005). Entrepreneurial innovation then can be defined in this context as "*the way to create the rents as a return to an entrepreneur's discovery of new combinations as disturbing a process of equilibrium* [within the factor markets]" (ibid: 140).There are two elements for investigation regarding utilisation of entrepreneurial innovation: its purpose of implementation to particular contexts as well as potential benefits of this utilisation. Looking at the university sector Boardman (2009) argues that there is strong evidence of financial support (a significant part of it governmental) which facilitates knowledge integration and research capacity development relying upon a resource-based view approach. The latter reflects on enhanced levels of the private sector involvement that offer the opportunity to academia in engaging with private companies in entrepreneurial new ways. And it is not only this because as Guerrero and Urbano (2012) argue universities of high creativity calibre are able to provide a workforce and value added based on knowledge and innovation transfer but they can also support individual's values and attitudes towards these issues.

Lynch (2012) provides a guideline of specific action an organisation should seek in order to achieve innovation. It is argued that a modified version of this list could find its implementation in the context of this paper. Nevertheless, universities are complex organisations enough to reject being helped by any approach which could improve their operation, especially with regard such an important factor like

entrepreneurial innovation. An adapted version of this general guideline that would encourage the innovation process is presented, as it follows:

- Question the current practices about innovation at a market and society levels;
- Consider carefully the purpose served by the current range of services offered by the organisation;
- Explore external timing and market opportunities;
- Set out competitor organisations' weaknesses;
- Deliver new and better value for money;
- Search wide and far;
- Seek to challenge conventional wisdom (Lynch, 2012: 291-292).

What follows then is the implementation of a resource-based view approach to the context of the Canadian higher education' sector with the aim to find out about the possibility of how entrepreneurial innovation can flourish.

4. Methodology

Methodology-wise the paper was based on a combination of collection of primary and secondary data. The research methods that were encountered were twofold: semi-structured interviews and secondary data. This triangulation approach could make justice to the point of view made by Marshall and Rossman (1999) that such an approach can enhance generalisation of data. The semi-structured interviews were conducted within a time span of about 5 years and reflected on the progress of entrepreneurial innovation in a particular Canadian university. In addition, numerical data from 7 surveys on the progress of a range of Canadian universities regarding certain questions were used. As the data didn't indicate any evidence of statistical analysis their usefulness is primarily indicative. This is not to say that the findings lacked of validity quite the opposite. As this is the first paper on resource-based view and entrepreneurship it is anticipated that more research will be done on this particular topic. As Denscombe (2010) argues quantitative data give the research an aura of scientific respectability.

In terms of limitations, it could be argued that it was the tight time schedule for writing up this paper that has created certain issues of collected data with no focus on specific issues that would have needed further investigation. To this extent, there is significant scope for the paper to be expanded research-wise with the aim to produce findings that could specifically answer all the uncertainties of implementing entrepreneurial innovation at the university level.

5. Entrepreneurial innovation in Canadian Universities

There are an increasing number of indications that entrepreneurship is becoming a vital component of existence for today's Canadian universities. According to Menzies (2009:7):

- Over the 5 years between 2004 to 2009 Entrepreneurship courses at universities across Canada became increasingly popular, with a 33% growth rate;
- The number of students taking Entrepreneurship courses has increased by 27% since 2004;
- The national growth rate for undergraduate Entrepreneurship courses between 1979 and 1999 was 444%. From 1999 to 2004, the growth rate was 9%, and for 2004 to 2009 was 22%;
- The national growth rate for graduate Entrepreneurship courses between 1979 and 1999 was 232%. From 1999 to 2004, the growth rate was 5%, and for 2004 to 2009 was 56%.

This increase in interest has to do with the development of a different mentality amongst university staff and students, which supports entrepreneurial activities as a source of innovation and creativity. One of the authors had the opportunity to visit a particular university in the eastern part of Canada in 2007 and experience a unique situation in which students from different schools not only declared their belief on the qualities of entrepreneurship but they were taking specific action in creating student-focused incubators (from observations of one of the authors).

Table 1 confirms the demand for entrepreneurship as the only 72 entrepreneurship courses of 1979 went to be a staggering 466 in 2009. To this extent the issue for resources becomes paramount for the higher education institutions of Canada and this could be highlighted via a framework that would

indicate the necessity of some factors that could be vital for further progress of entrepreneurial innovation (Table 2). Having said this, we should bear in mind that Canadian universities do not exist to act as entrepreneurship drivers but primarily to teach entrepreneurship, something that has been carried out with various degrees of success. In this context though, one would notice that Canadian universities try not just to "teach entrepreneurship" only but to a certain degree to "do entrepreneurship", or "support entrepreneurship" as a priority (Wells, 2012: 36).

Table 1: Number of entrepreneurship courses at Canadian Universities: 1979, 1999, 2004 and 2009

Course Type	1979	1999	20 year Increase	1999	2004	5 Year Increase	2004	2009	5 Year Increase
Undergraduate	41	223	444%	223	243	9%	243	296	22%
Graduate	31	103	232%	103	108	5%	108	168	56%
Total	72	326	353%	326	351	8%	351	466	33%

Source: Menzies, 2009, p. 17.

Table 2: A resource-based view approach in achieving entrepreneurial innovation at the HE level

	Attributes of Resource-based View Approach Applied in the University sector
PURPOSE OF IMPLEMENTATION	
Unit of analysis	Resources and capabilities
Analysis for innovation	Specific resources that are used
Criterion for innovation	Observe the creation of value
BENEFITS OF IMPLEMENTATION	
Desired effect on the organisation	Development of technology and knowledge transfer
Impact on management	Strategic decision Communication process to university staff and students
Risks	Loss of critical skills and capabilities
Competitive advantage	Achievement

6. Discussion

The aim of this investigation is to analyse and interpret the research findings in a manner that can establish existence of entrepreneurial innovation in the context of Canadian Universities. The information in the previous section indicates the fact that Canadian Universities have taken very important steps in promoting entrepreneurial innovation by attempting to establish a strong entrepreneurial culture at university level.

Table 3 presents very clear numerical evidence about the workloads, expenditure, income, inventions, patent applications and start-ups that were used in a span of years between 1996 and 2002 (Association of University Technology Managers, 1997 up until 2004).There is a steady progress of increase in numbers which indicates that entrepreneurial innovation has been supported in a in a very clear manner and this could well be the case for the following years to date (ibid). This is reflected in the words of a senior academic in a university of eastern Canada who argues that:

Table 3: Indicators and investment of Canadian Universities that enhances entrepreneurial innovation

Elements	1996	1997	1998	1999	2000	2001	2002
Professional FTEs	538.99	477.42	522.60	555.95	634	*	*
Support staff FTEs	391.88	509.44	540.47	598.07	669	*	*
*Research Expenditure - Industrial Sources***	184,630	284,886	270,589	289,634	364,899	417,704	405,401
*Research Expenditure - Federal Government***	538,550	710,840	763,824	787,773	941,993	1,322,156	1,397,216
*Licences Income Received***	16,124	15,709	19,280	20,328	36,904	*.	*

Elements	1996	1997	1998	1999	2000	2001	2002
Invention Disclosure	10,178	11,303	11,784	12,324	13,032	*	*
Total Patent Applications	4,733	6,629	7,714	8,802	9,925	*	*
Start-ups	248	261	285	280	252	*	*

Source: The Association of University Technology Managers (years 1997 up until 2004).

*****The value needed was not available due to distribution of values per university and not as a sum.

******Thousands of Canadian dollars.

> *We spend a lot of time in the first introductory entrepreneurship course on creativity and innovation, just getting them thinking about possibilities. I like to see an emphasis on idea generation and exploring their [students] creativity and their ability to think about how things whether they are processes or approaches or whatever may be modified and adaptive hence a focus on innovation.*
>
> *(Senior academic at a university of eastern Canada)*

This increasing culture is so evident that:

> *Students in one of the years in high school running a company, their own company with the view to make money. Our students go to the classrooms in high schools to help them with this company programme. We also have them come here at the University so that's all part of increasing their exposure to what's going on in the Business School. And there isn't all about, you know, finance and accounting. There an entrepreneurship culture here in which they can participate.*
>
> *(The dean of the business school at a university of eastern Canada)*

It could be argued that this University has preferred a more commercial approach, which derived from its attitude towards entrepreneurship. This was clearly stated in the website of its centre on entrepreneurship that "provides aspiring entrepreneurs with counselling advice and direction on a business idea to the point of business start-up" (A University in Eastern Canada, 2008). However, in the same website it is also stated that this centre is "open to all members of the university community including undergraduate and graduate students, faculty, staff, and alumni".

Additionally, that there was evidence of willingness to see entrepreneurship as affecting the local community in a positive way in the long run, as one of the young entrepreneurs at their incubator event suggested:

> *So I think that just economic factors have forced people to be innovative to be entrepreneurial to create opportunities for themselves here. Projects like Launch Pad allows the next generation, our generation to have another alternative in building a future here instead of going to the mainland or another place. Anytime you can keep somebody here, a young person that is going to build a business here and employ other people then you build a boost for everyone.*
>
> *(Young entrepreneur at a Canadian University)*

This university has already reached a well defined state of entrepreneurial orientation culture. This is reflected in the university's curriculum. For example, the Faculty of Business created the position of the Chair in Youth-Focused Technological Entrepreneurship, which encompasses responsibilities of conducting relevant research, creating new ventures; and support entrepreneurship within the subject areas of business, engineering, science and medicine. In addition, their entrepreneurship institute introduced a series of initiatives such as: the Entrepreneur-in-Residence initiative; scholarships and awards to recognise entrepreneurial endeavours, business plans, etc; In this respect, it would be fair to claim that this Canadian university has had well established innovation, proactiveness and risk taking approaches.

In summary then and answering the question about how far how entrepreneurial innovation exists in Canadian universities this could be answered as it is presented in Table 4.

Table 4: The resource-based view and entrepreneurial innovation at Canadian Universities

	Attributes of Resource-based View Approach Applied in the University sector	Canadian Universities
PURPOSE OF IMPLEMENTATION		
Unit of analysis	Resources and capabilities	Heavy investment on entrepreneurial activities
Analysis for innovation	Specific resources that are used	Heavy investment on items of innovation such as patents, licences, etc
Criterion for innovation	Observe the creation of value	Increasing evidence of innovative schemes on entrepreneurship that affects primarily the teaching of the subject area
BENEFITS OF IMPLEMENTATION		
Desired effect on the organisation	Development of technology and knowledge transfer	Evidently both in educational and co-curricular activities
Impact on management	Strategic decision	University governance reflects on entrepreneurial innovation culture
Risks	Loss of critical skills and capabilities	Nothing that does warrant lack of risk
Competitive advantage	Achievement	Yes to the extent that promotes a new phase for entrepreneurship

7. Conclusions

It seems that there is enough evidence even within the remit of this initial paper to argue that Canadian universities are aspired to and attempt quite significantly to promote entrepreneurial innovation. This could be argued that comes up the following steps (by utilising the VRIO framework):

- Organisational resources are considerably used in promoting entrepreneurial innovation both at a nationwide university level like with the case of licensing or specifically at the example of the business school in the eastern part of Canada;
- These resources can be considered as rare because they reflect on a considerable generation of efforts both at national and local level, which gives capacity for establishing a unique identity not commonly shared by other organisations;
- Each university seems to be different therefore there is uniqueness in creation of conditions that promote entrepreneurial innovation. This makes their resources imperfectly imitable by competitor organisations;
- All the elements above make each university an independent case that fits within the context of an increasing trend in promoting entrepreneurial innovation.

The last point to be made for this paper is a promise: that the topic is so rich in research terms and policy consequences so a second paper will follow shortly.

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References

Agarwal, R., Audretsch, D. and Sarkar, M.B. (2007) "The Process of creative construction: knowledge spillovers, entrepreneurship and economic growth", *Strategic Entrepreneurship Journal* Vol.1, Issue 3-4: 263–286.

Akio, T. (2005) "The Critical Assessment of the Resource-Based View of Strategic Management: The Source of Heterogeneity of the Firm", *Ritsumeikan International Affairs*, Vol. 3, pp. 125-150.

Alvarez, S.A. and Busenitz, L.W. (2008) "The entrepreneurship of resource-based theory", *Journal of Management*, Vol. 27, pp. 755-775.

Aldrich, H.E. and Yang, T. (2012) "Lost in translation: Cultural codes are not blueprints", *Strategic Entrepreneurship Journal*, Vol. 6, No.1, pp. 1-17.

Apostolakis, C. (2011) "The role of higher education in enhancing social entrepreneurship", *International Journal of Social Entrepreneurship and Innovation*, Vol. 1, No. 2, pp. 124-137.
Association of University Technology Managers (1997 up until 2004) *Licensing Survey Diskette* Association of University Techonology Managers Inc.
Barney, J.B. and Hesterly, W.S. (2012) *Strategic Management and Competitive Advantage, Concepts and Cases*, Pearson Education, Boston.
Bhide, A (2003) "How entrepreneurs craft strategies that work". In H. Mintzberg, J. Lampel, J.B. Quinn and S. Ghoshal (eds.), *The Strategy Process – Concepts, Contexts, Cases* Pearson Education Limited, Harlow.
Boardman, P.C. (2009) "Government centrality to university-industry interactions: University research centers and the industry involvement of academic researchers", *Research Policy*, Vol. 38, pp. 1505-1516.
Bowman, C. and Ambrosini, V. (2003) "How the Resource-based and the Dynamic Capability Views of the Firm Inform Corporate-level Strategy", *British Journal of Management*, Vol. 14, pp. 289-303.
Denscombe, M. (2010) *The Good Research Guide for small-scale social research projects*, Open University Press, Maidenhead.
Easterby-Smith, M. and Prieto, I.M. (2008) "Dynamic capabilities and knowledge management: an integrative role for learning?", *British Journal of Management*, Vol. 19, pp. 235-249.
Guerrero, M. and Urbano, D. (2012) "The development of an entrepreneurial university", *Journal of Technology Transfer*, Vol. 37, No. 1, pp. 43-74.
Hamidi D.Y., Wennberg, K. and Berglund, H. (2008) "Creativity in entrepreneurship education", *Journal of Small Business and Enterprise Development*, Vol. 15, No. 2, pp. 304-320.
Hindle, K. (2009) "The relationship between innovation and entrepreneurship: easy definition, hard policy", *AGSE Swinburne University* [accessed on 18 April 2012] <URL: http://www.swinburne.edu.au/lib/ir/onlineconferences/agse2009/000173.pdf>.
Lynch, R. (2012) *Strategic Management*, Pearson Education Limited, Harlow.
Marshall, C. and Rossman, G.B. (1999) *Designing qualitative research*, SAGE Publications, Thousand Oaks.
Menzies, T.V. (2009) *Entrepreneurship and the Canadian Universities* [accessed on 21 June 2012] <URL: http://www.brocku.ca/entship>.
Nham, P.T. and Hoang, V.H. (2011) "Building an integrated framework of strategic management theories to explain performance of firm in one industry", *Journal of Global Management Research*.
Parker, S. (2010) "A predator-prey model of knowledge spillovers and entrepreneurship", *Strategic Entrepreneurship Journal*, Vol. 4, Issue 4, pp. 307-322.
Rumelt, R. (2011) *Good strategy, bad strategy*, Profile Books Ltd., London.
Sandler, M.R. (2010) *Social Entrepreneurship in Education – Private Ventures for the Public Good*, Rowman & Littlefield Education, Plymouth.
Sanchez, R. (2003) "Analysing internal and competitor competences – Resources, capabilities, and management processes". In D.O. Faulkner and A. Campbell (eds.), *The Oxford Handbook of Strategy*, Oxford University Press, New York.
Warren, K. (2008) *Strategic Management Dynamics*, John Wiley & Sons, Ltd., Chichester.
Wells, J. (2012) "The role of Universities in Technology Entrepreneurship", *Technology Innovation Management Review* April 2012 [accessed on 21 June 2012] <URL: http://www.timreview.ca>.
Wernerfelt, B. (1984) A resource-based view of the firm, *Strategic Management Journal*, Vol.5, pp. 171-180.

Certifying Innovation: A Proposal for a Standard With Innovation Management System (IMS)

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Abstract: Today it's definitely known to everyone what Quality Management System is. A Quality Management System (QMS) is the set of all connected and interdependent activities that affect the quality of a process, a product or a service. Since the 80s the first Western companies, especially those Americans, started to realize the importance of the quality development for the success of an organization. It 's always in the 80s that the first of standards of the reference ISO, aimed to the quality were published. In 1987, in fact, the International Organization for Standardization adopted the British code BS 5750 and published what is now called ISO 9000 series of standards. First of all, a cultural evolution, and then a technological revolution, is the history of the quality. This important legacy in terms of know-how, best practices and experiences has been used by the Italian Association for the promotion and the enhancement of the Culture of the Technology Transfer (AICTT), to transfer the results obtained in the field of the quality to the field of the business innovation. For the first time in Italy, but also in Europe, we speak of IMS, Innovation Management System as a means of certification. The core of this certification, proposed in a innovative form by AICTT, is to detect firm's ability to innovate, but not with regard to certification of the innovation made ex post, that is still a novelty in the panorama of certification activities, but with reference to the firm's ability of quantification of the tangible and intangible assets (human capital, creativity, etc..), measured using a parametric method based on a proprietary panel of indicators that are not statically linked each others, and free of any document of structural heaviness replaced by a fully web-based platform, inserted in the circuit system of university-industry-bank. To this end, the AICTT has filed a trademark, CTE (Company Technology Efficiency), which puts companies in a certain class of efficiency (the same way as it does for appliances with respect to energy compliance) and based on this can aspire to a certain threshold of credit in the industrial research.

Keywords: certifying innovation, innovation management system, technology transfer, audit, efficiency

1. Brief notes on the association AICTT

On April 19, 2011, with an official deed, has been officially established in Naples headquarters of the National Association AICTT, for Italian TransferTechnologyCulture promotion. Following are already planning the constitutions of other federal offices in other regions of Italy.

The Italian TransferTechnologyCulture Association aims to promote, encourage and create the culture of technology transfer through the study, development and application of methodologies and techniques for organizational design, management and continuous improvement of activities related to innovation processes, products and services in different fields of reference.
Particularly, the Association:

- Promotes the understanding of the importance of technology transfer for the individual and collective welfare in industry, government agencies, schools, service sector, in the service industry and promotes the matching between universities, research centers and enterprises and institutions;
- Provides opportunities for members to study and exchange of experiences;
- Liaises with other associations that have similar purposes;
- Supports the training of all interested parties who perform professional activities in innovation and technology transfer.

To achieve these goals, the Association promotes and produces events (conferences, congresses, conferences, courses, seminars, meetings, etc..); ensures the dissemination of news, publications

and information; promotes any initiative aimed at stimulating the advancement of research, dissemination of knowledge and realization of applications in the fields of competence.

2. Role of AICTT in comparison to other institutions

In times of crisis, a strategy capable of governing two variables, that are often antithetical and competing each other, that is the duty to contain costs, especially those who were not primary, and the need to excel among the competitors in their industry field, may be to share assets, facilities and even human resources related to innovation. It's necessary to move the assets related to the competitiveness of business from key factors of innovation, which instead should be placed on a shared basis, to different parameters related to the final stages of the value chain as well as to the performance-management activities, such as communication, retention, promotion, quality of service, etc..

The sharing of research laboratories, for example, especially in geographical areas on which production chains insist or clusters of homogeneous firm can represent an opportunity, in a time in which, unfortunately, corporate survival strategies prevail, to continue to pursue strategic competitive advantages through an scale economy of costs related to activities, things and people with high added value, difficult to bear by the individual.

In this context it should be necessary to assist another combination that can fully realize the scenario in question. This condition is the need to have a so-called super technology partner, a research institution, a university, to support and continuously feed this hub of innovation in clusters and chains of slave business through iterative processes of technology transfer. This mechanism then triggers a virtuous cycle, once fully operational, the opportunity to enhance the research, in turn, constitute the technological offer of such a technology partner.

In figure 1 the role of AICTT in comparison to other institutions is described.

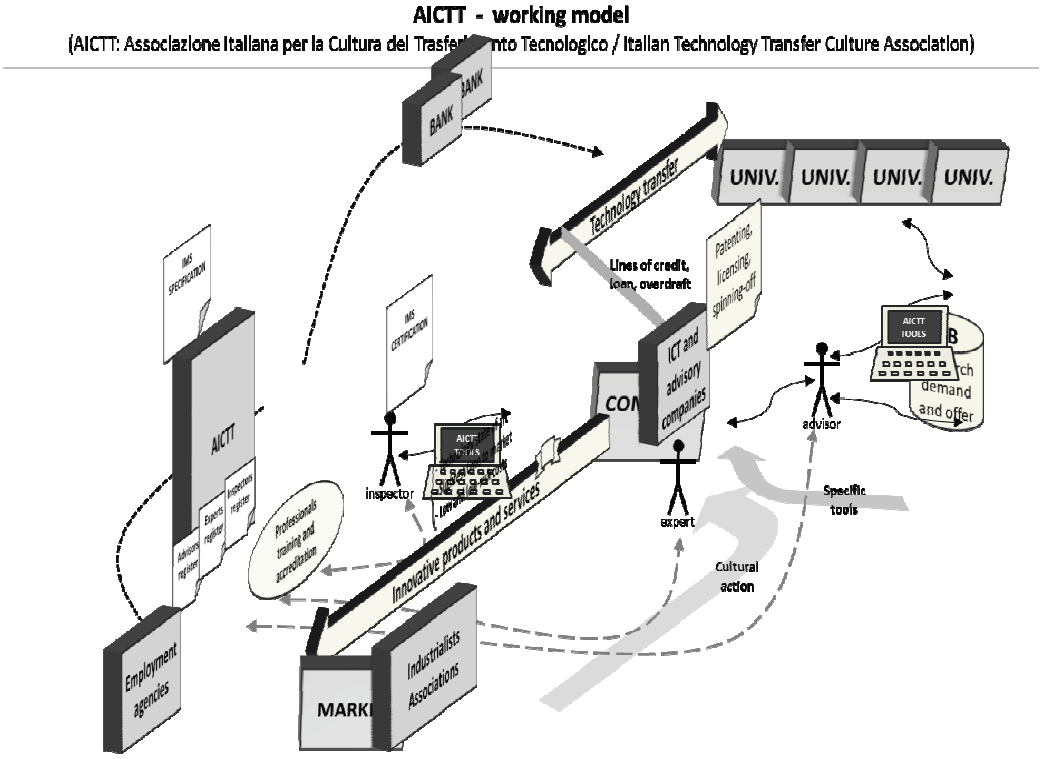


Figure 1: AICTT working model

3. The certification of IMS

3.1 Introduction and notes on the construction of the specification

The proposed IMS certification will certainly be a voluntary certification, and more precisely, a specification compliance to AICTT's procedures, since it does not drafted by any national or international body, but simply a document as proof that the organization complies with what is prescribed for her and implement behaviors that characterize the organization itself in the market as an organization oriented to innovation, continuously seeking to improve their products / services and their systems of production / supply, in order to respond to increasingly changing market demands, to customer's requirements, to changes to mandatory regulations, and to a more rational management of resources (financial, human, physical) and of her inside processes.

The concept of the specification proposed by AICTT has been based on the structure of the most famous voluntary certification, the UNI EN ISO 9001:2008, which is the certification of quality management system;of course quality and innovation are two closely related concepts, then it was considered for the assumptions on which to base the specification, to rely on what already has been excellently prepared by international organizations about the system of quality management (approach, documentation, responsibilities), the second part of the specification, however appears to be the most interesting, because the concept of the various processes of implementation / delivery of product / service of UNI EN ISO 9001:2008 has replaced the concept of the various phases that characterize the emergence of an innovation: from research of the possible areas of improvement, the definition of innovation to be made, the preparation of plans for technical and economic feasibility, implementing real innovation, test results and any corrections.

In addition, two appendices of the specification are themselves, and more specifically, objects of certification with reference to the staff's certification. These appendices are able to certify that the organization is responsible for the whole system of innovation management, and to certify who must determine the suitability or less of the management system for innovation organization, ie certifiers.

We note that in the specification, compliance with the terminology of the UNI EN ISO 9001:2008, the term organization is used to indicate companies of all types, sizes and sectors.

3.2 The specification of IMS

The specification is divided into the following parts:

- Purpose and Scope: defines the concept of innovation, the importance and purpose of having a system for managing innovation in an organization that wants to be competitive in the continuous guidance of a system for managing innovation ;
- Documentation: defines the types of documents be drawn up for a system of innovation management, and methods for their production, approval, storage, modification;
- Responsibilities: defines the responsibility for the policies, objectives and review management system innovation;
- Phases of the management system of innovation: they are defined and specified steps to be followed by the organization to implement its own internal innovation: the definition of the situation, the definition of the prospects for innovation, the feasibility (technical, economic financial and know-how), planning of activities and operations, measurement, analysis and improvement.

For each of these phases are listed in the records to be produced, what these records should contain, and the technical tools that the organization can use to establish them.

The phases of the management system of innovation have been considered to be cyclical in perspective: the state of departure, which analyzes an organization that wants to implement a new innovation process is simply the point at which the organization is arrived earlier in the development and implementation of innovation processes, and a new process of innovation can be seen even as rehabilitation and correction of the above, if he is found from the analysis did not proceed as planned.

Appendix A - Checklist of the management system for innovation: this Appendix includes the checklist to be used by auditors or by those want to test the system for managing innovation to establish the

organization's compliance with the principles of the specification itself; through this information to be included and questions to be answered for each of the following topics: Scope and prospectus, drafting and document control, accountability, and review objectives, checklists of the current status, identification of innovative lines, feasibility plan , planning and operational management, measurement analysis and improvement; any question the answer is required, as well as references to documents that attest to their veracity, and any known noncompliance

Appendix B - Certification of IMS responsible: this certification regards personnel, in the organization, that has to deal with the management system for innovation: are defined purpose and scope of the certification requirements required of the personal responsibility, the functions to be accomplished and the professional profile required to match; are finally described the verification procedures of the said characteristics;

Appendix C - Certification of auditors of management systems for innovation: Appendix C - this certification regards auditors of management systems for innovation: they must verify the IMS's compliance to the specification's requirements: are defined purpose and scope certification, personal requirements which must be fulfilled auditors, the functions to be accomplished and the professional profile required to match; are then described the verification procedures of the above characteristics.

4. "Core" activities to promote AICTT's certification

AICTT has as mission the promotion and dissemination of culture on technology transfer.

To start a virtuous circle of activities of mutual recognition of subjects involved in the chain of technology transfer, AICTT has launched a series of institutional relations.

4.1 Banking system

The research credit industry is certainly a "high-value service" added for Credit Institutions, however, is both a service to be provided with ample margins of safety related to the strength of the beneficiary. So far, this solidity is typically assessed by means of financial assets and liabilities. The certification proposal represents a survey tool focused specifically on the innovative capacity of business and hence the ability to capitalize on the funding received through the estimation of both tangible elements (for instance infrastructure for registration of innovations in time, or "facilities" for inventorying intelligent equipment acquired funds on design), and through "intangibles assets" (such as the identification of control parameters and disturbance to the innovation, or the assessment of the capital management Human indoor than outdoor Funds paid for advice).

4.2 Universities and research centers

Universities and Research Centers are the suppliers of the "product" on which the Innovation Management System acts.

4.3 Ministerial bodies and local authorities

The involvement of institutional bodies that will implement AICTT offers a double value. An internal value is relative to the opportunities for local authorities themselves to be certified in order to enhance its internal resources, which can lead to convergence of the different actions of "e-government" provided for the PA.

A second value is relative to the qualification of firms eligible for funding ad hoc innovation. Often, many funds of funds on innovation are directed to innovative companies, but then there isn't a criterion for qualification and selection of such subjects. The certificate in question could become pre-requisite to notice.

4.4 Training schools

Among the priority objectives of the proposed methodology, there is the institution of an accredited register, named AICTT-TUV (where TUV is a certification Body), where it's possible to register, after an appropriate training course, different profiles operating in the innovation and technology transfer fields; so that they can see recognized and codified in requirements their own knowledge as to check

up on corporate innovation, as to make an inspection for innovation, useful, for example, in ex-post audits of projects after financing.

This initiative is characterized by a strong social value in terms of impact on employment, producing new professional figures, accredited and recognized, that, so far, have often been requested but whose availability was approximate and not rigorous. An example is that the reference to these profiles is made inside of notices of funding, but these are still missing information about the requirements they must prove to posses.

In figure 2 the "core" activities to promote AICTT's certification are shown.

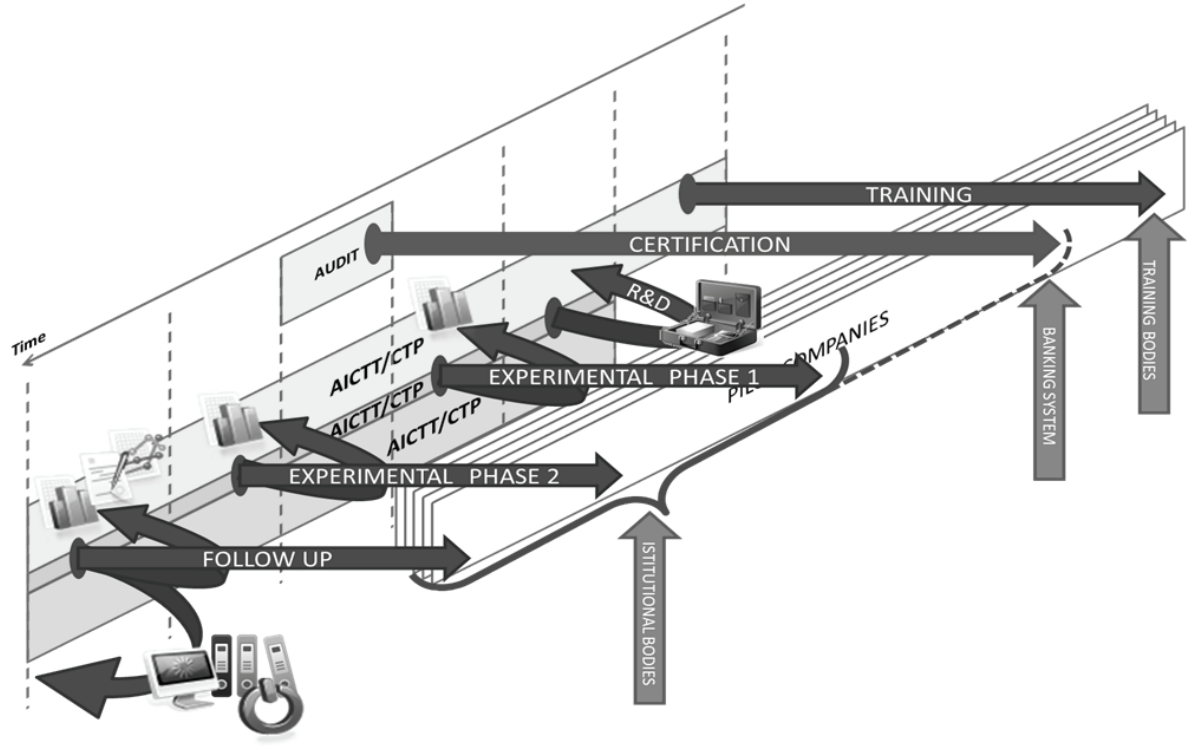


Figure 2: "Core" activities to promote AICTT's certification

5. The new concept of CTP, "company technology performance"

In an era where every year are produced more information and knowledge than have ever been produced throughout the history of mankind, and where it is even more difficult to select and enhance this volume of information and knowledge, the real meaning of " innovation "can have very different shades. At the same time, for every company committed to the market, the need to create value through innovation is configured more like a condition not a choice, and often as a prerequisite to survival rather than for the growth.

Be it manufacturing or service, it may change the object of innovation (new products or new services, new patents, new processes, or simply the generation of new needs, new ways of using products and services already consolidated), but not the centrality of innovation to define objectives across all sectors and at every class size of firms : costs reduction, improvement of the quality of products and services, capacity of acquire new customers and retain the existing ones, safeguard the welfare of their employees, to mention among these goals, the most immediate and well known ones, in the consulting business.

Large and small actors, of the productive economic system, have been facing, since several years, a scenario and an environment characterized by deep uncertainty, at the same time cause and effect of a severe recession economic and of a structural financial instability. This situation is widely led back, by many analysts, to a serious threat for many companies, making potentially unsustainable over time their market position and, sometimes, their survival.

However, in this critical scenario described above, a real opportunity of competitive advantage could be developed for those companies that can consolidate or gain market share through their ability to select, acquire and manage knowledge at lower costs, thus increasing their intellectual capital and generating new economic value.

These companies are those that can best be characterized by the index proposed by AICTT, CTP "Company Technology Performance", ie the ability to generate innovations (and hence to develop competitiveness) against low investments (as a result of actions taken to optimize business resources already present "in-house ") in: knowledge, research and development, CRM, training, patents, technology tools, consulting and supply.

Thus defined, the CTP index is therefore not a static measure, and does not represent, by far, the ability to innovate, but rather it is a dynamic quantity, which measures the sustainability of innovation. And in that sense, measure and evaluate the technical performance of a company can be a key to assessing the sustainability of tactical and strategic decisions for the consolidation, or the potential growth of the firm's market position.

The evaluation of the company technological performance is certainly a complex and delicate activity, infact, the CTP index is determined by the ability to increase, enhance, preserve and develop its intellectual capital, and to use it for the achievement of economic and financial purposes (for example, to negotiate access to credit, precisely on basis of an objective measure of sustainability of an investment in innovation).

The urgency to develop, validate and apply a methodology for assessing the technical performance of companies is due to the fact that many companies, and the aforementioned structural condition of the global economy represents a litmus test , are run by managers not aware of the intangible values and in these same organizations, the skills, best practices and information essential in making the policies of subsistence and development, are jealously guarded by individual employees or, even worse, from the occasional consultants. So, for these companies are configured too high and oversize costs of acquisition of knowledge, and are found, typically, the obvious difficulties in using the knowledge to generate economic value prior to their heritage of corporate knowledge becomes obsolete, together to the total inability to use these assets as leverage.

Consistent with the premises, the evaluation of CTP index is carried out in three key areas:

- Economics of Knowledge: the ability to turn knowledge into results of corporate income;
- Knowledge Engineering: ability to manage corporate knowledge (which means remove it, clean it, structure it, encode it, store it, distribute it, regenerate it, in a continuous cycle and permanent);
- Finance Knowledge: Ability to organize, measure, document and convert the asset value in corporate knowledge (intellectual capital, which is made of relations, human resources and equipment resources, the value of the production cycle, both in manufacturing than in services).

For each of the three lines, the measure of the Company Technological Performance is conducted through the recognition of a schedule of key performance indicators (KPI) objective and verifiable.

Valued all indexes, it is possible to position the company about technological performance in terms of overall score and scores shared for indicators of a specific director, identifying gaps and emerging corrective actions.

One of the possible methods of synthetic representation of the CTP index is that used for energy efficiency subsisting, between the two indexes, an analogy much deeper rather than only semantics.

6. Benefits of certification proposal

Finally and very briefly, the certification in question is intended to provide a series of intrinsic and extrinsic benefits to all players in the process of innovation.

6.1 Advantages for companies

Companies that decide to adopt a voluntary system of certification as proposed, as a first intrinsic advantage, have the opportunity to optimize their internal resources related to the innovation process, and as extrinsic advantage, can have easier access to credit to Research and Innovation, in its

various forms (local calls, national and European Community, awards, bank loans, etc..) because it is inherent in the mission of AICTT the goal of eliciting from these organizations operating in the potential funding the certification mark.

A corollary of these advantages should be considered a return of image, especially in the startup phase of the initiative, the company certified as a result of the promotion done by AICTT.

6.2 Advantages for banks

The Banks have the opportunity to promote their service credit for research and industrial innovation by purchasing the margins of reliability and above all of efficiency respect to their customers beneficiaries, with particular reference to marginal credits to be delivered to customers already beneficiaries funding.

6.3 Benefits for training institutes

Training Institutes can provide courses that give special rights to access to professional roles coded and entered in a AICTT register. In addition, such training is periodic, because there is a path-keeping requirements for access to the register.

6.4 Advantages for universities and research centers

The activation of a framework agreement between the University and AICTT, within which to budding specific conventions and collaborations, both may be an element of technology transfer catalysis processes on which universities are evaluated and is a factor for the enhancement of partnerships with businesses to participate in calls for funding.

6.5 Advantages for institutional bodies

The employment effects resulting from the creation of new job profiles, if recognized at ministerial, can become a source of job development initiatives.

For local authorities this certification, if recognized as part of the requirements in the notice, may become a tool by the attributes of precision and accuracy, designing funds only to worthy recognized beneficiaries .

7. Conclusions

Analyzing the current scenario, it should be noted that the regulations treat summarily the subject of innovation and continuous improvement as the post-production / providing a product / service in the UNI EN ISO 9001:2008 and UNI EN ISO 9004:2009, but not considering a systemic approach to the subject as has been proposed in the following work; equally serious shortcoming is that they are very limited cases where certification bodies, in the absence of international standards, build on their disciplinary systems innovation management, despite the theme of continuous improvement and innovation in both the modern and globalized world, perhaps the most critical factor that determines the success or failure of an organization, behind are also very limited number of entities can really help organizations in activities that lead to innovation, research the type of innovation in its viability plan, development, implementation and analysis: how it emerged from the analysis, in fact, most of them only provide a simple information service, but no practical support to innovative actions.

The construction of the specification for the certification of management system for innovation wants to be a starting point for a broader discussion on innovation management: good regulation and structures that favor their implementation in a concrete way would surely be a good support for organizations that want to innovate continuously and often do not have, however, the knowledge and practical tools to do it.

The specification drawn up as future developments requires testing and practical verification of compatibility with other standards; a further step is to train staff, managers and auditors, who are so knowledgeable of the national innovation system, its operation, and management system for innovation in all its aspects. Finally, the specification may be added by certification bodies as another type of certification to offer its customers.

References

Asian Productivity Organization, Top Management Forum on Strategic Management of Technology and Innovation, Strategic Management of Technology and Innovation ©APO 2007, ISBN: 92-833-7063-5 Report of the APO January 2010.

Bradford, M., and Florin, J. Examining the Role of Innovation Diffusion Factors on the Implementation Success of Enterprise Resource Planning Systems" International Journal of Accounting Information Systems, 4, (2003), pp.205-225.

Carter, L. and Bélanger, F., The utilization of e-government services: citizen trust, innovation and acceptance factors, Information Systems Journal, 15(1), (2005), pp. 5-25.

SuoBai-min; Wang Jia-bin; Zhang Han-bing, Primarily Research on Knowledge Audit for Evaluating Enterprise Knowledge Management Capability Management and Service Science, 2009. MASS '09. International Conference on Digital Object Identifier: 10.1109/ICMSS.2009.5302226 Publication Year: 2009 , Page(s): 1 - 5

Zhonghua Liao and Aihua Yang, Knowledge Sharing Based on Project Management, China Human Resources Development, vol. 222, 2008, pp. 95–98.

The Main Drivers of Financial Innovations: Evidence From the Global Crisis

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Abstract: A key characteristic of the last decades was the development of financial innovations in a fast pace. Many of such innovations have emerged in the United States and then have spread to other financial markets. Thus, a feature of the financial innovations is the rapidity they propagate from one financial institution to another, from one financial market to another, which makes easier the process of integration at the international level. Among the most quoted factors contributing to the burst of financial innovations are financial market instability and the rapid developments in information technology. A particularity of innovation in financial fields compared with innovation in other fields is the important role that regulation has in emerging new products and services. Banks always search way to circumvent regulations that affect their profitability. A relevant example in this respect is the role that financial innovation played in the pre-crisis period. By securitization of credits, many banks in developed countries abandoned the traditional business model and adopted a revolutionary one ("originate and distribute" model). The new instruments of credit risk transfer allowed banks to diminish the burden of regulatory capital, but, at the same time exposed them to hidden risks. Financial innovation contributed to creating complex and opaque products that affected stability of financial system and imposed the reform of financial regulation. A key issue for regulators is to allow only the financial innovations that are beneficial for society. Against this background, the first section of the paper reviews the main factors that stimulated innovation in financial sector. The role of financial innovation in the context of the global crisis is emphasized in the second section. Finally, the paper concludes with some proposals to building the regulatory framework for financial innovations in order to maintain a balance between innovations on the one hand and safety and financial stability, on the other hand.

Keywords: innovation, financial innovation, the global crisis, regulatory arbitrage, financial regulation

1. Introduction

Casu et al. (2006) define financial innovation "as the act of creating and then popularising new financial instruments as well as new financial technologies, institutions and markets" (p. 39).

Over time, financial innovation had an important role in development and economic growth. The main factors contributing to the ongoing process of financial innovation are financial market instability and the rapid developments in information technology. At the same time, as Kane (1977, 1981, 1988) highlights, banks always search new modalities to circumvent the regulations that affect their profitability. Therefore, a key-driver of financial innovation is regulation.

In the pre-crisis period, financial innovation had an important role in the business models adopted by banks in many developed countries. Through securitization they converted loans into securities, which were sold to final investors. This technique allowed banks to diminish their regulatory treatment. But with the most recent financial innovations, the structured products became more complex and opaque and the risks associated to the securitization process became more difficult to assess. In this context, financial innovation was one of the factors which triggered the 2007 crisis. Currently, the regulatory framework of financial activity is subject to a profound reform both at national and international level.

2. Financial innovation: Key-drivers, similarities and differences among different kinds of innovations

Using case studies, experiments or other research methods, theorists have tried to better understand the sources of innovation and creativity.

Innovation, as defined in "Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data" (OECD 2005), "is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (p. 46).

Adams (2006) provides the definition of service innovation: "Service innovation is a combination of: technological innovation; innovative business model; the social organizational innovation, and innovation demand aiming at improving existing service systems [incremental innovation], or creating a new value proposition [new types of offerings], or creating new service systems [radical innovation]".

According to Drucker (1993), innovation should be seen and implemented as an opportunity to materialize into a product or service different from the existing one. Moreover, innovation is an idea, practice, process or product that transforms an idea proposed as a solution in an application that is perceived as new by an individual.

Innovation can be classified into four main types: product innovation, process innovation, organizational innovation and marketing innovation (OECD 2005 pp. 49-52).

To define the financial innovation, the specialty literature starts from the elements that make up the financial system, namely institutions, markets, mechanisms, products, services and regulations that provide the transfer of the funds from savers to borrowers. Starting from this premise, the financial innovations refer to the novelties brought to the elements that are included in the financial system: new financial institutions, markets, mechanisms, products and services. Like in other areas, financial innovations do not necessarily mean new institutions, markets, mechanisms, products and services but they are assimilated to the changes that are made to the already existent elements (incremental innovation). Their purpose is to raise efficiency and improve services to customers The grounds for the financial innovations are the permanent mutations happening in the economic and financial environment. Therefore, the innovation process in the financial field is a permanent process (see for example Negrus, 2008; Casu, Girardone and Molyneux, 2006; Frame and White, 2002).

Like in other areas, financial innovation could be categorised in radical innovation and incremental innovation. The type of innovation – radical innovation or incremental innovation - in financial system, strongly depends on the financial sector in which it happens. For example, as underlined in KPMG LLP (2007), the retail banking innovation focuses mainly on new ways, modalities of doing business rather than on radical new products. Generally, the new retail products are incremental developments of the basic existent products such as loans or savings. In this context, on-line banking transactions, a new customer delivery channel, are one of the most important process innovations of recent years. One explanation of the fact that retail banks are poor in developing of radical new products is the pressure from regulators' part. On the other hand, other financial sectors, such as investment banking, are characterised by "constant, creative product innovation" (p. 9) (for example, derivatives and structured finance products in recent years).

Llewellyn (1992) underlines some points of commonality as well as some differences between financial innovations and other kinds of innovations. The increase of efficiency and competitiveness is identified as the reason of innovation both in the financial area, and other fields. Nevertheless, there are three fundamental differences between the financial innovations and the innovations in other sectors: (1) unlike many industries, the research costs for creating new products are relatively small in the financial area; (2) since there is no invention patent, the financial innovations are easy to copy and (3) the financial innovations are strongly influenced by regulations. Lerner and Tufano (2011) highlight what is challenging (and different) about financial innovations. Apart from the complex and dynamic role plaid by regulation in creating of new financial products and services, in the authors' view assessing the social consequences of financial innovations is one challenge of innovation in financial sector. Besides, the above-cited work suggests that the consequences of financial innovations might change over time.

Unlike firms operating in other areas, banks were traditionally subject to a strict control. The reasons that justify this control are related to the fact that banks operate with funds of depositors who must be protected against loss and failures of banks. Besides, the failure of a bank might destabilise the entire banking sector, with negative impact on financial stability and real economy. Another reason underlined by the specialty literature is the necessity to prevent monopolies in banking sector. From historical perspective, an important moment in establishing the rules for banking activity was the Great Depression. The dramatic consequences of the 1929-1933 crisis determined authorities of those times to subject banks to a strict regulations. Moreover, in the Unites States and Italy a strict separation between commercial banks and investment banks was realised. However, since the

1980s, with deregulation and financial liberalization, the strict rules governing banking activity were gradually removed and replaced by other rules, less stringent.

Howells and Bain (2008) suggest that the process of regulation, the development of technology and increased volatility are the most cited factors that contributed to financial innovation. All these factors led to creating of several financial innovations, which had different monetary and economic implications (table 1).

Table 1: Financial innovation

Causes	Results	Implications
Regulation and deregulation	Eurodollar markets	Money substitutes
	Money market mutual funds	New monetary instruments
	CDs	Evade quantity controls
	"Bill leak"	Securitization
	Off-balance-sheet activity	Rise in money's own rate
	Increased competition	Money's own rate market related
		Liability management
Volatility	Swaps	Risk reduction
	Options	Loan demand less interest elastic
	Futures	
	Variable rate lending	
Technology	Globalization	Economies in cash holding
	24hr markets	Larger debit and credit positions
	Programme trading	(fall in velocity)
	Derivatives	Liability management
	ATMs	Credit derivatives
	EFTPOS	
	Credit checking	
	Cheaper intermediation	
	Cheaper entry	
	(contestable markets)	

Sources: Howells and Bain (2008), p. 530.

Regulation was a key-factor of financial innovation beginning with the creation and developments of Eurodollars markets, which were an answer to the Regulation Q in the U.S. According to this rule, the U.S. banks were not allowed to pay interest on deposits that exceeded a certain level. Therefore, in order to circumvent this rule, the U.S. banks transferred part of their deposits in Europe. Money market mutual funds were another response to this limitation. In order to increase the profitability of their savings, the investors transferred their funds from banking deposits to money markets mutual funds that were not submitted to Regulation Q and other constraints. In the U.K. a similar response was the "bill-leak". Circumvention gave birth to off-balance sheet activity; banks begun providing guarantee to commercial bills issued by large corporations. Subsequently, off-balance sheet activity diversified, becoming an important source of income for many banks. Securitization – a form of off-balance sheet activity – was also developed in order to circumvent the capital regulatory requirements. Increasing financial volatility led to developments of products to manage the new risks: swaps, options, futures, variable rate lending. Like in other areas, technology allowed the decrease of production costs, by developing of communications networks, ATMs, EFTPOS etc. (see Howells and Bain, 2008, p. 530-532).

According to Lumpkin (2009) financial innovation is a result of a competitive economy. Frame and White (2002) point out that charging differential tax on different streams of income or on different categories of assets stimulate financial innovations, by finding new ways to reduce taxes. The increased preference of investors towards financial instruments in the detriment of the traditional

banking deposits was one of the contributing factors that stimulated innovation in international banking (BIS, 1986).

3. The regulatory arbitrage – key driver of financial innovation in the pre-crisis period

Schwartz (2009) places the flaws in financial innovations among the most important three factors contributed to the emergence of the global financial crisis. Expansive monetary policy and the collapse of the market for selected financial instruments are the other two factors cited by the above mentioned work. The negative role of the sub-prime mortgage innovation in association with market participants' ignorance is also revealed by Pol (2009). Farhi and Cintra (2009) review the tendencies that occurred on financial markets in the last decades prior to the crisis. The first process refers to the fact that the amount of credit available through commercial banks increased. In order to obtain the necessary funds, banks moved part of the assets off balance sheets. The second tendency was the increasing role of banks as services providers. Finally, the authors mention the emergence of many institutions which play similar role with commercial banks' role, but that not being subject to the strict regulations of commercial banks. Consistent with these observations are Gambacorta and Marques-Ibanez (2011) who underline that the growth in lending was accompanied by expansion of financial products traditionally offered by financial institutions and development of "originate-to-distribute" model. At the same time, with increase of institutional investors, banks' funding relied much more on financial markets. Traditionally, banks grant credits and hold them on their balance sheets until maturity. In order to grant credits, banks assess the debtors' creditworthiness and take the credit risk, namely the risk that debtor does not pay the interest and instalments ("originate to hold" model).

By using of securitization, "the originate-to-distribute" model allows bank to sell credits and convert them into securities. The activities related to lending are no longer concentrated at a single institution – the bank originating the loan – but are dispersed across all parties involved in the securitization process. As in the traditional banking model, the originating bank assesses the debtor's creditworthiness and grants loans. Unlike the traditional version, the loans are not kept in the bank balance to maturity, but are sold to the special purpose vehicle which issues securities that are collateralized by loans. Finally, the securities are bought by diverse investors, who will be paid from the interests and instalments paid by debtors. Initially, securitization was used for homogeneous assets such as mortgages and consumer receivables. One innovation in the securitization process was the use of this practice for heterogeneous assets too (Lumpkin, 2009). Another innovation was related to the issuance of assets-backed securities in different tranches. It is worth noting the more recent innovation that accompanied the securitization process, namely the multiple levels of securitization, which gave birth to complex and opaque structured products (CDO squares).

The "originate-to-distribute" model offered banks many advantages, but at the same time, increased risk-taking with negative effects on financial stability. In addition, the crisis has revealed several problems related to the compensation schemes associated with the new banking model. **Another innovation to transfer risks from originating bank to another part is credit derivative contract (credit default swap – CDS), which allows the transfer of risks without transferring the underlying asset.** A comparative presentation of the three bank models is illustrated in Table 2.

Table 2: Alternative bank models

	Traditional	Securitisation	CDS
(1) Accept deposits		☑	
(2) Originate loans			
(3) Utilise comparative advantage: Information Risk analysis Monitoring			
(4) Transform into loans			
(5) Accept risk			
(6) Hold on balance sheet			
(7) Capital Backing			
(8) Insurance	Internal	Shift	Insure

Source: Llewellyn (2010), p. 105

The academic literature considers that the main driver of financial innovation associated to securitization process was regulatory arbitrage. In 1988 the Basle Committee on Banking Supervision published a report on capital measurement and capital standards ("International Convergence of Capital Measurement and Capital Standards"), known as the Basel I. According to this report banks have to hold capital equal to at least 8% of their risk-weighted assets. The document adopted in 1988 was revised in 2004 (the Basel II), by introducing a revolutionary method to assess the risks. The adoption of these documents gave birth to creation of a shadow banking system in order to avoid the constraint of regulatory capital. By securitization process banks transferred assets off balance. In this way, they diminished the regulatory capital, by exploiting one of the flaws of the Basel Accords.

4. The post-crisis regulation of financial innovation

The disastrous consequences of the global financial crisis on financial stability and taxpayers in many countries of world conferred financial innovations a pejorative meaning. Terms as "destabilizing innovations", "toxic financial innovation" or "economically malignant financial innovation" emerged in the context of the global financial crisis, being associated to the sub-prime mortgage innovation (Pol, 2009).

According to Schwartz (2009), the basic flaw of innovations adopted in securitization and derivatives was the difficulty in assessing their price. Therefore, in the author's view, one of the most important lessons of the crisis for investors was "to be wary of innovations that have not been thoroughly tested" (p. 23). In this context, one of the most major consequences of the global financial crisis was the reforming of financial activity that must be adapted to the tendencies on financial markets. At the same time the new regulatory framework have to capture the lessons learned from the crisis.

The Basel III regime developed within the Basle Committee is considered the starting point in reforming the regulatory framework of international financial activity. The new regulatory provisions aimed to strengthen the resilience of banking sector, by introducing new capital and liquidity standards. One key-point of reform is the regulatory treatment of complex securitization positions and off balance sheet vehicles in order to better capture the risks associated with capital markets activities.

Albertazzi et al. (2011) suggest that, despite all, "securitization is not that evil after all". To diminish the negative impact of asymmetric information related to securitization the authors propose some measures: banks might sell less opaque loans or might retain a share of the equity tranche.

Starting from the premise that the rapid pace of introduction of new and complex products overwhelmed the capacity of the system to assess and limit risk, Lumpkin (2009) emphasis the necessity to enhance transparency and disclosure as well as to diminish complexity. Subsequently, the above-mentioned work gives some examples of measures taken by different authorities to protect retail clients against undesirable effects of financial innovation. The central bank of the United Arab Emirates introduced a directive that forces local banks to require permission for selling structured products to retail clientele. In March 2009, the Monetary Authority of Singapore proposed some measures to increase the financial education of consumers. The measures aimed to promote more effective disclosure are also proposed.

Similarly, Cechetti (2010) considers that the safest financial instruments may be available for everybody; as the safety degree of the financial instruments decreases, a more limited number of users must have access to them.

Pol (2009) advanced creation of an institution aimed to register and evaluate any new financial idea. The role of this "institutional innovation" is to allow only those innovations for the public interest which do not cause the increase of vulnerability of the financial markets.

At the other hand, a worldwide view is that the new regulations must not prevent innovation, considered a key element for economic growth and development: "Regulation must not prevent innovation, which is necessary if we are to improve product choices for consumer and expanded access to credit. But we need to ensure that innovation does not compromise other clearly stated goals, including systemic stability and consumer protection. The challenge for regulators and market participants alike is, as always, to strike the right balance" (Draghi, 2009). The same idea is also underlined by Lumpkin (2009).

The report on the future of banking conducted by CFO Research Services predicts that “an era of disciplined innovation” will come. In order to grow, banks have to innovate new modalities to distribute credit. But the innovation has to be under the imperative of the global financial stability. This report is based on interviews of top executives of financial institutions and rating agencies worldwide (CFO Research Services, 2011).

5. Conclusions

An important characteristic of the last decades was the acceleration of the financial innovation that was stimulated by the rapid developments in information technology and increased financial market instability. A key factor was financial regulations that determined banks to find ways to circumvent them.

Starting with the 1980s, the traditional banking model based on deposits and loans suffered revolutionary changes. Due to fierce competition, deregulation and liberalization, as well as evolution of technology and financial innovation, banks have increasingly begun to provide services to clients. Under these circumstances, an increasingly important part of their income began to take the form of fees and commissions. A major role in these developments reverted to the regulations, which have prompted banks to find solutions to elude them.

The securitization of credit was deemed initially a way to spread risks across financial system with positive impact on financial stability. But the global financial crisis revealed that securitization was one of the major causes which triggered the sub-prime mortgage crisis in the US, which, subsequently, spread to other financial markets and real economy.

These weaknesses had a negative impact on global financial stability, requiring the reconsideration of financial regulatory framework. The new financial regulations have to allow only the emergence of financial instruments that are beneficial for society. Another imperative is to ensure the global financial stability. At the same time, due to the important role of financial innovation for economic grows, the authorities have to find a balance between financial innovation and regulations.

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References

Adams, K. (2006) “The sources of innovation and creativity”, [online], National Center on Educational and the Economy, http://www.skillscommission.org/wpcontent/uploads/2010/05/SourcesInnovationCreativity.pdf.

Albertazzi, U., Eramo, G., Gambacorta L. and Salleo C. (2011) ”Securitization is not that evil after all”, *BIS Working Papers no. 341.*

BCBS, 2010a. *A global regulatory framework for more resilient banks and banking systems*. Basel: Basel Committee on Banking Supervision.

BCBS, 2010b. *International framework for liquidity risk measurement standards and monitoring*. Basel: Basel Committee on Banking Supervision.

BCBS, 2004. *International Convergence of Capital Measurement and Capital Standards a Revised Framework*. Basel: Basel Committee on Banking Supervision.

BCBS, 1988. *International Convergence of Capital Measurement and Capital Standards*. Basel: Basel Committee on Banking Supervision.

BIS, 1986. *Recent innovations in international banking*. Basel: Bank for International Settlements.

Casu, B.,Girardone, C. and Molyneux, P. (2006) *Introduction to banking*, Pearson Education Limited, Edinburgh, Harlow, Essex.

Cecchetti, S. (2010) “Current efforts to enhance global financial supervision”, Bank for International Settlements, Remarks prepared for the Federal Reserve Bank of San Francisco Asia Banking and Finance Conference, 7-8 June.

CFO Research Services, 2011. *The Next Era in Banking*. Boston: CFO Publishing LLC.

CSFI, 2012. *Banking Banana Skins 2012: The system in peril*. London: Centre for the Study of Financial Innovation.

Draghi, M. (2009) “Financial stability in the global environment? Learning the lessons from the market”, Keynote speech at IOSCO’s Annual Conference, Tel Aviv, 10 June.

Drucker P. (1993) *Inovatia si sistemul antreprenorial*, Editura Enciclopedica, Bucuresti.

Farhi, M., Antonio, M. and Cintra, M. (2009) “The Financial Crisis and the Global Shadow Banking System”, *Revue de la régulation*, n. 5, Maison des Sciences de l’Homme, Paris Nord, 1er semestre.

Frame, W. S., and White, L. J. (2002) "Empirical Studies of Financial Innovation: Lots of Talk, Little Action?", *NYU Working Paper No. EC-02-18*.
Gambacorta, L. and Marques-Ibanez, D. (2011) "The bank lending channel: Lessons from the crisis", *BIS Working Papers no. 345*.
Gordon, I., Travers, T., Whitehead C. and Scanlon, K. (2009) *London's Place in the UK Economy 2009-10*, London.
Howells, P. and Bain, K. (2008) *The economics of money, banking and finance*, Pearson Education Limited, Edinburg Gate, Harlow, Essex.
Kane, E.J. (1988) "Interaction of Financial and Regulatory Innovation", *American Economic Review*, 78, pp. 328-334.
Kane, E.J. (1981) "Accelerating Inflation, Technological Innovation and the Decreasing Effectiveness of Banking Regulation", *Journal of Finance,* 36, pp. 355-367.
Kane, E.J. (1977) "Good Intentions and Unintended Evil: The Case against Selective Credit Allocation", *Journal of Money, Credit and Banking*, vol 9, pp. 55-69.
KPMG LLP (2007) "Banking on Innovation?" *Publication number 310061,* pp. 1-24.
Lerner, J. and Tufano, P. (2011) "The Consequences of Financial innovation: A Counterfactual Research Agenda", *Working Paper 16780*, National Bureau of Economic Research, Cambridge.
Llewellyn, D. (2010) "The global banking crisis and the post-crisis banking and regulatory scenario", University of Amsterdam, Research Papers in Corporate Finance.
Llewellyn, D., 1992. Financial innovation: a basic analysis. In H. Cavanna, ed. 1992. *Financial Innovation.* London: Routledge.
Lumpkin, S. (2009) "Regulatory Issues Related to Financial Innovation*", OECD Journal: Financial Market Trends*, issue 2, OECD.
Mason, J.R. (2008) "The Summer of '07 and the Shortcomings of Financial Innovations", *Journal of Applied Finance,* vol. 18, Spring/Summer, pp. 8-15.
Negrus, M. (2008) *Produse si servicii bancare. Marketing bancar*, Editura Fundatiei Romania de Maine, Bucuresti.
OECD, 2005. *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, 3rd edition. Paris: Organization for Economic Co-operation and Development.
Pol, E. (2009) "Regulating financial innovations without apology", WP 09-01, University of Wollongong.
Schwartz, A. (2009) "Origins of the Financial Market Crisis of 2008*", Cato Journal*, Vol 29, no. 1, pp. 19-23.

Evaluation and Adoption of University Technologies by Enterprises

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Abstract: The relationships between university and industry have become increasingly important. On the one hand, investment in new technologies, as a response to the rapid and constant changes in the competitive environment, is vital to firms, and on the other hand, the universities have been call upon to have a more intervening stance in the enterprise context, reinforcing their so-called "third mission" in terms of a direct intervention in the economic circuit. Policy directives have led to an almost generalized adoption of specific measures by the part of the higher education sector, including the implementation of organizational structures that deal with technology transfer (technology transfer offices, science parks and start-up incubators near the university premises'), the implementation or reinforcement of new regulatory structures concerning intellectual property (the possibility to protect research findings by university staff through the patent mechanism) and stimulus for greater interaction with society at large (alterations in the requirements for career progression). In this work we propose to look at the perspective of the enterprise, and explore the motives, the mechanisms, and the practice of firms that interact with universities. We privilege an integrated view of the phenomenon, focusing on the process of evaluation and adoption of technologies generated in the universities, and licensed or acquired by firms. Research on this theme is scattered and difficult to integrate, or to extract definite conclusions from it. The main research questions are: what are the main benefits, barriers and outputs perceived by firms in their interaction with universities? what are the main tools, methodologies, criteria, and relative weights with which firm evaluate their investment in new technologies? The research was based on a quantitative approach and on an intentional non-probabilistic sampling strategy. The sample includes thirty three Portuguese firms, from different sectors. The selection criteria was based on the innovative performance of the firm, and on the concomitant presumption that innovative activities are well structured inside the firm. The sample includes micro, small, medium and large firms. A proportion of the sample includes conglomerates, and in fact, the sample represents approximately one hundred and twenty two firms. A quantitative structured questionnaire was the main instrument of data collection, but some interviews with selected firms were also realized, in order to substantiate or consolidate some of the data that was obtained through the questionnaire. In this paper we present the preliminary results of the analysis of that data. One of the main results was the realization that the criteria, tools and methodologies that are adopted by firms are not uniform throughout the process of evaluation and adoption of the technologies. It depends on the stage of the process. Accordingly, we propose a division of the process in specified stages and we identify which criteria, tools and methodologies firms' values most at each one.

Keywords: technology evaluation and licensing, innovation, university industry relations, technology adoption and transfer

1. Introduction

Research on the specific tools, methodologies and criteria that firms use in their process of evaluation and adoption of technologies from the universities is scattered and inconclusive. This paper presents an integrated perspective on the issue, backed by relevant empirical data. The main research questions are: what are the main benefits, barriers and outputs perceived by firms in their interaction with universities? What are the main tools, methodologies, criteria, and relative weights with which firm evaluate their investment in new technologies? The research questions developed out of the perception that the process of technology transfer between university and industry was hampered by difficulties related to the process of technology evaluation. We begin this work with a critical review of the existing literature about the concepts related to the interaction university-industry, focusing on the process of evaluation and adoption of technologies generated in the universities. Then we identify the methodology adopted in this work and finally the results are analyzed under the light of the research questions.

2. Conceptual framework

Firms face increasing and difficult challenges regarding the dynamics of technological change, and struggle to understand the factors behind them and to develop appropriate response strategies (Tidd, Bessant and Pavit 2008). As a result, companies are urged to seek new ways of acquiring external innovation through, for example, universities (Salas 2009). The establishment of cooperative relationships with universities is increasingly becoming an important source of business innovation.

However, University Industry Relations (UIR) are difficult to establish, and both firms and universities have different motivations to enter a relationship (Salter 2009), although it seems that the acquisition and transfer of technology is beneficial for both parties (Ramos-Vielba, Fernández-Esquinas and Espinosa-de-los-Monteros, 2010). The motivation for firms to enter a UIR is related to access to scientific breakthroughs, to the possibility of increasing the applied power of science, to the delegation of selected development activities and getting access to technological resources (Bonnacorsi and Piccaluga, 1994). The high costs of some projects and the complexity and multidisciplinary of knowledge involved, advances in information technology and communication are some of the causes that explain the increase on UIR (Romero 2007). The motivations for universities to enter UIR are related to access to knowledge developed elsewhere, to financial motivations and the need to obtain additional funds for research, and, last but not least, to policies that have been set up to encourage scientific collaboration, motivated by the belief that collaboration maximizes public investment in research funding. The widespread notion in the literature is still that UIR are unidirectional relations, where industry is seeking knowledge from university, but research shows that bidirectional relations are in fact, the norm (Meyer-Krahmer and Schmoch, 1998). That would explain why UIR are less intense in regions where industry is less developed (Sanchez and Tejedor, 1995), and why size of firm seems to be an important determinant of university-industry interaction (Fontana, Geuna and Matt, 2006).

Technology evaluation is a fundamental aspect in the process of decision making and technology transfer. This term is often used in the literature to identify the whole process, which ranges from opportunity identification to the decision of adoption or transfer (Wang 2006). Many methodologies and critical aspects of this process have been identified, and is now generally accepted a segmentation of the process in several stages (Daim & Kocaoglu, 2008). However, most approaches still suggest that the evaluation methods are predominantly quantitative, independently of the stage of the process, and derive from traditional financial evaluation techniques such as NPV (Schilling and Hill 1998; Floyd 1997; Milis, Snoeck and Haesen 2009), Payback Period (Sohal et al. 1999; Twiss 1990; Milis, Snoeck and Haesen 2009), ROI (Daim and Kocaoglu 2008; Twiss 1990), DCF (Twiss 1990; Yan, Hong and Lucheng 2010; Dissel et al. 2005), among others. However, the evaluation of new technologies, ideas and business concepts, which constitute the main objects of technology transfer between university and industry, seems not to be adequately covered by these techniques, since in most instances of UIR, characterized by early stages of technology development, there is not a tangible commercial product (Damodaran 2001). Traditional financial techniques find it extremely difficult to include non-quantitative factors (intangibles, both in terms of benefits, or in terms of costs or risks) that may be fundamental in terms of the evaluation and adoption of technologies originated in the universities, and which seem to be essential in the context of UIR (Ordoobadi, 2010). This makes it difficult to establish an objective system for evaluating intangible factors, since it is not possible to design and apply appropriate quantitative indicators (Chiesa and Frattini 2010). Many other models adopt an approach based on checklists and scoring to overcome the mentioned difficulties. However, the criteria definition seems to be vague and the number of variables is generally quite restricted (Linton et al, 2002). Small firms, due to less elaborated evaluation techniques and/or lack of resources to apply them, are the ones that face greater difficulties in overcoming this absence of relevant indicators when dealing with new technologies in the context of UIR, and, very often, they are guided by intuition and experience (See and Clemen 2005; Ordoobadi, 2006). Technology transfer from universities to firms, according to many models proposed in the literature, follow a linear model (Siegel et al. 2004). Although it may be an oversimplification, a linear perspective may be useful for the identification of crucial steps on the complex process of transfer and commercialization of new technology. Several models for evaluating investments in new technologies, and which could be applied in the context of technologies originating from university labs that are in a early stage of development, have been proposed, based on the idea that the process of technology evaluation can be separated in stages (Jolly, 2012). However, specific techniques and valuation metrics are not associated with those stages. In this paper, we propose a step further in that direction.

3. Methodology

The data on which this study relies consists of primary data collected from the Portuguese business sector. The research was based on a quantitative approach and on an intentional non-probabilistic sampling strategy. The sample includes thirty three Portuguese firms, from different sectors. The selection criteria was based on the innovative performance of the firm, and on the concomitant presumption that innovative activities are well structured inside the firm. Thirty three answers were received (16.5% response rate) and the sample includes five microenterprises, six small companies,

twelve medium companies and ten large companies. A proportion of the sample includes conglomerates, and in fact, the sample represents approximately one hundred and twenty two firms. Although being a non-probabilistic sample, its scope and creditworthiness is important**,** since, according to official Portuguese R&D statistics (GPEARI, 2011), it represents 22.34% of total Portuguese investment in business R&D. A quantitative structured questionnaire was developed based on key concepts extracted from the scientific literature, on exploratory interviews conducted with some companies, and on the business experience of the researchers, and it was the main instrument of data collection. Some interviews with selected firms were also realized, in order to substantiate or consolidate some of the data that was obtained through the questionnaire. The extent and depth of the questionnaire limited the number of responses, but it provided a rich set of data. A total of 642 variables were collected. This paper presents only some preliminary results that support our arguments. Work is in progress regarding a detailed statistical analysis, and the formulation of additional explanatory models.

4. The process of university-industry collaboration

The process of university-industry collaboration is a complex one, which involves key decisions on the part of the intervenient players. From the perspective of the firm, which is the privileged perspective on this paper, it necessarily starts with the decision to engage or not in such a relation. The decision not to engage is explained by the obstacles that firms face when confronted with that particular partner. The decision to engage in a relation involves expectations of results. If there is an engagement then the process of evaluation and selection of which technologies or which relations to establish follows, having in mind the expected benefits. Thus, the process of university-industry collaboration evolves within this integrated context. As such, the data we collected addressed this issue. The two extremes of the process, engagement and expected benefits or outcomes, provide indications on the very rationale of this relationship.

The aggregated results are presented in a series of tables. All tables present only the five most valued and the five least valued factors. For each table and question there were many more factors whose importance was asked to the respondents.

The three following tables present the results concerning the UIR engagement problem. Tables 1 and 2 indicate the responses to factors concerning the decision to engage or not in UIR. Table 3 indicates the outcomes of those relations.

Table 1: Expected benefits with the collaboration

Type of benefits	**Mean (n=28)**
Access to qualified human resources	4,14
Generation of new products	4,04
Generation of new processes	3,96
Sales increase	3,93
Obtain technical support for solving problems	3,71
Access to laboratories and equipment	3,25
Access to the tacit knowledge of the partner	3,11
Research costs reduction	3,07
Patents	2,96
Maintaining Technology Ownership	2,75

Five point Likert scale: 1= Unimportant; 2= Of little importance; 3=Moderately important;4= Important;5=Very important

Table 1 presented the expected benefits, which are analysed below, in conjunction with table 2 and 3. Concerning engagement, the reverse of the coin is the difficulties that firms experience when trying to relate to universities. It s important to understand those constrains, as they may prove a decisive factor not to engage in UIR. The following table presents the results on this topic.

The main barrier that firms face when they interact with universities is the short-term orientation of the industry research and different research time horizons. Another main barrier is the different missions and goals of each institution. The inadequacy of the nature of academic research to the interests of the industry is also an important barrier.

Table 2: Frequency of barriers to university-industry collaboration

Type of barriers	Mean (n=28)
Short-term orientation of the industry research / different time horizons	3,61
Different missions and goals	3,54
Inadequate nature of academic research to the interests of the industry	3,32
Lack of suitable governmental funding for UI joint research	3,11
Unrealistic expectations of universities about the value of their technologies	3,04
Lack of acceptance of the results generated by the partner	2,43
Poor rewards for university researchers	2,21
Potential conflict of interests regarding confidentiality	2,21
Potential conflicts about industrial property rights	2,21
Geographical distance between universities and industry	2,07

Five point Likert scale: 1=Never; 2= Rarely; 3=Usually; 4= Very frequently;5= Always

These are somehow familiar results that have showed up in the literature, and they are coherent with the expected benefits and main outputs of UIR signalled by firms. Firms' objectives are clearly very well defined, and address essentially short terms benefits in terms of product and process development (with the exception of the need to access qualified human resources, which may include a short or a medium term perspective), which is eventually at odds with the objectives pursued by universities.

Table 3: Main outputs for the process of technology transfer:

Outputs	**Mean (n=33)**
Product or service development	4,00
Economic development	3,55
Continuing training for the company	3,52
Informal transfer of know-how	3,39
Workshops and seminars	3,18
Sponsored research agreements	2,85
Affiliate programs	2,58
Joint publications	2,55
Serependity	2,45
Creation of joint labs	2,45

Five point Likert scale: 1=Never; 2=Rarely;3=Usually; 4= Very frequently; 5= Always

Table 3 presents the results of the questionnaire regarding the frequency of the main outputs of technology transfer, which can be confronted with the results in table 1.

Referring to table 1, we can see that the main benefit that firms expect when they interact with universities is the access to qualified human resources. This result is in line with several studies that highlight the importance of this factor. Referring to table 3, one can see that the main outputs of technology transfer are product or service development, economic development and continuing training for the company, which are in line with the other main benefits expected with the cooperation (Table 1), which is the generation of new products and the generation of new processes, and which are more related to the main preoccupation of this paper, since they imply an implicit process of evaluation and selection of technological options. The importance attributed to these expected benefits and outputs stresses the importance of understanding more fully the evaluation and selection processes that are implied in the process, in order to improve and better comprehend the articulation between the two actors involved in the process. It justifies the relevance of this work and the analysis of the results that we present in the next section regarding the process of evaluation.

5. Technology evaluation

This is the main section of this paper, whereby the analysis of the results highlight some important factors that have not been properly addressed in the literature. We assume that the process of technology evaluation and selection is divided in stages, similarly to the main literature on the subject, but, unlike this one, we find that the techniques, tools and decision criteria associated with each stage is different, and it varies accordingly. As mentioned in the review section above, most models assume that the most widely used methods are quantitative and derive from traditional financial evaluation techniques. Our results do not support that view. Although quantitative techniques are used, they are used, as a determinant decision tool, only in some stages of the process. We identified five stages in

the evaluation process, which are: the idea generation stage, the screening stage, the idea evaluation stage, the opportunity stage and the feasibility stage. In the following tables, we present the tools and methodologies used in the first three stages, and then a table presenting the differential evaluation criteria that firms attribute to each stage, supporting our argument that tools, methodologies and criteria are not indiscriminately used throughout the evaluation and selection process. As mentioned before, only the five most valued and the five least valued factors are indicated in the tables. For each table and question there were many more factors that were asked to the respondents.

Table 4 presents the results of the questionnaire regarding the tools and techniques used in the stage of idea generation.

Table 4: Tools and techniques used in the stage of idea generation

Type of tools and techniques	**Mean (n=33)**
Meetings	3,67
Brainstorming	3,64
Check Lists	3,03
Flowcharts	2,94
Questionnaires	2,79
String diagram	1,64
Idefo diagram	1,61
Lotus flower	1,61
Edgar	1,55
Jb help me	1,52

1=Never; 2= Rarely; 3=Usually; 4= Very frequently; 5= Always.

The main tools and techniques used by firms in the stage of idea generation are the meetings. Another main tool and technique is the brainstorming. Checklists are also widely used tools in this stage. The results regarding the evaluation methods used in the screening stage are quite different from those used in the previous stage, and the results are shown in Table 5.

Table 5: Evaluation methods used in the screening stage

Evaluation methods	**Mean (n=33)**
Experience	4,09
Opinion and advice from companies and collaborative networks	3,03
Intuition	2,85
Check lists	2,79
Others	2,00
Rapidscreen	1,76
Strategy Canvas	1,58
COAP	1,45
Quick Outlook commercialization Assessment	1,39
TEC Algorithm	1,30

1=Never; 2= Rarely; 3=Usually; 4= Very frequently; 5= Always.

The main evaluation methods used in the screening stage are the experience, opinion and advice from companies and collaborative networks, and intuition. The least used are methodologies that are quite systematic and that involve a considerable amount of quantitative considerations. The degree of subjectivity involved in this stage is somewhat surprising, and it is not very often referred to in the literature, since at this stage it would be expected that the collection and analysis of some hard numbers would have a greater weight in terms of decision making. In fact, the importance of quantitative methods will only become visible in the next stage, and particularly, in the last stages of the evaluation process. Table 6 presents the results of the questionnaire regarding the evaluation methods used in the screening stage.

Table 6: Evaluation methods used in the idea evaluation stage

Evaluation methods	**Mean (n=33)**
Experience	3,97
Competitive advantage	3,88
Business goals	3,88
Cost benefit analysis	3,88

Evaluation methods	**Mean (n=33)**
Strategic Analysis Model	3,61
Delphi	1,48
Stochastic programming	1,39
Fuzzy logics	1,36
Stochastic differential equation	1,36
TEC Algorithm	1,36

1=Never; 2= Rarely; 3=Usually; 4= Very frequently; 5= Always

The main evaluation methods used in the idea evaluation stage are experience, competitive advantage and business goals. Curiously, subjective criteria (experience) still seems to dominates the picture, although more structured and quantitative methods acquire a substantial weight. Notice that the methods and the tools that are used in this stage are also quite different from those used in the previous stages, reflecting the different decision criteria that are used in the different stages. The decision criteria becomes gradually less subjective and more quantitative. The next section highlights this "evolution" in the process of decision making of firms, and it will include the final stages of the process.

6. Weighting of the different dimensions and criteria used in the evaluation process according to the specific stage of development

During the above presentation, discussion and analysis of the results, it became clear the validity of the assumption that evaluation and selection methodologies, tools and criteria are not uniform along the evaluation process. In Table 7, in which all identified stages of the evaluation process are included, we emphasize the decision criteria that are used in each stage, presenting the results from the questionnaire about the weighting of the different dimensions and criteria used in the evaluation process, according to the specific stage of development. The table summarizes the main results of this study, supporting our argument for the existence of a differential approach in terms of the tools, methodologies and decision criteria that are determinant in each stage. The data was obtained in the following way: respondents were asked to weight, in a scale ranging from 0 to 1000, the relative importance of each dimension, in each stage of the evaluation process. Responses to all dimensions were required, and the sums of the weights equalled, necessarily, 1000.

On the screening and idea evaluation stages, the main dimension is the market, followed by the technology and by a subjectivity factor. On the feasibility stage, it is the economic/financial dimension and on the opportunity stage, the main dimension is the financial analysis.

Table 7: Weighting of the different dimensions and criteria used in the evaluation process

Dimension	Stage			
	Screening stage	Idea evaluation stage	Feasibility stage	Opportunity Stage
Market	44,94%	27,91%	19,30%	-
Technology	38,20%	23,10%	-	-
Subjectivity	16,86%	9,06%	-	-
Product/Service	-	21,22%	-	-
Risk	-	18,71%	12,21%	-
Economic/Financial	-	-	20,43%	-
Technical	-	-	16,20%	-
Operational	-	-	12,26%	-
Legal	-	-	10,12%	-
Organizational	-	-	9,48%	9,87%
Financial analysis	-	-	-	16,91%
Financial plan	-	-	-	14,94%
Executive summary	-	-	-	14,09%
Project evaluation	-	-	-	12,73%
Marketing	-	-	-	11,99%
Entrepreneurs	-	-	-	11,68%
Social impact	-	-	-	7,79%
Total	100%	100%	100%	100%

We realize that, not only are the tools and methodologies different, so is the nature of the criteria that underlies the use of those tools. In the early stages, subjectivity and qualitative approaches dominate

the decision process, whereas structured and quantitative approaches are gradually superimposed or determine later stages. This is also true in the last stages, present in the table along with the ones that have already been discussed.

The main point here is that the evaluation process is a complex one that involves several stages, whose characteristics imply the adoption of different decision criteria supported by different tools and methodologies. In the first stages of the process, the stages that deal with idea generation and screening, qualitative and subjective criteria dominate the process. This is explained by the fact that there are not definite or consolidated concepts that can be conducive to qualitative analysis or to structured processes of evaluation, generally based on a quantitative approach. There is not yet a "dominant design", to make an analogy with Abernathy and Utterback (1978), or a well defined concept, and as such there is no sure way to collect data or to rely on specific patterns of data. The technology that is being evaluated, and whose origin is the university, is presumably of a new vintage, or it possesses characteristics that may not be totally familiar to the evaluator, so there may not be recorded or familiar references on which to rely a sound assessment. Qualitative assessments, experience and intuition become relevant factors on these stages. In later stages, as the product concept is consolidated, and the requisites for data collection become much more established, quantitative assessments take over, eventually dominating the later stages, whereby uncertainty is reduced and information retrieval is maximized.

7. Conclusion

One of the mains results of this research was the realization that the criteria, tools and methodologies that are adopted by firms are not uniform throughout the process of evaluation and adoption of the technologies. It depends on the stage of the process. Accordingly, we propose a division of the process in specified stages and we identify which criteria, tools and methodologies firms' values most at each one. This is particularly important in the context of transfer of technologies from universities, since these technologies may fit well within some stages and not so well in other stages.

Important implications for the practice of technology evaluation may result from this research, as we expect to develop a new evaluation model that assumes the division of specific process steps, identifying and considering the criteria for analysis of the potential of ideas appropriate to each stage. The first stage, the screening of ideas, analyzes the issues related to the market, technology and subjectivity. The second stage, the evaluation of ideas, analyzes the issues related to the market, technology, product/service, risk and subjectivity. The third stage, the viability of ideas, analyzes the economic and financial issues, market, technical, operational risk, legal and organizational. The fourth and final stage, the opportunities of ideas, analyzes the issues related to financial analysis, the executive summary, project appraisal, marketing, sponsors, organizational factors and social impact.

One of the main distinguishing feature of this evaluation model is the introduction of a variable on subjectivity in the analysis of innovative ideas, which, according to the results obtained in this research, is a methodology (including experience) often used in the selection of business opportunities in a context of uncertainty, especially in the early stages of development, typical of university technologies. The results of our research also pose some challenges to existing theoretic models proposed in the literature, which scarcely assume any differentiation in the stages of the process of technology evaluation. Our results show that such a perspective does not adequately models the process.

References

Abernathy, W.J., and Utterback, J.M. (1978) "Patterns of industrial innovation", *Technology Review*, Vol 80, No 7, pp 40–47.

Bonaccorsi, A., and Piccaluga, A. (1994) "A Theoretical Framework for the Evaluation of University-Industry Relationships", *R & D Management*, Vol 24, No. 3, pp 229-247.

Chiesa,V., and Frattini, F.(2009) "Evaluation and Performance Measurement of Research and development: Techniques and Perspectives for Multi-level Analysis", R&D Management, *Vol 20, No. 5, pp 513-514.*

Daim, T. U., and Kocaoglu, D.F. (2008) "How Do Engineering Managers Evaluate Technologies for Acquisition? A Review of the Electronics Industry", *Engineering Management Journal,* Vol 20*,* No*.* 3, pp 44 -52.

Damodaran, A (2001) *The Dark Side of Valuation: Valuing Old Tech, New Tech, and New Economy Companies,* Financial Times Prentice Hall, London.

Dissel, M, Farrukh, C, Probert, D, and Phaal, R. (2005) "Evaluating Early Stage Technology Valuation Methods: What is Available and What Really Matters", *Proceedings from 2005 IEEE International Engineering Management Conference*, St John's, Newfoundland, Canada, Vol 2,pp 302-306.

Floyd, C. (1997) *Managing Technology for Corporate Success*, Gower Publishing, Hampshire.
Fontana, R., Geuna, A., & Matt, M. (2006) "Factors Affecting University-Industry R&D Projects: The Importance of Searching, Screening and Signalling", *Research Policy*, Vol 35, No. 2, pp 309-323.
GPEARI, (2009) *As Empresas e Instituições Hospitalares com mais Despesa em I&D em 2008*, GPEARI - Ministério da Ciência, Tecnologia e Ensino Superior.
GPEARI, (2011) *IPCTN10: Resultados Provisórios*, GPEARI - Ministério da Ciência, Tecnologia e Ensino Superior.
Linton, J.D., Walsh, S.T. and Morabito, J. (2002) "Analysis, ranking and selection of R&D projects in a portfolio", *R&D Management*, Vol 32, No. 2, pp 139-148.
Meyer-Krahmer, F., and Schmoch, U. (1998) "Science-Based Technologies: University-Industry Interaction in Four Fields", *Research Policy*, Vol 27, No. 8, pp 835-851.
Milis, K, Snoeck,S and Haesen, R. (2009) "Evaluation of the Applicability of Investment Appraisal Techniques for Assessing the Business Value of IS Services", [online], FBE Research Report,KBI_0910,K.U.Leuven,BE.https://lirias.kuleuven.be/handle/123456789/247210.
Ordoobadi, S. (2006) "Development of a Tool for Managing Technological Innovations in Small Manufacturing Companies", *Proceedings of the 7th Asia Pacific Industrial Engineering and Management Systems Conference*, Bangkok, Thailand.
Ordoobadi, S. (2011) "Inclusion of Risk in Evaluation of Advanced Technologies", *The International Journal of Advanced Manufacturing Technology,* Vol 54, No.1-4, pp 413-420.
Ramos-Vielba, I, Fernández-Esquinas, M. and Espinosa-de-los-Monteros (2010) "Measuring University–industry Collaboration in a Regional Innovation System", *Scientometrics,* Vol 84, No.3, pp 649–667.
Romero, F. (2007) " University-Industry Relations and Technological Convergence", *Proceedings from PICMET 2007*, Portland, Oregon, USA, pp 233-240.
Salas, J.A.P. (2009) "Best Practices for Industry-University Research Collaboration", Master Dissertation, Massachusetts Institute of Technology, Cambridge.
Salter, A, Bruneel, J. and D´Este, P. (2010) "Investigating the factors that diminish the barriers to University-Industry Collaboration", *Research Policy,* Vol 39, No.7, pp 858-868.
Sanchez, A. M., & Tejedor, A. C. P. (1995) "University-Industry Relationships in Peripheral Regions: The Case of Aragon in Spain", *Technovation,* Vol 15, No. 10, 613-625.
Schilling, M.A. and Hill, C.W.L. (1998) "Managing the New Product Development Process: Strategic Imperatives", *The Academy of Management Executive ,*Vol 12, No.3, pp 67-81.
See, F.E., Clemen R.T. (2005) "Psychological and Organizational Factors Influencing Decision Process Innovation: The role of Perceived Threat to Managerial Power", Working paper, Duke University, Durham, NC.
Siegel, S.S., Waldman, D.A., Atwater, L.E. and Link, A.N. (2004) "Toward a Model of the Effective Transfer of Scientific Knowledge from Academicians to Practitioners: Qualitative Evidence from the Commercialization of University Technologies", *Journal of Engineering and Technology Management,* Vol 21*,* No*.*1-2, pp 115-142.
Sohal, A.S., Schroder, R., Uliana, E.O. and Maguire, W. (1998) "Adoption of AMT by South African Manufacturers", *Integrated Manufacturing Systems,* Vol 12, No.1, pp 15 – 34.
Tidd, J., Bessant, J. and Pavitt, K. (2008) *Gestão da Inovação*, Bookman, Porto Alegre.
Twiss, B.C. (1990) *Business for Engineers,* Reprinted ed.1991, Peter Peregrinus, London.
Wang, Y.-T. (2006) *Information Technology Investment Decisions and Evaluation in Large Australian Companies*, Ph.D., Nathan, Griffith University. http://www4.gu.edu.au:8080/adt-root/public/adt-QGU20070716.175827/index.html
Yan, L., Hong, Z., and Lucheng, H. (2010) "Review on Methods of New Technology Valuation", *Proceedings of 2010 International Conference on E-Business and E-Government,* Guangzhou, China, pp 1932-1935.

Voice Behaviour – Intrapreneurship in Sheep's Clothing?

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Abstract: During the last decades there has been a growing interest in the organizational behaviour literature in extra-role behaviour. The most researched form of such behaviour is organizational citizenship behaviour (OCB), a form of extra-role behaviour that includes being helpful and compliant, with the intention to maintain and reinforce the status quo. Although this type of extra-role activities is important, many researchers argue that it is not sufficient and that organizations also need employees who are willing to challenge and bring about innovation and constructive change. Voice behaviour refers to the constructive challenge intended to bring improvement. This type of behaviour is about making innovation and change suggestions and pointing-out the necessary modifications to procedures. This is particularly important when an organization's environment is dynamic. In many ways this construct originating from the organizational behaviour literature seems very similar to the construct of intrapreneurship or entrepreneurial behaviour in the entrepreneurship literature. The authors from this field of research have also noted the importance of employee-initiated change for organizational adaptability and there has also been a growing academic interest in intrapreneurship in the last decades. This growing interest is based on the commonly accepted argument that, in an innovation context, effective internal entrepreneurship facilitates the firm's exploitation of its current competitive advantages and exploration for tomorrow's opportunities. Some of the discussions around entrepreneurial activity in strategic management and entrepreneurship literatures argue that strategy originates within the organization via individual entrepreneurship and that the impetus for innovation often occurs at lower levels in an organization. Considering this, many authors in this field argue that internal entrepreneurship is in many organizations much more a question of culture and employee behaviour, than it is of established research and development processes. In this paper we demonstrate the similarity between voice behaviour construct from the organizational behaviour literature and intrapreneurship construct from the entrepreneurship and strategic management literatures, thus contributing to the most need multidisciplinary approach to entrepreneurial behaviour.

Keywords: entrepreneurial behaviour; extra-role behaviour; innovative behaviour; intrapreneurship; voice behaviour

1. Introduction

The most successful companies are those who learn continuously and react rapidly, speeding-up their capacity to generate new business ideas and innovation. It is usual in the entrepreneurship literature, authors arguing that one of the ways for firms to achieve that transformative ability is through entrepreneurial actions from within – intrapreneurship. This entrepreneurial ability is in many organizations much more a question of culture and employee behaviour, than it is of established research and development processes (Burgelman 1983). Intrapreneurs are workers that go beyond their job descriptions, providing valuable help to innovate some aspect of their companies. So, intrapreneurship may be considered extra-role behaviour. Extra-role behaviours are those not included in an employee's job description and that contribute to the well-being of the organization or its members.

Similarly, the recognition of the need for innovative behaviour from employees as a way for a firm to respond to sudden changes in the environment is also not new in the organizational behaviour literature. In fact many researchers argue that initiative and proactiveness are essential behaviours to competitive advantage and organizational success (e.g. Crant 2000) and there has been a growing interest during the last decades on organizational citizenship behaviour (OCB) and related constructs such as extra-role behaviour (Van Dyne, Cummings and McLean Parks 1995).

Considering that the seminal works on intrapreneurship in the strategic management / entrepreneurship literature date from the 80's (e.g. Burgelman 1983; Pinchot 1985), we notice that the organizational behaviour authors have in fact started earlier to address the issue of innovative behaviour. In 1978, Katz and Kahn characterize spontaneous innovative behaviours as actions that are essential to the organization. "The resources of people for innovation, for spontaneous

cooperation, for protective and creative behaviour are.., vital to organizational survival and effectiveness (Katz and Kahn, 1978, pp. 403-404)".

Intrapreneurship is an individual behaviour within an organizational setting. In fact, several studies on the entrepreneurship literature (e.g. Ginsberg and Hay 1994; Hornsby, Kuratko and Zahra 2002) suggest the need to research factors such as leaders' role, organizational culture, and other aspects of organizational behaviour related to intrapreneurship.

Considering the above, the goal of this paper is to explore the idea that intrapreneurship, as a field of research, can benefit from decades of research on organizational behaviour. We will do that by analysing one particular form of individual organizational behaviour – *voice behaviour*, and its similarities with intrapreneurship. Voice behaviour can be described as "proactively challenging the status quo and making constructive suggestions" (Van Dyne, Cummings and McLean Parks, 1995, p. 266) and is believed to play a critical role in organizations (Edmondson 1999; Morrison and Phelps 1999). This paper is part of a wider research project which intends to bring an organizational behaviour perspective on corporate entrepreneurship.

Other authors have made the connection between voice behaviour and entrepreneurial behaviour (Folger 1993) but have not demonstrated the similarities and differences between the constructs. In the first section, we will describe the constructs as they have been used by researchers in their own fields, discussing the similarities and differences. In the second section, we will compare the antecedents of both constructs and the measures used by researchers.

2. Constructs

Voice behaviour as extra-role behaviour: In line with Van Dyne, Cummings and McLean Parks (1995, p. 218), we consider extra-role behaviour as a "behaviour which benefits the organization and/or is intended to benefit the organization, which is discretionary and which goes beyond the existing role expectations." Extra-role behaviour differs from in-role performance, which is related to a worker's expected job duties.

Organizational citizenship behaviour (OCB) is considered the primary form of extra-role behaviour. To Organ (1988, p.4), OCB is the "…individual behaviour that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization".

Researchers have been proposing a variety of specific dimensions of OCB including altruism, conscientiousness, sportsmanship, courtesy, civic virtue (Organ 1988), obedience, loyalty, advocacy participation, social participation, functional participation (Van Dyne, Graham and Dienesch 1994), helping and voice (Van Dyne, Cummings and McLean Parks 1995; Van Dyne and LePine 1998), as well as organization-focused and interpersonal-focused organizational citizenship behaviour (Williams and Anderson 1991).

Voice behaviour can been seen as challenge-oriented citizenship behaviour (Van Dyne, Cummings and McLean Parks 1995; Van Dyne, Graham and Dienesch 1994; Van Dyne and LePine 1998), as voice behaviour is characterized by making constructive suggestions with the intent to improve, and speaking out and challenging the status quo for the good of the organization (Burris, Detert and Chiaburu 2008; Choi 2007; Van Dyne and LePine 1998; Whiting, Podsakoff and Pierce 2008). Some researchers define voice behaviour as expressing one's views (e. g. Thibaut and Walker 1975), while others see it as consequence of job dissatisfaction (e. g. Withey and Cooper 1989). In this paper we follow the proposals of Van Dyne and LePine (1998) where voice behaviour is defined as making innovative suggestions for change and recommending modifications to standard procedures even when others disagree, and Van Dyne and colleagues (Van Dyne, Cummings and McLean Parks 1995), where voice behaviour is potentially beneficial to others or organizations, so it's hardly just a manifestation of dissatisfaction.

Voice behaviour is discretionary because it is not required by management, or outlined in the workers job description (Van Dyne, Cummings and McLean Parks 1995); it is challenge-oriented, with the aim of making constructive changes (LePine and Van Dyne 1998; Morrison and Phelps 1999; Van Dyne, Cummings and McLean Parks 1995); and, it is potentially risky because it implies defying the status quo, sometimes against everyone else's opinion.

Intrapreneurship as an autonomous innovative behaviour: Some authors distinguish the term 'intrapreneurship' (the term coined by Pinchot in 1985) from that of 'corporate entrepreneurship' (e.g. Covin and Miles 1999), others don't (e.g. Antoncic and Hisrich 2001). To Sharma and Chrisman (1999, p. 18) corporate entrepreneurship is "(...) the process whereby an individual or group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization".

Covin and Miles (1999) offer a thorough analysis of the construct of corporate entrepreneurship. These authors identify different phenomena that are often viewed as examples of corporate entrepreneurship, including intrapreneurship as proposed by Pinchot (1985) - an individual or individuals championing new product ideas within a firm. An intrapreneur to Pinchot (1985) is someone who possesses' entrepreneurial skills and uses them within a company instead of using them to launch a new business. However, recently other authors have using the concept of intrapreneurship in a more encompassing way, not referring exclusively to product championing. For instance, to Antoncic and Hisrich (2001) intrapreneurship is "…the process of uncovering and developing an opportunity to create value through innovation and seizing that opportunity without regard to either resources or the location of the entrepreneur in a new or existing company". Intrapreneurship involves employee initiatives in organizations in order to create something new, not necessarily new products.

For the purposes of this paper, intrapreneurship is a form of corporate entrepreneurship, as proposed by Covin and Miles (1999), although not limited to the championing of new product ideas. Following Sharma and Chrisman's (1999) definition of corporate entrepreneurship we will define intrapreneurship as a process whereby an individual instigates renewal or innovation within an organization.

Burgelman (1983) suggests that innovation in organizations is the result of two distinct behavioural processes. The first of these is what he calls induced strategic behaviour, which is an outcome of strategy, while the second process, the author calls it autonomous strategic behaviour. While induced strategic behaviour is seen as the official path for innovation, Burgelman (1983) proposes that as long as operational-level participants see opportunities that exceed those proffered by top management, autonomous strategic behaviour will occur. Intrapreneurship is considered an autonomous strategic behaviour.

Differences and similarities: From the above we can conclude that intrapreneurship, at least as an autonomous strategic behaviour, is an extra-role behaviour. Being extra-role behaviour with the intent to innovate and improve the organization, it implies speaking out and challenging the status quo. On the other hand, voice behaviour being oriented to improve the organization is many times related to innovation. So, this constructs overlap in many circumstances (see Figure 1).

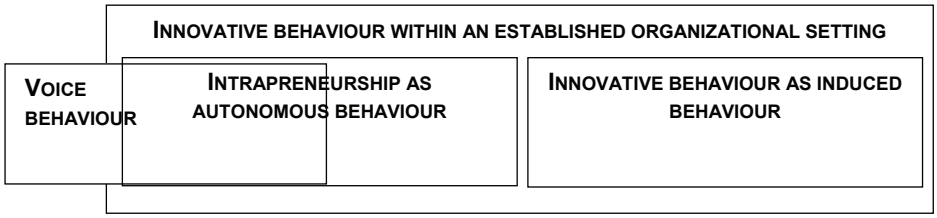


Figure 1: Overlapping of constructs

To Jong and Wennekers (2008), if it is true that innovative work behaviour (intrapreneurship) always involve aspects of proactive behaviour, such as voice, it is also true that voice, may have a much wider application than opportunity pursuit and innovation. However, it seems that Jong and Wennekers (2008) assume that intrapreneurship always intends to champion a new product.

If we consider intrapreneurship as a change-oriented innovative behaviour in an organizational context not exclusively oriented to championing new products, but also for process renewal, then the concepts of voice and intrapreneurship overlap in a more significant way than that consider by Jong and Wennekers (2008). Moreover voice behaviour has a much bigger impact in organizational performance that it is sometimes considered in the literature, in many ways similar to intrapreneurship.

Mackenzie, Podsakoff and Podsakoff (2011) demonstrate that challenge-oriented behaviour in the form of voice has important effects on sales, profit as a percentage of sales, and turnover. Van Dyne, Cummings and McLean Parks (1995) argue that, because voice behaviour is designed to provide creative and constructive suggestions, it should help the organization adapt to external changes in the environment. Similar points have also been made by Organ, Podsakoff and MacKenzie (2006), who noted that employees who have close contact with the marketplace and who make suggestions about how to respond to changes that they see taking place also help the organization adapt more easily to environmental changes.

3. Antecedents and measures

In an interactionist approach, behaviour is the result of both situational and dispositional antecedents (Endler and Edwards 1986). So, it is pertinent to compare the antecedents of both constructs.

Situational antecedents: Several authors have acknowledged the important role of context regarding organizational citizenship like behaviours (e.g. Mowday and Sutton 1993; Stamper and Van Dyne 2001). Other situational factors such as team psychological safety (Edmondson, 1999) have also been found to be positively associated with employees' voice behaviour. Other authors have stressed the importance of leaders in motivating employees to voice their opinions (e. g. Detert and Burris 2007). Liu, Zhu and Yang (2010) found that employees are most likely to voice their opinions towards someone whom they strongly identify with, and that transformational leaders have direct positive effect on employee extra-role behaviours. The components of transformational leadership, namely, intellectual stimulation, inspirational motivation, idealized influence, and individualized consideration (Bass and Avolio 1994), should all encourage employees' voice behaviour. With the support and encouragement of leaders, employees are more likely to focus on tasks rather than worries and fears, thus they become willing to take risks to voice their opinions. Fuller, Marler and Hester (2006) argue that there is a strong positive relationship between access to resources and voice behaviour. Stamper and Van Dyne (2001) suggest the highest levels of OCB require both a full time work status and less bureaucratic organizational culture. Folger (1993) argues the need for an organizational system that exhibits procedural fairness for extra-role behaviours to emerge.

It is common to find in the entrepreneurship literature that the main antecedents to entrepreneurial action within the firm are structure (Naman and Slevin 1993), work discretion / autonomy (Hornsby, Kuratko and Zahra 2002); strategy (Naman and Slevin 1993); strategy making process (Covin and Slevin 1991; Lumpkin and Dess 1996; Covin and Miles 1999); firm resources (Hornsby, Kuratko and Zahra 2002); organizational culture (Dess and Lumpkin 2005); top management team characteristics (Ling *et al.* 2008); leadership and managerial support (Hornsby, Kuratko and Zahra 2002; Kurakto *et al.* 2005; Ling *et al.* 2008).

From the above we can conclude that voice and autonomous entrepreneurial behaviour have many common situational antecedents, as shown in Figure 2.

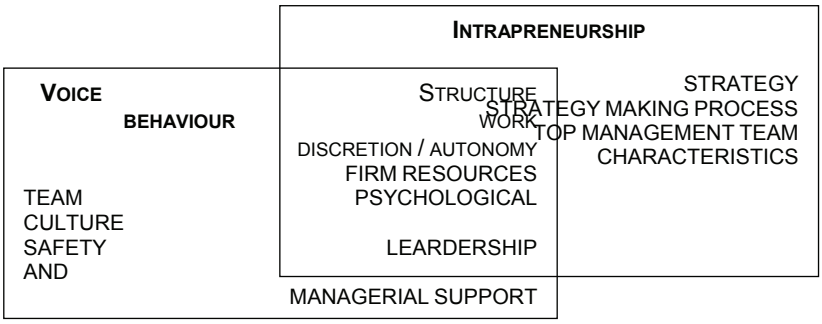


Figure 2: Overlapping of situational antecedents

However, there are some antecedents of intrapreneurship that are not usually considered in the voice behaviour literature, and the inverse is also true. This doesn't mean that they have never been studied or that they are not relevant. Considering the similarities in the construct that we pointed out to in the previous section this only calls for the need of more empirical research to address this question.

Dispositional antecendents: Van Dyne, Cummings and McLean Parks (1995) argue that the antecedents of challenge-oriented behaviours are e.g., propensity to take risks, need for achievement, psychological ownership, and task orientation. Individual factors such as satisfaction (LePine and Van Dyne 1998; Withey and Cooper 1989) and general self-efficacy (LePine and Van Dyne 1998; Morrison and Phelps 1999) are also positively associated with employees' voice behaviour. Research shows that conscientiousness is positively associated with all dimensions of OCB, including individual initiative (Singh and Singh 2009). Conscientiousness is a personality characteristic included in the Five-Factor Model that represents the extent to which an individual is generally hard-working, responsible, and detail-oriented (Goldberg 1990). Risk-taking is usually the main dispositional antecedent in entrepreneurship studies. Individuals must have a willingness to take a risk and have a tolerance for failure should it occur to engage in entrepreneurial behaviour (Burgelman 1983; Sykes and Block 1989). Other characteristics necessary to an intrapreneur are proactiveness (Naman and Slevin 1993), receptivity to innovation (Burgelman 1985), and active resistance to bureaucracy (Mintzberg 1991). There some common individual disposition between voice behaviour and entrepreneurial behaviour, mainly risk-taking and proactiveness. However there are some dispositional antecedents of voice behaviour that have not, to our knowledge, been study by intrapreneurship researchers. Again, this doesn't mean they are not relevant. It possible to raise the hypothesis that need for achievement might be a relevant antecedent of entrepreneurial behaviour, for instance.

Measures: On Table 1 we compare two measures used by researchers to operationalize the constructs of voice behaviour and entrepreneurial behaviour. It is possible to verify some similarity between those measures; though entrepreneurial behaviour is operationalized probably a more action oriented behaviour than voice behaviour, even though Van Dyne, Cummings and McLean Parks (1995) defined voice behaviour as challenging-promotive behaviour. Promotive behaviour is proactive; it causes things to happen. Challenging promotive behaviour emphasizes ideas that are change-oriented. An example is precisely speaking up and making recommendations for change and innovation.

Table 1: Measures of voice and entrepreneurial behaviour

Voice behaviour Van Dyne and LePine (1998)	Entrepreneurial behaviour Pearce II, Kramer and Robbins (1997)
This particular worker…	
…develops and makes recommendations concerning issues that affect this work group.	…vividly describes how things could be in the future and what is needed to get us there
…speaks up and encourages others in this group to get involved in issues that affect the group.	…encourages others to take the initiative for their own ideas …inspires others to think about their work in new and stimulating ways …creates an environment where people get excited about making improvements …gets people to rally together to meet a challenge
…communicates his/her opinions about work issues to others even if his/her opinion is different and others disagree.	…boldly moves ahead with a promising new approach when others might be more cautious
…keeps well informed about issues where his/her opinion might be useful to this work group.	…displays an enthusiasm for acquiring skills
…gets involved in issues that affect the quality of work life here in this group.	…'Goes to bat' for the good ideas of others
…speaks up in this group with ideas for new projects or changes in procedures.	…devotes time to helping others find ways to improve our products and services …quickly changes course of action when results aren't being achieved
	…efficiently gets proposed actions through 'bureaucratic red tape' and into practice

Although the measures of voice behaviour proposed by Van Dyne and Le Pine (2008) are commonly accepted and are being consistently used in the organizational behaviour literature to study voice behaviour, this seems not to be the case concerning measures of entrepreneurial behaviour. For instance the proposals of Jong and Wennekers (2008) and Jong *et al.* (2011) are very different from that of Pearce II, Kramer and Robbins (1997). Jong and Wennekers (2008) emphasize that intrapreneurship is a special case of entrepreneurship and thus shares many key behavioural characteristics with that concept, but the authors also recognize that…

> *"… intrapreneurship distinctly belongs to the domain of 'employee behaviour' and thus faces specific limitations that a business hierarchy and an internal business environment may impose on individual initiative, as well as specific possibilities for support that an existing business may offer to a nascent intrapreneur (Jong and Wennekers, 2008, p. 24)".*

4. Conclusion

The goal of this paper was to explore the idea that intrapreneurship, as a field of research, can benefit from decades of research on organizational behaviour. We did that by analysing one particular form of individual organizational extra-role behaviour – voice behaviour. This paper will be relevant to any researcher concerned with the topic of intrapreneurship, as it draws attention to the wide variety of empirical research from the organizational behaviour field that is relevant to the study of intrapreneurship.

However, the view proposed in this paper is limited in a number of aspects. First, we explore much more the similarities than the differences between the constructs. For instance, one can argue that a relevant dimension of intrapreneurship, opportunity seeking, is not taken in consideration when studying voice behaviour. Secondly, the degree of similarities is dependent on a broader definition of intrapreneurship than that proposed by Pinchot more than 30 years ago, and this may not be accepted by all researchers. Thirdly, it would be impossible to review all references regarding studies on the antecedents and measures, both of voice as of entrepreneurial behaviour, so we must admit that other researchers not referenced in this paper may have pertinent information to the degree of overlapping of the concepts. Finally, we have not thoroughly criticized the assumptions behind most of the propositions of the referenced authors.

Anyway, we believe that the initial goal of our work has been achieved. We conclude that similarities between the constructs are relevant, and they should be widely researched. We also conclude that voice behaviour is not always focused on innovation but we can easily assume that entrepreneurial behaviour can never happen without some form of voice behaviour, even if intrapreneurship may imply other more action-oriented behaviours than just voice. Still these are behaviours that happen in an organizational context making some of the recent areas of research on organizational behaviour pertinent to the study of intrapreneurship - i.e. voice behaviour, as are the traditional areas of organizational behaviour studies. Previous researchers have already suggested that the concept of entrepreneurial behaviour captures the idea that leaders, the culture and other organizational processes together generate a strong impetus to innovate, take risks, and aggressively pursue new opportunities.

We call for the need of multidisciplinary empirical studies in future research on intrapreneurship. Many times well studied and validated constructs, antecedents and measures are there under "sheep's clothing" in other fields of research, waiting to be used and make social sciences progress much more quickly and becoming much more useful to practitioners.

References

Antonic, B. and Hisrich, R. D. (2001) Intrapreneurship: Constructive refinement and cross-cultural validation. J*ournal of Business Venturing*, **16**, pp. 495–527.

Bass, B. and Avolio, J. (1994) *Improving organisational effectiveness through transformational leadership*. London: Sage.

Burgelman, R. A. (1983) Corporate entrepreneurship and strategic management: Insights from a process study. *Management Science*, **23,** pp. 1349–1363.

Burgelman, R. A. (1985) Managing the New Venture Division: Research Findings and Implications for Strategic Management. *Strategic Management Journal,* **5**(January/March), pp. 39-54.

Burris E. R., Detert J. R. and Chiaburu D. S. (2008) Quitting before leaving: The mediating effects of psychological attachment and detachment on voice. *Journal of Applied Psychology*, **93**, 912–922.

Choi J. N. (2007) Change-oriented organizational citizenship behavior: Effects of work environment characteristics and intervening psychological processes. *Journal of Organizational Behavior*, **28**, pp. 467–484.

Covin, J.G. and Miles, M. P. (1999) Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship Theory and Practice*, **23**(3), pp. 47–64.

Crant, M. J. (2000) Proactive Behaviour in Organizations. *Journal of Management*, **26**(3), pp. 435-462.

Detert, J. R., and Burris, E. R. (2007) Leadership behavior and employee voice: Is the door really open? *Academy of Management Journal*, **50**, pp. 869−884.

Dess, G. G. and Lumpkin**,** G. T. (2005) The Role of Entrepreneurial Orientation in Stimulating Effective Corporate Entrepreneurship. *Academy of Management Executive*, **19**(1), pp. 147-156.

Edmondson, A. C. (1999) Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly,* **44**, pp. 350-83.

Endler, N. S. and Edwards, J. M. (1986) Interactionism in personality in the twentieth century. *Personality and Individual Differences*, **7**, pp. 379–384.

Folger, R. (1993) Justice, motivation, and performance beyond role requirements. *Employee Responsabilities and Rights Journal*, **6**(3), pp. 239-248.

Fuller, J. B., Marler, L. E. and Hester, K. (2006) Promoting felt responsibility for constructive change and proactive behavior: exploring aspects of an elaborated model of work design*. Journal of Organizational Behavior,* **27**, 1089-1120.

Ginsberg, A. and Hay, M. (1994) Confronting the challenges of corporate entrepreneurship: Guidelines for venture managers. *European Management Journal*, **12,** pp. 382–389.

Goldberg, L. R. (1990) An alternative ‘‘description of personality’’: The Big-Five factor structure. *Journal of Personality and Social Psychology*, **59**, pp. 1216–1229.

Hornsby, J. S., Kuratko, D. F. and Zahra, S. A. (2002) Middle managers’ perception of the internal environment for corporate entrepreneurship: Assessing a measurement scale. *Journal of Business Venturing*, **17,** pp. 49–63.

Jong, J. and Wennekers, S. (2008) Intrapreneurship – Conceptualizing entrepreneurial employee behaviour. Report published under the *SCALES-initiative (SCientific AnaLysis of Entrepreneurship and SMEs)*.

Jong, J., Parker, S. K., Wennkers, S. and Wu, C. (2011) Corporate Entrepreneurship at the Individual Level: Measurement and Determinants. Report published under the *SCALES-initiative (SCientific AnaLysis of Entrepreneurship and SMEs)*.

Katz, M. A. and Kahn, R. L. (1978) *The Social Psychology of Organizations.* 2nd ed., New York: John Wiley & Sons.

Kurakto, D. F., Ireland, R. D., Covin, J. G. and Hornsby, J. S. (2005) A Model of Middle-Level Managers’ Entrepreneurial Behavior. *Entrepreneurship: Theory and Practice*, **29**(6), pp. 699-716.

LePine, J. A. and Van Dyne, L. (1998) Predicting voice behavior in work groups. *Journal of Applied Psychology*, **83**, pp. 853−868.

Ling, Y., Simsek, Z., Lubatkin, M. H. and Veiga, J. F. (2008) Transformational Leadership’s Role in Promoting Corporate Entrepreneurship: Examining the CEO-TMT Interface. *Academy of Management Journal*, **51**(3), pp. 557-576.

Liu, W., Zhu, R. and Yang, Y. (2010) I warn you because I like you: Voice behavior, employee identifications, and transformational leadership. *The Leadership Quarterly,* **21**, pp. 189–202.

Lumpkin, G. T., and Dess, G. G. (1996) Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, **21**, pp. 135-172.

Mackenzie, S. B., Podsakoff, P. M. and Podsakoff, N. P. (2011) Challenge-oriented Organizational Citizenship Behaviors and Organizational Effectiveness: Do Challenge-oriented Behaviors Really Have an Impact on the Organization’s bottom-line? *Personnel Psychology*, **64**, pp. 559–592.

Mintzberg, H. (1991) The Innovative Organization *in The Strategy Process: Concepts, Contexts, Cases*. 2nd ed., Henry Mintzberg and James Brian Quinn, eds. Englewood Cliffs, NJ: Prentice Hall, pp. 731-46.

Morrison, E. W. and Phelps, C. C. (1999) Taking charge at work; extra-role efforts to initiate workplace change. *Academy of Management Journal,* **42**, pp. 403-19.

Mowday, R. T. and Sutton, R. I. (1993) Organizational Behavior: linking individuals and groups to organizational contexts. *Annual Review of Psychology,* **44**, pp. 195-229.

Naman, J. L. and Slevin, D. P. (1993) Entrepreneurship and the Concept of Fit: A Model and Empirical Tests. *Strategic Management Joumal,* **14**(2), pp. 137-53.

Organ, D. W. (1988) *Organizational Citizenship Behavior: The Good Soldier Syndrome.* Lexington, MA: Lexington Books.

Organ D. W., Podsakoff, P. M. and Mackenzie S. B. (2006) *Organizational citizenship behavior: Its nature, antecedents, and consequences*. Thousand Oaks, CA: Sage.

Pearce II, J. A., Kramer, T. R. and Robbins, D.K. (1997) Effects of managers' entrepreneurial behavior on subordinates, *Journal of Business Venturing*, **12**, pp. 147-160.

Pinchot, G. (1985) *Intrapreneuring: why you don't have to leave the corporation to become an entrepreneur*, New York: Harper and Row.

Sharma, P. and Chrisman, J. J. (1999) Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Entrepreneurship Theory and Practice*, **23**(3), pp.11–28.

Singh, A. K. and Singh, A. P. (2009) Does Personality Predict Organizational Citizenship Behaviour among Managerial Personnel. *Journal of Indian Academy of Applied Psychology*, **35**(2), pp. 291-298.

Stamper, C. L. and Van Dyne, L. (2001) Work status and organizational citizenship behavior: A field study of restaurant employees. *Journal of Organizational Behavior*, **22**, 517–536.
Sykes, H. B. and Z. Block (1989) Corporate Venturing Obstacles: Sources and Solutions, *Journal of Business Venturing*, **4**(3), pp. 159-67.
Thibaut, J., and Walker, I. (1975) *Procedural justice: A psychological analysis*. Hillsdale, NJ: Erlbaum.
Van Dyne L, Graham J. W. and Dienesch R. M. (1994) Organizational citizenship behavior: Construct redefinition, measurement and validation. *Academy of Management Journal*, **37,** pp. 765–802.
Van Dyne L., Cummings L. L. and McLean Parks J. M. (1995) Extra-role behaviors: In pursuit of construct and definitional clarity (A bridge over muddied waters). *in* Cummings L. L., Staw B. M. (eds.) *Research in organizational behavior*. Greenwich, CT: JAI Press, Vol. 17, pp. 215–285.
Van Dyne L. and LePine J. A. (1998) Helping and voice extra-role behaviors: Evidence of construct and predictive validity. *Academy of Management Journal*, **41,** 108–119.
Withey, M. J. and Cooper, W. H. (1989) Predicting exit, voice, loyalty, and neglect. *Administrative Science Quarterly,* **34**, pp. 521−539.
Whiting S. W., Podsakoff P. M., Pierce J. R. (2008) Effects of task performance, helping, voice, and organizational loyalty on performance appraisal ratings. *Journal of Applied Psychology*, **93**, pp. 125–139.
Williams, L. J. and Andersen, S. E. (1991) Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management,* **17**, pp. 601-617.

Innovation and Internationalization of IT Companies – Comparative Case Studies in Brazil and Portugal

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Abstract: This paper uses a case study methodology to examine the process of innovation of internationalized Information Technologies (IT) companies in Brazil and Portugal. It was directly applied an interview to four IT companies, two from Brazil (Navita and Stefanini) and two from Portugal (Altitude Software and Ydreams). The study has two main objectives, firstly analyze the innovation management for internationalization of IT companies according with the theoretical model of innovation presented by Tidd et al (2005), secondly compare the process of innovation management of IT companies between an emergent economy (Brazil) and a small developed economy (Portugal). The study allowed some findings about similarities of IT companies in Portugal and Brazil, such as, the importance of the links with universities, the higher qualification of the founders, the innovative and international profile of the entrepreneurs that promotes the establishment of networking and partnership in global markets. The results also suggest that some internationalization strategies are mainly dependent from the internationalization process of their clients. This study also reveals some differences related to the dimension of domestic market and the degree of economic development of studied countries. Finally, we believe that within the existing literature, the original contribution of the paper lies on its comparison of innovation management of IT companies in two countries in different stages of development and with different dimensions of domestic market.

Keywords: innovation, internationalization, IT companies, case study

1. Introduction

Innovation is considering an important tool for organizations (Hamel and Prahalad 1998, Tidd et al, 2005). Consequently, scholars and practitioners have studied how innovation can be managed. Hansen and Birkinshaw (2007) define innovation management as the active and conscious organization, control and execution of activities that lead to innovation.

This research, applied an exploratory approach for the reason that, even investigating a well-researched topic, it focuses on the perspective of two economies in different stages of development, so far an under- explored field. For this, we have considered two premises, (i) companies from both types of economies are becoming more internationalized (UNCTAD, 2010); and (ii) innovation and differentiation is related to a competitive entrance of companies in foreign markets (Cassiman, Golovko, 2011; Kafouros, et. al 2008). The entrepreneur profile and the international network are determinant for the growing process of companies. This discussion contributes to a recently studied issue: the importance of international network of entrepreneurs and intra-entrepreneurs (ex: Whelan, 2011). Part of these companies is identified in the literature as born global (Oviatt and McDougall, 1994; Knight and Cavusgil, 1996; McDougall and Oviatt, 1994; Bell et al., 2001; Gabrielsson and Kirpalani, 2004) and as so, they capture value (phase 4) from external environment, affecting their capacity of operation, innovation and performance (Efrat and Shoham, 2011). Thus, we deduce that internationalized IT companies from both developing and developed economies carry out similar innovation management. Consequently this paper aims to explore the following questions: (1) How Brazilian and Portuguese IT companies manage innovation process for internationalization? And (2) What are similarities and differences in innovation process between IT companies? At the end, the paper proposes some propositions and research clues to further studies in this field. The paper were divided in two fundamental parts, the first part presents a literature review and the second part propose the case study research and final remarks.

2. Innovation

The process of innovation management depends on the perspectives of innovation. The definition of innovations varies across sub-fields of innovation research. The importance of innovation is imperative (Tidd et al, 2005) or could means as Coopers refers, "It's war: Innovate or die" (Cooper, 2005, p. 4). In literature we can identify several definitions of innovation, Drucker (1985) consider innovation as a specific tool of entrepreneurs, whereby entrepreneurs exploit opportunities to the development of different products or services. Other definition of innovation proposed by OECD (1991) are the technological innovation, mainly applied to manufacturing sector define innovation as an iterative process initiated by the perception of a new market and/or new service opportunity for a technology-based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention. Attending to Garcia and Calantone (2002) this definition addresses two important distinctions: [1] the 'innovation' process comprises the technological development of an invention combined with the market introduction of that invention to end-users through adoption and diffusion, and [2] the innovation process is iterative in nature and thus, automatically includes the first introduction of a new innovation and the reintroduction of an improved innovation.

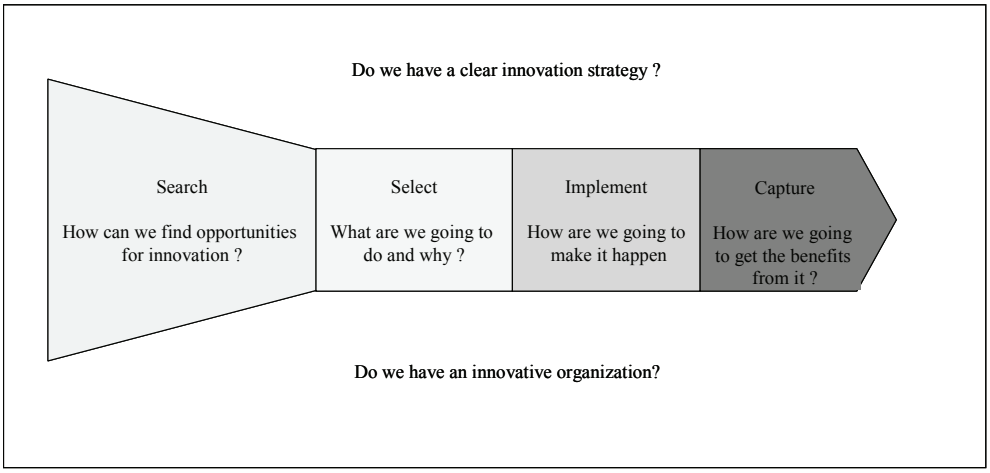
Additionally, it is important to highlight that an invention does not become an innovation until it has processed through production and marketing tasks and is diffused into the marketplace (Freeman, 1991; Layton, 1977; Song and Montoya-Weiss, 1998).

Another perspective of innovation provided by Albury (2005) consider that successful innovation is the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes, efficiency, effectiveness or quality. Innovations vary along different dimensions; type of innovation, degree of novelty of the innovation and type and size of the organization in which the innovation project took place and fifth, the environment/sector in which the innovation was developed. The first, dimension is type of innovation; we can found in the literature authors that's distinguish, for instance, product, process and service innovations (Albury, 2005). However, Joseph Schumpeter (1942) was the first author to propose a classification of innovation according typologies. Schumpeter identified five typologies of innovation associated with entrepreneurial act: (1) Product: the introduction of a new good; (2) Process: the introduction of a new method of production; (3) Business model: the opening of a new market, that is a market (4) Source of supply: the conquest of a new source of supply of raw materials of semi manufactured goods, and (5) Mergers and divestments: the carrying out of the new organization of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position. The second dimension refers to the degrees of innovation novelty and it is possible classified innovation according different criteria's. According with the novelty we can point out radical versus incremental innovations. Radical innovation is really a new product or service and is discontinuous with the past. Incremental innovation refers to an improvement in an existing product or service. While the majority of research takes a firm's perspective toward novelty, others look at new to the world (Song and Montoya-Weiss, 1998) new to the adopting unit (Ettlie and Rubenstein, 1987), new to the industry (Colarelli, 1998) new to the market (Kleinschmidt and Cooper, 1991; Meyers and Tucker, 1989), and new to the consumer (Atuahene-Gima, 1995). The third dimension respects a distinction between innovations private firms and in public organizations. Finally the size of organization is considered, because, management techniques are different in small organizations compared to large ones.

3. Innovation management

Tidd (1997) argued that the research on the innovation management has been highly fragmented, and to a large extent non-cumulative. The reason is related to the three different perspectives of research: management of R&D and technology; new product development and marketing; and organizational development and change. The innovation process is inherently complex, and implies the characterization of the technological market and organizational contingencies that affect the opportunity for innovation. The conceptual model of innovation process used here (figure 1) was firstly proposed by Tidd et al (2005) and then improved by Tidd and Bessant (2009). Depending of the companies' innovation strategy the effort inside each phase is different. A short summary of the phases is presented bellow:

- Search – scanning the environment for processing relevant signals about, threats and opportunities for change. These can take different forms, sometimes integrated (new technologies, new market requirements, changes in legislation, etc.). Once these factors are diverse and not always obvious, it is crucial to implement mechanisms to identify, select and process information (often just "signs") on these drivers of innovation. The main limitation of this is that the search information tends to be more effective but also more limited as the time and experience increased, and may represent a barrier to more radical forms of innovation.
- Select – refers to an effective selection of the various opportunities that may arise, taking into account their potential and strategic alignment with the company and its capabilities and skills (which does not mean it can not be mobilized external expertise in a specific innovation project). The objective of this phase is to resolve these conflicts and determine which projects should move to the next stages of the process.
- Implement – converting the potential idea into something new for internal or external market (enabling innovation). The purpose of the implementation phase is to concretize the opportunities previous identified. The implementation phase is a process that tends to be iterative and gradual. In the early stages the uncertainty is large at all levels. As the process developments, initial problems will be solved and uncertainties are being increasingly smaller. The end of this process will allow the innovation (internally in the case of a new type of business, or externally, on the market, in the case of a new product or service).
- Capture value from innovation – this phase refers to the learning process that allows doing better next time. The innovation process always involves an important component of learning, whether the innovation is successful or its implementation will eventually fail. Moreover, the process that leads to innovation allow creates a competitive advantage to develop incremental innovations later. It opens a path that can last for years and generate new products, processes or services based on an early version.



Source: Tidd and Bessant, 2009

Figure 1: Model of innovation process

Based on these phases, the research proposes an interview guide (annex 1) to capture information indispensable to answer to the research questions. For that we considered four dimensions of innovation (Oslo Manual, OECD, 2005): product, process, marketing and organizational.

4. Innovation and internationalization in IT companies

IT industry is very innovative and one of the biggest investors in R&D activities. In terms of R&D expenditures, patents, and venture capital investment, it exceeds other industries (OECD, 2009). Besides, products, companies, and even services are very globalized on this industry. Expenditure on software R&D has risen most rapidly of all parts of the ICT (Information and Communication Technologies) sector (OECD, 2009). The reason for that is probably because software development is the most important peace to make IT innovative products. According to Frascati Manual (OECD, 2002), identifying R&D component in the process of software development is difficult once “software development is an integral part of many projects which in themselves have no element of R&D. The software development component of such projects, however, may be classified as R&D if it leads to

an advance in the area of computer software" (OECD, 2002, p. 46). Table 1 shows examples of what OECD (2002) consider R&D activity in software.

Table 1: Examples of R&D in software

Should be included in R&D	Should not be included in R&D
R&D producing new theorems and algorithms in the field of theoretical computer science. Development of information technology at the level of operating systems, programming languages, data management, communications software and software development tools. Development of Internet technology. Research into methods of designing, developing, deploying or maintaining software. Software development that produces advances in generic approaches for capturing, transmitting, storing, retrieving, manipulating or displaying information. Experimental development aimed at filling technology knowledge gaps as necessary to develop a software programme or system. R&D on software tools or technologies in specialized areas of computing (image processing, geographic data presentation, character recognition, artificial intelligence and other areas).	Business application software and information system development using known methods and existing software tools. Support for existing systems. Converting and/or translating computer languages. Adding user functionality to application programs. Debugging of systems. Adaptation of existing software. Preparation of user documentation.

Source: OECD, 2002

5. Methodology

The empirical research applies the case study methodology. According with Yin (1994) case study method is most appropriate for the investigation that search questions such as "how" and "why" about a contemporary phenomena about which the researcher has little or no control. Yin (1994) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the limits between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1994, p. 13).

Case studies can be single or multiple-case designs. A multiple design must follow a replication rather than sampling logic. When no other cases are available for replication, the researcher is limited to single-case designs (Yin, 1994). Multiple cases strengthen the results by replicating the pattern matching, thus increasing confidence in the robustness of the theory.

This exploratory study adopted an iterative process of data collection in conducting four case studies built on the results of a semi-structured interviews (see Annex 1 – Interview guide) applied to key-informers from Portuguese and Brazilian IT companies - Altitude, Ydreams, Navita and Stefanini. The interview was applied to key-informers during 4th trimester of 2011 and 1st trimester of 2012. The study aims to suggest hypotheses/propositions for more systematic investigation (Platt, 1992, p. 28). This methodology is applied to study internationalization process (Johanson and Wiedersheim-Paul, 1975) and prior research suggest that a multi-level frameworks can expand our understanding of firm internationalization (Andersson, 2000; Terjesen and Elam, 2009). The research questions explored, already mentioned in introduction, are: (1) How Brazilian and Portuguese IT companies manage innovation process for internationalization? And (2) what are similarities and differences in innovation process between IT companies? Besides semi-structured interviews, documental data was collected in companies websites, journals and other documents.

6. Comparative studies in Brazil and Portugal

The case studies presents a brief description of IT companies (Brazilian and Portuguese) and than present tables that summarize the qualitative information collected and organized according conceptual model of innovation (Tidd and Bessant, 2009).

6.1 Brazilian companies

6.1.1 Navita

Navita is specialized in solutions for mobility, telecom and portals, however, the most important product (and service) of the company is a solution for enterprise mobility management, which includes a range of activities for mobile device control, such as: management of contents available on each device according to level of managers; control of use (ex: data access ability or disability in roaming, etc.); contents management when lost or stolen device; managing the relationship between Navita's clients and telephony operators; maintenance of mobile devices. Navita also provides mobile enterprise applications for mobilizing of regular information systems for its clients. Navita is a company with just over 100 employees, based in Brazil (three sites in different Brazilian states), that support clients all over Latin America. The company was founded in 2003 and has worked with different products, services and business models since then. One of the Navita's founders stated: "the company only survived due to the persistence of both founders, who felt restless until find a competitive opportunity to perform".

In 2009 Navita finally began to operate in its current business, and it has started to internationalize in 2010, motivated by meeting demand of Brazilian multinational companies (clients), which needed support for management of mobile devices in its foreign subsidiaries. Somehow, this new business (and so the company) may be considered a "born global", once it took less than a year to be internationalized. However, less than 2% of revenue comes from overseas. Related to innovation, the company has no formal R&D division. Clients' necessities are the most important motivators for product innovation. The "ideas" of new products, prospected on the clients, goes to the board of company that evaluates their strategic fit and market potential (possibility of extending to other customers). Once approved, an innovation project is formed with multidisciplinary team in order to find technical and financial feasibility. Navita is a service company whose distinction is a network of partners with mutual dependence globally. For example, Navita's mobility management system leads mobile operators to create a market differential in terms of aggregated services for their business customers, on the other hand Navita have wider market by accessing operators' clients. Navita's network includes business telephony operators (ex. Telefónica, TIM, Nextel), device manufacturers (ex. Apple, Nokia, Samsung), local technical assistance (ex: Insomnia Sensebyte Argentina, Rhiscom Chile, Actin México). Table 2 shows company's innovation process according to Tidd and Bessant model (2009).

Table 2: Navita's innovation process

Phases	Results	
Search	Internal sources	Company does not have formal R&D department.
	External sources	Clients are the most important source of new ideas that are used to solve existing problems identified by them. The company has strong international networks and captures ideas from their partners and clients.
Select	Evaluate ideas	Ideas are evaluated considering if they are aligned with the company's strategy and if the product/service may be replicated in other clients. New ideas are transformed into projects (and later into services or products) by a multi skill team, whose employees contribute to different ongoing projects.
Implement	Four dimensions of innovation	Company mainly has organizational and marketing innovation by developing new ways to attend client (new business model). It used its experience in Brazil to act abroad; all the accumulated learning that company has performed in a huge and diverse country like Brazil (with 27 states with different law and taxation) is used to meet client's necessities in other countries. As intellectual property, company uses agreement for industrial secrets. Time for applications in IP offices is considered too long for the necessity of companies' products.
Capture	Strategies for internationalization and the importance of innovation	It was internationalized by following clients' demands abroad. Characteristics of the main company's product/service (enterprise mobility management) are essentially global.

6.1.2 Stefanini IT solutions

Stefanini was established in 1987 and has become a major international technology company (about 16 thousand employees) that offers products and services such as: consulting services (divided in vertical sectors or industries), software development and integration, Business Process Outsourcing - BPO. Company is not focused on development of innovative products, instead its differential, when compared to its competitors, is rapidity of software development and service provision for clients. It is a vantage mainly developed due its capacity of process innovation and a proprietary tool that is software for controlling of routine's library. This tool was developed by Stefanini in order to control use of functions / algorithms already developed by its programmers and software analysts around the world.

Stefanini is one of the most internationalized Brazilian company with subsidiaries located in Americas, Europe and Asia. It's first FDI (foreign direct investment) was in 1996, in Argentina. This was the first step of a gradual intensification of internationalization, very similar to Uppsala Model (Johanson, Vahlne, 1977). The following stages included subsidiaries in other countries in America (including USA) until 2001, Europe by 2003, and finally Asia in 2006. In 2012 it has operational units in 28 countries and software factory in 8 countries besides Brazil: United States, Mexico, Colombia, Peru, Argentina, Romania and India. See Stefanini's innovation process in Table 3.

Table 3: Stefanini's innovation process

Phases	Results	
Search	Internal sources	Company does not have formal R&D department, but a software development department (called software factory) which is responsible not only for traditional software development but also for products incremental innovativeness. New ideas come mainly from specific consulting areas (directly evolved to client's needs). There is an internal system to stimulate (and help) employees to transform new ideas into product innovation.
	External sources	It has grown acquisition of companies (mainly startups) with technological solution for a product improvement.
Select	Evaluate ideas	Ideas are evaluated considering if they are aligned with the company's strategy and if the product/service may be replicated in other clients.
Implement	Four dimensions of innovation	Technological innovation is for process once companies' products are traditional and incremental innovation depends on few innovative developments. Copyright is used as intellectual property, but this is not essential for company.
Capture	Strategies for internationalization and the importance of innovation	Internationalization motivated by market expansion for traditional products in the 1990's; global competitiveness (specially with Indian companies) led Stefanini to search differential in process.

6.2 Portuguese companies

6.2.1 Altitude software

Altitude is a IT Portuguese company founded in 1993 as Easyphone that provides a Unified Customer Interaction (UCI) suite over IP manages, measures, and improves relationships with customers from small to large organizations worldwide. Altitude Software is also recognized for its leadership in the contact center outsourcing market. Nowadays Altitude Software has 300 employees, offices in 16 countries and 1100 live installations worldwide in about 80 countries. In the terms of sales and distribution, Altitude serves its customers either directly or through a wide network of partners. Altitude Software Partner Network (ASPN) has more than 160 members promoting Contact Center solutions using Altitude's products and services. Altitude partners with companies like Siemens, NextiraOne and other local and global Systems Integrators like British Telecom Global Services, Atos Origin, Mantis Informatics, Mellon Technologies, Fujitsu Services and many other companies spread all over the world committed to offer superior Customer Interaction Solutions. And, company has also about 1100 live installations worldwide in about 80 countries. Additionally, as a truly global and multicultural

organization, Altitude combines various languages from 25 nationalities. See Altitude's innovation process in Table 4.

Table 4: Altitude's innovation process

Phases	Results	
Search	Internal sources	Company has R&D department, with a significant relative budget. Also have complementary methodologies to generate new ideas and stimulate creativity.
	External sources	Altitude has international networks and captures ideas from their partners, clients, suppliers, universities and research institutes and other international networks. Also the competitors can be an important source of new ideas. However the clients are the most important stakeholder and frequently follow the clients in their internationalization process. And mostly generating new ideas to solve existing problems identified by clients.
Select	Evaluate ideas	Company evaluate the ideas considering market trends and competitors. They also evaluate the possibility of products replication and consequently the standardization for different markets with small adjustments.
Implement	Four dimensions of innovation	Altitude mainly develops product innovation. The innovation is protected though copy rights because the investment in patents are hard and. bureaucratic There are a gap between the patent process, that is too large and the product life-cycle that is too short.
Capture	Strategies for internationalization and the importance of innovation	It is possible to identify several internationalization strategies depending from company lifecycle. Sometime these companies prefer in a first stage, expand to large markets with fast financial returns. Others identify the markets according with technological partnerships and others follow the clients. Some Asian countries are important markets.

6.2.2 YDreams

YDreams is a global company, founded in 2000 with a strong linkage with university (the founder is professor and researcher) that is redefining the interactivity concept with a particular focus on the field of Natural User Interfaces and Augmented Reality.

Combining technology, art and design, the company conceives full-scale interactive environments and experiences, and innovative products that are transforming the way we interact with information and contents. The year 2004 marks the internationalization phase of the company with the opening of an office in Barcelona, in 2007 opening of an office in Austin, Texas.

The company has 120 employee and offices in Lisbon, Barcelona, Austin, Rio de Janeiro and São Paulo, and developed over 500 projects for clients around the world, such as Adidas, Vodafone, Nokia, TMN, Barclays, Coca-Cola, Santander, BBC, JCDecaux, IDEO, among others, and partnerships with Microsoft, Siemens, Geodan, Grupo Portucel Soporcel, Sonae Indústria and Corticeira Amorim. Table 5 presents YDreams innovation process.

Table 5: YDream's innovation process

Phases	Results	
Search	Internal sources	Company has R&D department and develops its own proprietary interaction technologies with a focus on Natural User Interfaces, the field of Augmented Reality, computer graphics, mobile computing and robotics, in-house.
	External sources	YDreams has international networks and develop some products in partnership. The company's proprietary technologies and ongoing R&D are also the launch pad for three unique spin out companies - Ynvisible, YVision and YDRobotics, and Audience Entertainment, a joint venture with a North-American partner.
Select	Evaluate ideas	Company evaluate the ideas considering market trends

		and competitors.
Phases	Results	
Implement	Four dimensions of innovation	YDreams mainly develops product innovation. The innovation is protected through legal mechanisms (copy right, patents) but also with secrecy implied by labour contracts.
Capture	Strategies for internationalization and the importance of innovation	YDreams identify the markets according with technological partnerships and following clients.

6.3 Brazilian and Portuguese IT companies – comparative analysis

We studied two different Brazilian companies successfully internationalized. Stefanini is a huge multinational with traditional products (software) and innovative process for software factoring, which ensured its global competitiveness. Navita is a small company with an innovative idea transformed into its main product and service that depends much more of organizational innovation (with real network) than of technological innovation. Both companies have in common an inability for R&D management (neither of them have formal R&D department) and do not consider technological innovation important to compete.

Although technological innovation is not a motivational force for internationalization, both companies have improved its products by global agreements. Navita is totally dependent not only of commercial network but also of technological partners to change and adapt its products and services abroad. Stefanini realized recently that acquisition of some innovative companies (in Brazil and abroad, mainly USA) is important to find solutions that fit properly their products improvements.

The analysis of the results reveals some similarities for both Portuguese companies. In fact, it was possible to understand that the opportunities and threats faced by Altitude Software and Ydreams are comparable and the strategic options undertaken during each stage of the innovation process (search, select, implement and capture) are similar. Both of Portuguese firms invest in R&D, establish international partnerships with others firms or clients and decide to internationalize early.

The comparison between Brazilian and Portuguese IT companies allows identifies some similarities and some differences considering the theoretical support of these study (Tidd and Bessant, 2009).

Concerning the stage of development of the Portuguese companies, both faced a period of expansion stage, however due to international crisis, particularly Ydreams is facing some difficulties related to its fast growing process. On the other hand, the current international crisis did not (yet) impact Brazil, thus the Brazilian studied companies are in an expansion stage of development. The market opportunities Brazilian companies faced in a recent period (since 2009), both nationally and internationally, led them to take higher risks not only in terms of international expansion but also of innovation investments.

Table 6 presents similarities and differences in order to answer to second question and what are similarities and differences in innovation process between IT companies? Table 6, also suggest some propositions derived from case studies research and in order to consolidate the results present some references that identify comparable results (Terjesen and Elam, 2009).

Table 6: Similarities and differences between Brazilian and Portuguese IT companies

	Comparative study	**Propositions**	**References**
Similarities	International partnership.	*P1: Technological innovation is not a motivational force for internationalization, companies improved its products by global agreements and partnership*	Knight and Cavusgil, 1996; Williamson, 1999; Li, 1988; Li, 2008; Zahra et al, 2000; Lubatkin et al, 2001; Johanson and Vahlne, 2003.
	Internationalization by following the clients.	*P2: IT companies following their clients in internationalization process*	Bell, 1995.
	The profile of the founding entrepreneurs influences the	*P3: The entrepreneurs profiles influences the internationalization of IT companies*	McDougall et al, 1994; Bloodgood et al, 1996; Andersson, 2000, 2002; Ibeh and Young, 2001;

	internationalization of IT companies.		Westhead et al, 2001; Moen, 2002.
	Comparative study	**Propositions**	**References**
Differences	A large markets imply a slower process of internationalization; Companies just initiate an internationalization strategy when local market is saturated.	*P4.1: Large markets imply a slower process of internationalization.* *P4.2: Companies born in large markets just initiate an internationalization strategy when local market are saturated*	Madsen and Servais, 1997.
	A small market determines a higher investment in R&D; A small market implies an earlier and fast internationalization process of IT companies.	*P5.1: IT companies born in small markets present higher investment in R&D* *P5.2: IT companies had born in small markets present a fast and earlier process of internationalization and higher propensity to become born global*	Vernon, 1966; Crick and Jones, 2000; Andersson, 2004; Carvalho, 2010.

7. Concluding remarks

The study suggests some evidences about IT companies in Portugal and Brazil. Historically, most IT companies born as start ups, the founders are very qualified and have strong links with universities and other sources' of R&D. The entrepreneurs' profile, influences the innovation process and internationalization of IT companies, most of the founding entrepreneurs studied or worked abroad before starting the venture. Due to the company international orientation the founders recruit human resources with high qualifications and an international profile. IT companies are players in international markets and generally have a fast growing process, some of them referenced in literature as fast growing gazelles (Henrekson and Johansson, 2010; Acs, 2011). The entrepreneur's profiles and the international networking/partnership are determinants for the growing process of IT companies and their internationalization. This discussion contributes to a recently studied issue: the importance of international network of entrepreneurs and intra-entrepreneurs (Whelan, 2011). Part of these companies is indentified in the literature as born global (Oviatt and McDougall, 1994; Knight and Cavusgil, 1996; McDougall et al, 1994; Bell et al., 2001; Gabrielsson and Kirpalani, 2004) and as so, they capture value (phase 4, tables 2,3,4 and 5, innovation process) from external environment, affecting their capacity of operation, innovation and performance (Efrat and Shoham, 2011).

The results besides suggest that some internationalization strategies are mainly dependent from their clients internationalization process, these pattern are more evident in companies that provides essentially services (Bell, 1995).

The case studies also reveal differences mainly based in the dimension of domestic market and degree of economic development of studied countries. On the one hand, in the Brazil, a large market implies a slower internationalization process, because the companies just initiate the internationalization when local market is saturated. On the other hand, a small market in a developed country implies higher investment in R&D and a fast and earlier process of internationalization (Vernon, 1966; Madsen and Servais, 1997; Crick and Jones, 2000; Andersson, 2004).

Finally we believe that within the existing literature, the original contribution of the paper lies on its comparison of innovation management of IT companies in two countries in different stages of development and with different dimensions of domestic market. Additionally the study identified clues and suggests a set of testable propositions that could be empirically confirmed or disproved. Considering the scarcity of comparative studies applied to IT companies, particularly in the cases of Portugal and Brazil, further work could investigate other companies, and develop some studies related to the findings of these study, such as, the relation between the degree of development and internationalization strategies; R&D and type of the market; entrepreneurs profiles and mindsets in different countries, etc. and also could contributes to the formulation of policies through the influence of policy makers to become more aware to the role of IT companies and promote a more close international trade policy between countries in the similar trajectories.

Annex 1: Interview guide (semi-structured interview)

Main goal	Specific goals
How can ideas for innovation be find? (PHASE: SEARCH)	Find internal sources of innovation Find external sources of innovation
How are the ideas assessed? (PHASE: SELECT)	Identify methods to evaluate the ideas
How to protect the new ideas? (PHASE:IMPLEMENT)	Innovation typologies
How to management the patent portfolio, internationalization strategy linked with new products or innovation process, etc (PHASE:CAPTURE)	Understand the options for commercialization of products and that strategies to protect innovation Identify the strategy for selecting markets to commercialize new products

References

Acs, Z. (2011) "High impact firms: Gazelles revisited" in *Handbook of research on entrepreneurship and regional developmen*t edited by Michael Fritsch, Edward Elgar, Cheltenham, UK, pp. 133-174.

Andersson, S. (2000) "Internationalization of the firm from an entrepreneurial perspective" International Studies Management Organization, 30(1), pp. 63-92.

Andersson, S. (2002) "Suppliers' international strategies" European Journal of Marketing, 36 (1/2), pp. 86-110.

Andersson, S. (2004) "Internationalization in different industrial contexts" Journal of Business Venturing, 19, 6, pp. 851-875.

Albury, D. (2005). "Fostering Innovation in Public Services." Public Money & Management, 25 (1), pp. 51-56.

Atuahene-Gima K. (1995) "An exploratory analysis of the impact of market orientation on new product performance: a contingency approach" Journal of Product Innovation Management, 12, pp. 275– 93.

Bell, J. (1995) "The internationalization of smaller computer software firms- A further challenge to stage theories" European Journal of Marketing, 28, 8, pp. 60-75.

Bell, J.; McNaughton, R.; Young, S.; Crick, D. (2001) "Born-again global' firms – An extension to the 'born-global' phenomenon", Journal of International Management, 7(4), pp. 173-189.

Bloodgood, J.; Sapienza, H.; Almeida, J. (1996) "The internationalization of new high-potential U.S. ventures: antecedents and outcomes" Entrepreneurship Theory and Practice, pp. 61-76.

Carvalho, L. (2010), "Innovation propensity of multinational firms in the service sector", Journal of Transnational Management, 15(1), pp. 26-45.

Cassiman, B.; Golovko, E. (2011) "Innovation and internationalization through exports" Journal of International Business Studies, 42(1), pp. 56–75.

Colarelli O'Connor G. (1998) "Market learning and radical innovation: a cross case comparison of eight radical innovation projects" Journal of Product Innovation Management, 15(2), pp. 151–66.

Cooper, R. G. (2005). *Product Leadership*. USA: Basic Books.

Crick, D.; Jones, M. (2000) "Small high technology firms and international high technology markets" Journal of International Marketing, 8 (2), pp. 63-85.

Drucker, P. F. (1985). *Innovation and Entrepreneurship*. UK: Pan Business Management.

Efrat, K.; Shoham, A. (2011) "Environmental characteristics and technological capabilities' interaction in high-technology born global firms" European Journal of International Management, 5(3), pp. 271-284.

Ettlie JE, Rubenstein AH. (1987) "Firm size and product innovation" Journal of Product Innovation Management, 4, pp. 89–108.

Freeman C. (1991) "The nature of innovation and the evolution of the productive system." In: OECD, editors. *Technology and productivity the challenge for economic policy*. Paris: OECD, pp.303–14.

Gabrielsson, M.; Kirpalani, V. (2004) "Born globals: how to reach new business space rapidly", International Business Review, 13(5), pp. 555-571.

Garcia, R.; Calantone, R. (2002) "A critical look at technological innovation typology and innovativeness terminology: a literature review" The Journal of Product Innovation Management ,19, pp. 110-132.

Hamel, G.; Prahalad, C. (1994) *Competing for the Future*. Boston: Harvard Business School Press.

Hansen, M.T.; Birkinshaw, J. (2007) "The innovation value chain", Harvard Business Review, v.85, 6, pp. 121-130.

Henrekson, M.; Johansson, D. (2010) "Gazelles as job creators: a survey and interpretation of the evidence" Small Business Economics, v. 35, 2, pp. 227-244

Ibeh, K.; Young, S. (2001) "Exporting as entrepreneurial act-an empirical study in Nigerian firms" European Journal of Marketing, 35, (5/6), pp. 566-586.

Johanson, J.; Wiedersheim-Paul, F. (1975). "The Internationalisation Process of the Firm: Four Swedish Case Studies" Journal of Management Studies, 12(3), pp. 305-322.

Johanson, J.; Vahlne, J.E. (1977). "The internationalization process of the firm: a model of market knowledge and increasing foreign market commitments" Journal of International Business Studies, v. 8, pp. 23–32.

Johanson, J., Vahlne, J. (2003) "Business Relationship, Learning and Commitment in the Internationalisation Process" Journal of International Entrepreneurship, 1(1), pp. 83-101.

Kafouros, M., Buckley, P., Sharp, J., Wang, C. (2008) "The role of internationalization in explaining innovation performance" Technovation, 28, pp. 63–74.

Kleinschmidt EJ, Cooper RG. (1991) "The impact of product innovativeness on performance" Journal of Product Innovation Management, 8, pp. 240 –51.
Knigth, G.; Cavusgil, S. (1996) "The born global firm: A challenge to traditional internationalization theory" Advances in International Marketing, 8(1), pp. 11-26.
Layton E. (1977) "Conditions of technological development". In: de Solla Price D, Spiegel-Rosing ID. *Science, technology, and society,* Beverly Hills, CA: Sage Publications
Li, P. (1998) "Toward a geocentric framework of organizational form: a holistic dynamic and paradoxal approach" Organization studies, 19, pp. 829-861
Li, P (2008) "Toward a geocentric framework of trust: an application to organizational trust" Management and Organization Review, 4, pp. 296-318
Lubatkin, M.; Florin, J.; Lane, P. (2001) "Learning together an apart: a model of reciprocal interfirm learning" Human Relations, 54, pp.1353-1382.
Madsen, T.; Servais, P. (1997) "The internationalization of born globals: an evolutionary process?" *International Business Review*, 6, pp. 561-583.
McDougall, P.; Shane, S.; Oviatt, B. (1994) "Explaning the formation of international ventures" Journal of International Venturing, 9, pp. 469-487.
Meyers PW, Tucker FG. (1989) "Defining roles for logistics during routine and radical technological innovation" Journal of Academy of Marketing Science, 17(1), pp. 73–82.
Moen, O. (2002) "The born globals a new generation of small European exporters" International Marketing Review*,* 19 (2), pp. 156-175.
OECD (2001) "Drivers of Growth: Information Technology, Innovation and Entrepreneurship" Science, Technology and Industry Outlook 2001, OECD Publishing
OECD (2002) Frascati Manual: the measurement of scientific and technological activities.
OECD (2005) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition.
OECD (2009) The Global Information Technology Report 2008-2009. World Economic Forum.
Oviatt, B.; McDougall, P. (1994) "Toward a theory of international new ventures" Journal of International Business Studies, 25(1), pp. 45-64.
Pelham A.; Wilson D. (1996). "A longitudinal study of the impact of market structure, firm structure, strategy and market orientation culture on dimensions of small-firm performance*"* Journal of the Academy of Marketing Science*,* 24(1), pp. 27–43.
Platt, J. (1992) "'Case study' in American methodological thought". Current Sociology, 40, 17–48.
Schumpeter, J. (1942) *Capitalism, Socialism and Democracy*, Harper, New York.
Song MX, Montoya-Weiss MM. (1998) "Critical development activities for really new versus incremental products" Journal of Product Innovation Management, 15(2), pp. 124 –35.
Terjesen, S.; Elam, A. (2009) "Transnational entrepreneurs' venture internationalization strategies: A practice theory approach" Entrepreneurship Theory and Practice, pp. 1093- 1120.
Tidd, J. (1997) "Complexity, Networks & Learning: Integrative Themes for Research on Innovation Management" International Journal of Innovation Management, v. 1, 1, pp. 1-21
Tidd, J. Bessant, J,, Pavitt, K. (2005) *Managing innovation: Integrating technological, market and organization change*, Sussex, John Wiley & Sons.
Tidd, J.; Bessant, J. (2009) *Managing Innovation: integrating technological, market and organizational change*. 4th ed. Sussex: John Wiley & Sons.
UNCTAD.(2010) World Investment Report.
Vernon, R. (1966) "International investment and international trade in product life cycle" Quarterly Journal of Economics, 80, pp. 190-207.
Zahra, S.; Ireland, R.; Hitt, M. (2000). "International expansion by new venture firms: international diversity, mode of market entry, technological learning, and performance" Academy of Management Journal, 43(5), pp. 925-950.
Yin, R, (1994), *Case Study Research*. Design and Methods, Sage Publications, London.
Westhead, P.; Wright, M.; Ucbasaran, D. (2001) "The internationalization of new small firms: a resource-based view" Journal of Business Venturing, 16, pp.333-358.
Williamson. O.E. (1999) "Strategy research: governance and competence perspectives" Strategic Management Journal, 20, pp 1087-1108.
Whelan. E. (2011) "It's who you know not what you know: a social network analysis approach to talent management" European Journal of International Management, 5(5), pp. 484–500.

Enterprise Potential of Portuguese Students Fostered by an Entrepreneurship Education Program

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Abstract: Several actions to promote entrepreneurship have been carried out with the aim of providing young people with entrepreneurial skills essential to address global change and to engage in innovative activities critical to countries' competitiveness. Entrepreneurship education is based on the recognition of the importance of familiarity, during childhood and adolescence, within the context of small businesses and the ability to stimulate motivation and the attributes and skills related to entrepreneurship through educational experiences, in order to present it as a career option and promote the latent enterprise potential of young people. Although the numerous ongoing Entrepreneurship Education Programs (EEP), it has not been made an independent evaluation of their alleged benefits, especially in pre-University Education. The purpose of this study is to assess the contribution of an EEP, addressed to the Secondary education, for young participants' desire for future self-employment and for the development of attitudes towards characteristics commonly associated with entrepreneurship, including achievement motivation, personal control, creativity, leadership and intuition. Demographic characteristics that, according to the literature, may influence the attitudes toward entrepreneurship and propensity for venture creation, have been included as the influence of family role models, gender, ethnic backgrounds of young people, parents emigration experience, the type of school attended, repeated participation in EEP and the cultural context. To collect data, a questionnaire was completed by students participating in the *EMPRE* Program – *Entrepreneurs at School*, implemented in a total of five secondary schools (the study population) in the academic year 2009/2010, obtaining 182 answers. It was used a control group for comparison of results. In opposition to previous research conducted abroad, we didn't find evidence that participation in the EEP can foster positive attitudes toward self-employment since the preference of the Portuguese youths, in terms of a career choice, has to do with their professional exercise as employees. However, the study found that participants in the EEP displayed greater enterprise potential than nonparticipants, pointing to the need for an extended discussion on the suitability of the methodology behind the EEP. The conclusions also suggest the possibility of a leakage of the Portuguese youths' potential and the resources spent by schools and the promoters of the EEP that, judging by the intentions expressed by students, will not have the desired returns in terms of independent business creation. Furthermore, the study highlights the relevance of cultural context in the development of enterprise potential, recommending a more aware transference of EEP to diverse cultural environments.

Keywords: entrepreneurship, education, latent enterprise potential, attitudes

1. Introduction

The rising unemployment rate and the increasingly uncertain labour market are among the reasons that have given rise to the numerous actions promoting entrepreneurship (Lee & Wong, 2005; Simões, 2010) in the European Union. Additionally, the phenomenon of globalization and the consequent obligation to make Europe more competitive has turned the development of an "entrepreneurial culture" into a political imperative (Gibb, 2002).

Young people must be prepared for the unlikelihood of having a job for a lifetime and many will experience periods of unemployment. Thus, they will have to use their abilities to create their own jobs and accept self-employment as a viable life project (Gibb, 1987, 1993, 2002; Hitty & O'Gorman, 2004).

The main purpose of this research is to evaluate the influence that participation in the Entrepreneurship Education Program (EEP) *EMPRE – Entrepreneurs at School* had on students' attitudes towards self-employment and their enterprise potential, using the Attitudes Toward Enterprise (ATE) test, developed by Athayde (2009). The EEP *EMPRE*, designed from the *EJE* Program (*Empresa Jóven Europea*), developed by *Valnalón*, a Spanish public company, was applied

in Portugal in the academic year 2009/2010 in a total of 5 secondary schools and comprises the creation and management of a company in school during an academic year. This methodology is frequently used in EEP because small business, allegedly, provides a context of uncertainty demanding entrepreneurial behaviour which will be stimulated through a learning environment that promotes discovery and learning by doing (Gibb, 1993).

The present article is organised into four additional chapters. Chapter 2 presents an analysis of the EEP, to better understand the importance of their evaluation, and a review of previously developed research on EEP evaluation. Chapter 3 describes the data collecting procedures and research methodology. The results and its comparison to preceding studies are revealed in Chapter 4, followed by the discussion of results and conclusions, in Chapter 5.

2. Literature review and hypotheses

2.1 Entrepreneurship education

It seems there is no consensus about what entrepreneurship entails (Fatoki & Chindoga, 2011; Hansemark, 1998) and what is involved in the pursuit of an entrepreneurial culture (Gibb, 1987, 2002).

In an educational context, entrepreneurship can be properly defined as a set of enterprising behaviours supported by certain skills and attributes. Those behaviours can be displayed in several circumstances and organisations (Gibb, 1987, 1993, 2002; Hytti & O'Gorman, 2004; Lee & Wong, 2005).

It is believed that entrepreneurship education is closely connected to the development of an entrepreneurial culture which recognizes the values of competitiveness, innovation and creativity (Gibb, 1987; Lee & Wong, 2005). Entrepreneurship education at the pre-college level is considered a multifaceted education and pursues comprehensive goals (Gibb, 1993; Hansemark, 1998), such as the encouragement of fundamental skills, essential to address the current labour market and cope with the global change (Gibb, 2002; Hitty & O'Gorman, 2004).

According to Walstad & Kourilsky (1998), it is particularly important to deliver entrepreneurship education at early ages, providing educative experiences, in order to encourage potential entrepreneurs, promote an enterprising culture and improve the perceived desirability and feasibility for entrepreneurship. Furthermore, it is useful to introduce youths to entrepreneurship as a career option, since it's during schooling years that they begin to think about professional future (Walstad & Kourilsky, 1998; Westhead *et al*., 2000; Peterman & Kennedy, 2003).

2.1.1 The need for evaluating the EEP

In order to properly defend the use of EEP, it will be necessary to evaluate their effect on students' behaviours (Gibb, 2002). Although there is evidence that teachers in the classroom are able to monitor the development of such behaviours (Gibb, 2002), the assessment of the outcomes of EEP generally rely on participants' opinions, a procedure that has several limitations (Westhead *et al*., 2000), or the simple monitoring by the promoting organisations (Athayde, 2009). Nevertheless, there is an urgent need to effectively measure the impact these programs have, to ensure that their objectives are achieved (Lee & Wong, 2005), since the haste with which they are being implemented have not yet permitted to evaluate their effectiveness (Gibb, 1987; Athayde, 2009).

Peterman & Kennedy (2003), in Australia, and Athayde (2009), in the United Kingdom, found that the participation in an EEP promoted young students' desire for self-employment. Peterman & Kennedy (2003) recorded changes in perceived venture desirability and feasibility, arising from participation in the EEP. Westhead *et al*. (2000) assessed the contribution of an EEP to participants' attitudes towards self-employment compared to nonparticipants, suggesting that additional longitudinal studies should be conducted in cultural and economic different environments.

2.2 Attitude theory vs. trait theory

Models based on personality traits were previously used to explain the entrepreneurship process, having been disregarded by Robinson *et al.* (1991), Krueger & Brazeal (1994), McCline *et al.* (2000),

Peterman & Kennedy (2003) and Athayde (2009), who share the attitudinal approach to entrepreneurship.

Gibb (1993) supports that some characteristics of entrepreneurial behaviour are not fixed personality traits and thus can be acquired via experience and training. According to the contingency theory of entrepreneurial behaviour implicit in the former approach, entrepreneurial behaviour can be induced and/or enhanced by the environment. This was also reinforced by Littunen (2000) who realized that entrepreneurial characteristics evolve throughout the entrepreneurial process. Intentions model focusing on attitudes and their antecedents was used by Krueger & Brazeal (1994) and Peterman & Kennedy (2003).

Robinson *et al.* (1991) identified four of the numerous attitudes commonly associated, in the literature, with entrepreneurship (need for achievement, locus of control, self-esteem and innovation) and developed the Entrepreneurial Attitude Orientation (EAO) scale.

McCline *et al.* (2000) updated the EAO scale including additional constructs to measure attitude to risk willingness and attitude to opportunity recognition, presenting a more extensive measure of the entrepreneurial orientation. Their efforts were followed by Athayde (2009) who developed the ATE test.

2.3 Latent enterprise potential and dimensions of the entrepreneur

Krueger & Brazeal (1994) presented the notion of entrepreneurial potential and distinguished between the entrepreneurial potential and the intention to become entrepreneurial since potential entrepreneurs do not need to have a clear intention toward starting a business; their potential (pre-existing preparedness to accept an opportunity) "is latent and is causally and temporally prior to intentions" (Krueger & Brazeal, 1994).

Using the model of Krueger & Brazeal (1994) with the necessary adjustments due to the target population of her investigation (young people at school) Athayde (2009) introduced the notion of latent enterprise potential as a "constellation of attitudes" toward five dimensions commonly associated with entrepreneurship: creativity, personal control, achievement, intuition and leadership (Athayde, 2009). The model developed by Athayde (2009) that supported the ATE test was used in the present investigation (Figure 1).



Figure 1: Model of latent enterprise potential in young people

2.4 Entrepreneurs' demographic characteristics

Entrepreneurial motivations are strongly related with having a role model, as revealed by several studies (Walstad & Kourilsky, 1998). Auken *et al.* (2006) stated that role models can affect the entrepreneurial intentions and career choice because of their influence on perceptions about one's ability to be successful in a new venture. According to Athayde (2009) and Simões (2010) the existence of family antecedents with businesses of their own is one of the aspects influencing the propensity to venture creation.

Regarding the effect of gender differences on students' entrepreneurial attitudes, Kourilsky & Walstad (1998), Athayde (2009), and Dabic *et al.* (2010) concluded that boys seem to be more willing to start a business than girls. Ethnic background is another demographic characteristic listed in the literature on entrepreneurship. Walstad & Kourilsky (1998) revealed that black youths expressed a stronger

interest in starting a business of their own than white youths. This was corroborated by Athayde (2009).

The type of school attended was presented by Athayde (2009) as influencing students' enterprise potential. She found that private schools' pupils scored higher at the ATE test than those at public schools, confirming prior investigation mentioned by her.

2.5 Entrepreneurship and culture

The assertion that some societies show greater predisposition toward entrepreneurship than others, led Thomas & Mueller (2000) to question the relevance of culture on the potential for and frequency of entrepreneurship. They observed the prevalence of four characteristics (risk-taking, locus of control, innovativeness and energy level) in different cultural settings, in order to comprehend whether culture, representing the value system of a society, affects the development of the entrepreneurial potential in different societies. They also intended to verify if the existing entrepreneurship research, mostly generated in the United States, United Kingdom and Scandinavia, would apply in different cultural contexts. Results showed that only one of the traits observed (innovativeness) doesn't vary systematically between cultures, strengthening the above assertion (Thomas & Mueller, 2000).

Based on Max Weber's work on Protestant work ethic, in which he argues that cultural and religious factors explain differences in entrepreneurial activity between societies, McClelland (1961) held that the need for achievement is determined by some societal factors, such as parental influences, and determines the entrepreneurial propensity within a society.

Rego (2004) found that, despite the recently growing achievement motive, there is still a propensity for affiliation in Portuguese motivational profile, consistent with the pattern drawn by McClelland (1961) about Portugal. With regard to Hofstede's cultural dimensions, Rego (2004) pointed out that the Portuguese pattern is symmetric of the cultural pattern drawn to Great Britain (and the United States), considering the position of each country in the model of Hofstede (1980, 1991) (Table 1).

Table 1: Cultural indices on Hofstede's model (1991)

Country	Hierarchical distance	Individualism	Masculinity	Uncertainty control
Portugal	63	27	31	104
Great Britain	35	89	66	35

Portuguese national culture doesn't encourage risk-taking and individual responsibilities and therefore restricts the level of entrepreneurship. So the population is perceived as having low entrepreneurial propensity (GEM Portugal, 2004).

The importance of cultural issue adds another challenge to the entrepreneurship teaching process, since pupils apprehend lessons in different ways depending on the cultural context in which they are (Gibb, 2002).

Based on the Literature Review and on the research of Athayde (2009), the hypotheses to be tested were:

- H1: Participants in the EEP are more willing than nonparticipants to run their own business in future.
- H1a: Participants in the EEP will score higher in the ATE test than nonparticipants.
- H2: Male and female students will differ in their desire for business ownership.
- H2a: ATE test scores will differ between male and female students.
- H3: Pupils with at least one self-employed parent and those with none will differ in their desire for business ownership.
- H3a: ATE test scores will differ between pupils with at least one self-employed parent and pupils with none.
- H4: Pupils from different ethnic backgrounds will differ in their desire for business ownership.
- H4a: ATE test scores will differ between pupils from different ethnic backgrounds.

- H5: Pupils at private schools and those at public schools will differ in their desire for business ownership.
- H5a: ATE test scores will differ between pupils at private and public schools.
- H6: Pupils with at least one parent with experience of emigration and those with none will differ in their desire for business ownership.
- H6a: ATE test scores will differ between pupils with at least one parent with experience of emigration and those with none.
- H7: Pupils with repeated exposure to EEP and those with only one participation will differ in their entrepreneurial intentions.
- H7a: ATE test scores will differ between pupils with repeated exposure to EEP and those who have participated just once.
- H8: ATE test scores will differ between Portuguese and English pupils.

The first hypothesis was concerned with how the participation in the EEP contributed to pupils' desire of running their own business in the future.

Hypotheses 2, 3, 4, and 5 were intended to evaluate the influence of demographic characteristics on pupils' intention to create their own job. Hypotheses 2a, 3a, 4a and 5a were developed to assess the impact of those demographic characteristics on youths' latent enterprise potential, measured by the ATE test.

Shapero & Sokol (1982) suggest that important life events, such as migration, may provide increased entrepreneurial activity. Given that immigration leads to the assimilation of the host society's cultural characteristics by the migrant so that he can integrate into that society, and given the presence of a not insignificant percentage of Portuguese students whose parents are or were emigrants, and given also the influence of behavioural models on entrepreneurial intentions, hypothesis 6 was intended to check the effect of parents' experience of emigration on pupils' self-employment motivation.

Hypothesis 6a was advanced to assess the impact of the previous factor on students' latent enterprise potential, as measured by the ATE test. Hypothesis 7 was designed to investigate the influence of repeated exposure to EEP on youths' desire to become self-employed and hypothesis 7a was intended to assess the contribution of repeated exposure, based on the ATE test scores.

Hypothesis 8 was advanced to evaluate whether national culture influences youths' latent enterprise potential, measured by the ATE test.

3. Data and research methodology

3.1 Research methodology

We first identified, by consulting the *EJE* website (http://www.valnaloneduca.com/eje/), the five Portuguese schools where the *EMPRE* Program had been offered in the academic year 2009/2010, and all of the 229 participants (the study population), defining the test group. It was used a control group for comparison of results, drawn from the same schools as participants and matched in terms of type of school, school grade and gender.

To collect data, a self-administered questionnaire was mailed to the participant schools' Principal (Table 2) to be completed in the classroom by students. The high response rate obtained ensures that a representative sample of participants was incorporated in the research. This and the use of a control group permits to overcome several limitations of training evaluations (Westhead *et al*., 2000; Athayde, 2009).

The questionnaire was designed and previously tested by Athayde (2009). It was translated and properly adjusted in its second part to the Portuguese social and educational systems.

The first part of the questionnaire consists of the ATE test itself. The second part of the questionnaire aims to gather information on a range of demographic characteristics of the respondents (age, gender, ethnic backgrounds, type of school attended, school grade, parents' type of work,

qualifications and emigration experience) and their qualification and career expectations. It was also included one last question asking whether the students had been previously exposed to an EEP.

Table 2: Questionnaires sent to schools

School - Place	Questionnaires Sent		Questionnaires Recceived	
	Participants at EEP	Nonparticipants	Participants at EEP	Nonparticipants
School - Mação	49	44	34	34
School - Tramagal	20	20	18	14
Solano Abreu's School - Abrantes	104	109	93 (88 valid)	90
Miguel Almeida´s School - Abrantes	29	31	16	31
Vizela's High School - Vizela	27	25	26	5
TOTAL	229	229	187 (182 valid)	174

3.2 Data

There were 184 male and 172 female respondents (Figure 2) ranging in age from 13 to 21 with a median age of 15.5 years old.

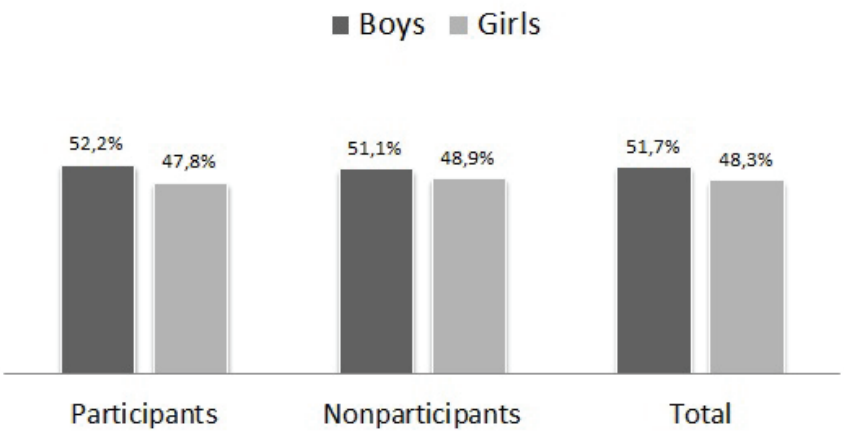


Figure 2: Answers by respondents' gender

182 respondents (51.1% of total respondents) had participated in the EEP, and the control group consists of 174 nonparticipants (48.9%) (Figure 3).

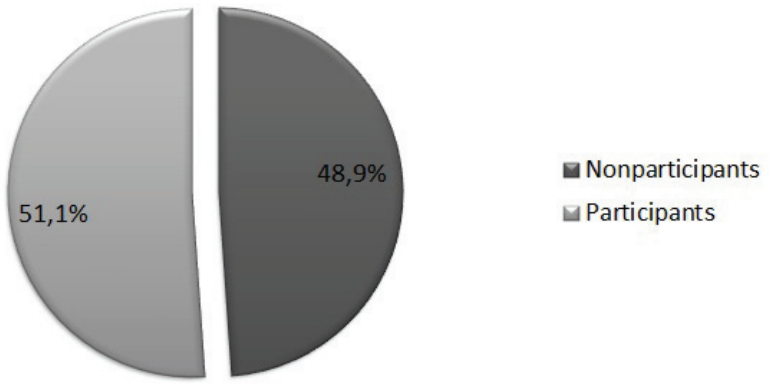


Figure 3: Answers by participation in the EEP

325 respondents attended one of the 4 public schools in the study and the remaining 31 went to the only private school (Figure 4).

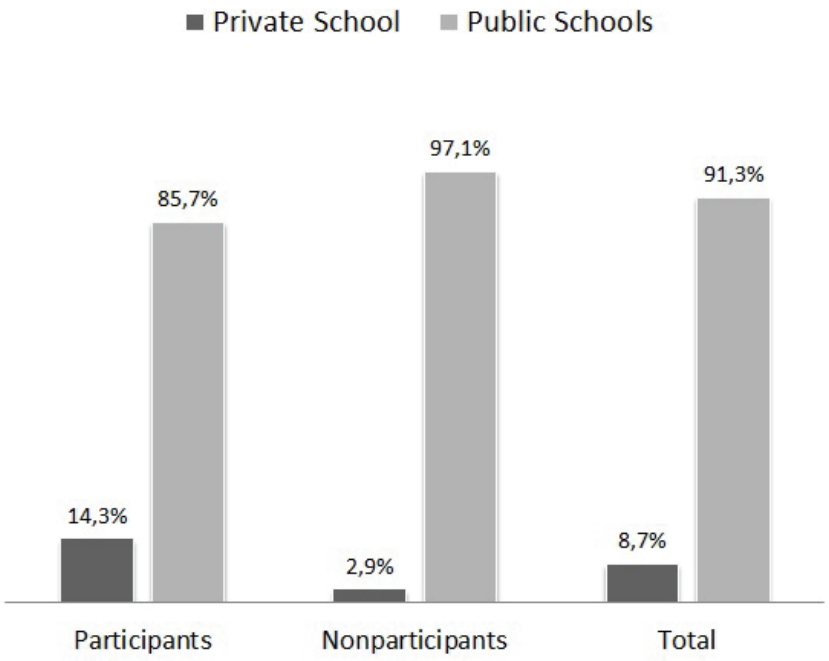


Figure 4: Answers by type of school attended

Concerning the ethnic background, the test group and the control group have a similar structure, with approximately 96% whites. The other ethnic groups considered are negligible. About the parents' present type of work, only the minority of the students has at least one self-employed parent. Most students' parents, participant or not, aren't self-employed (Figure 5).

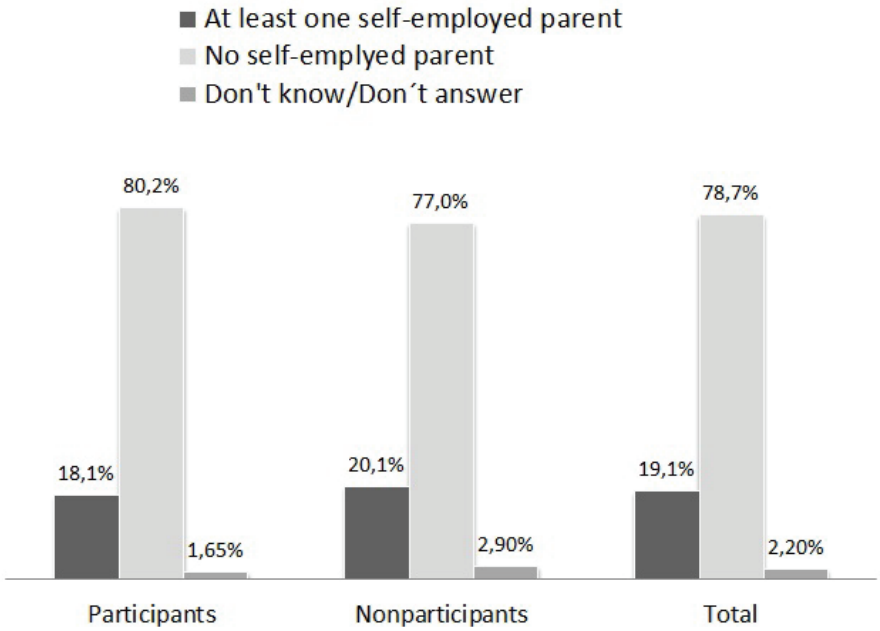


Figure 5: Answers by parents' present type of work

Regarding parents' emigration experience, the majority do not have that experience. Approximately one quarter of the students mentioned that one (or both) of their parents has emigration experience (Figure 6).

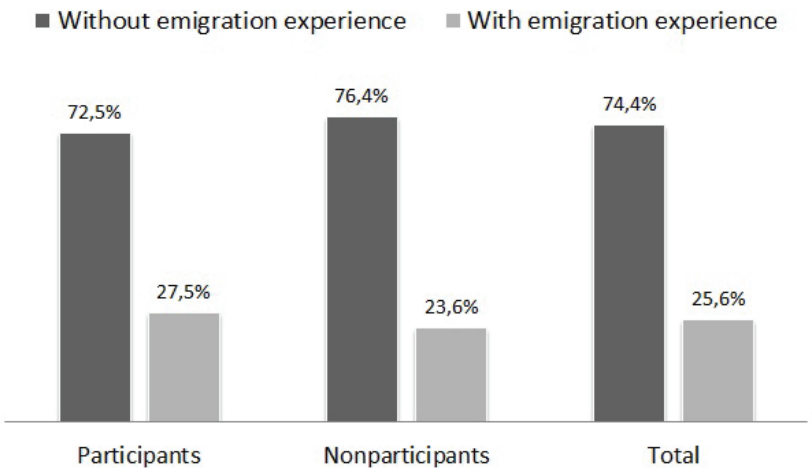


Figure 6: Answers by parents' experience of emigration

We found that most of the students of the sample (71.9%) had no previous experience in EEP and 28.1% of the respondents were repeating the experience. Amongst the 174 subjects of the control group, only 13 (7.5%) had already participated in an EEP. It appears then that most of the students with previous experience in EEP took part again and therefore there can be a cumulative effect of repeated exposure to EEP for them (Figure 7).

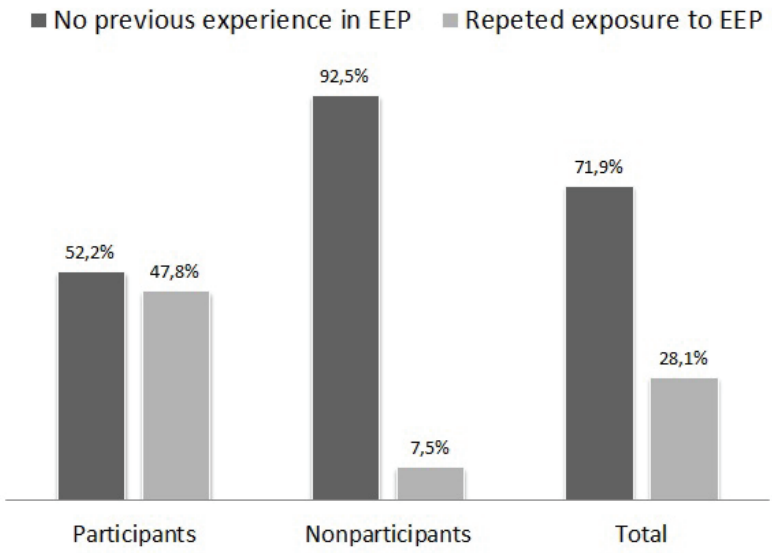


Figure 7: Answers by previous experience in EEP

4. Results

It was hypothesized that the desire for self-employment would be influenced by demographic attributes and participation in the EEP (hypotheses 1 through 7). In order to test the significance of the above independent variables on the dependent variables – career options at 21 years old (working to a large organisation, working to a small business, having own business, working in a profession and being unemployed) – it was conducted a multiple analysis of variance, using the General Linear Model Multivariate Procedure. None of the independent variables were statistically significant at the 5% level to the career options (Table 3).

Table 3: Box's test of equality of covariance matrices

Box's M	168.746
F	1.090
df 1	135
df2	11404.887
Sig.	.225

Since there is no significant bias across groups' distribution and the sample has more than 30 subjects, we chose to perform a parametric test – the *T*-test for equality of means. We have concluded that there is no statistically significant difference between participants and nonparticipants in each career option, particularly in self-employment option (Sig. = .512), and then the hypothesis 1 is rejected. Furthermore, hypotheses 2, 3, 4, 5, 6 and 7 are also rejected because we cannot assume a statistically significant difference between groups formed on the basis of provided demographic factors, regarding the desire for self-employment.

Hypotheses 1a, 2a, 3a, 4a, 5a, 6a and 7a concern the enterprise potential of young people, measured by the ATE test scores, taking into account participation in the EEP and demographic variables. Data on the dependent variable – enterprise potential – were checked for normality, which was rejected. An analysis of variance was calculated using the 7 factors listed (Table 4) as independent variables and the ATE test scores as the dependent variable. None of the independent variables were statistically significant for ATE test scores at the .05 level but, at the .10 level we cannot reject the hypothesis that the participation in the EEP is significant for ATE test scores.

Table 4: Analysis of variance - results for ATE test scores

ANOVA Table (Between-Groups)

Independent variables	Results at ATE test		
	Sig.	Group	Mean
Participaton in the EEP	.088	Nonparticipants Participants	152,0000 154,5604
Type of school	.280	Private Public	155,9355 153,0585
Gender	.185	Girls Boys	154,3372 152,3478
Ethnic background	.365	White from Portugal Nonwhite/other nationality	153,5000 150,8846
Self-employed parent	.548	No Yes	153,4036 154,5441
Migration experienced parent	.924	No Yes	153,3509 153,1868
Previous participation in EEP	.183	No Yes	152,6836 154,9100

Although we had large groups, normality was rejected, which led us to performed the Mann-Whitney U nonparametric test to compare median values between participants and nonparticipants. The conclusion was to reject the hypothesis of equality of medians (Sig. = .021), meaning that there is statistical evidence to sustain that the ATE test scores differ depending on whether the student had participated in the EEP (median = 156) or not (median = 153), confirming hypothesis 1a.

Mann-Whitney U was still performed to compare median values of ATE test scores between groups formed on the basis of demographic characteristics and previous participation in an EEP. We have decided not to reject the equality of median values. So, the hypotheses 2a, 3a, 4a, 5a, 6a and 7a are rejected. Will also be noted that hypothesis 8 showed no statistical significance.

5. Conclusions, limitations and future directions

This research, unlike previous studies (Robinson *et al*., 1991; Peterman & Kennedy, 2003; Athayde, 2009), didn't find evidence that the participation in the EEP *EMPRE* positively influenced the Portuguese students' intention to start their own business.

The ATE test scores, measuring the latent enterprise potential of youths in this research, didn't prove to vary with the provided demographic factors. Those scores seem to vary only slightly with the participation in the EEP: the students who had participated in the EEP scored statistically higher than nonparticipants, presenting then a greater enterprise potential. This finding supports the results obtained by Athayde (2009). However, in our investigation, participants in the EEP don't reveal the intention of creating their own business, despite their greater enterprise potential. It is important to understand that circumstance in future research, mainly the likelihood of its relation to the perception of adverse contextual factors, as the idea that setting up a business involves too complex and time consuming procedures, or that the tax burden is too heavy for Portuguese companies, or even that it is difficult to access financial support (GEM, 2004; Dabic *et. al*, 2010; Fatoki & Chindoga, 2011). It

would be worthwhile to study how the above circumstance is the consequence of the stigma of business failure typifying the Portuguese society, or the non-inclusion of entrepreneurship and business creation thematic into educational curricula, or even the inadequacy of teaching approaches.

Therefore, we can be facing the possibility of a leakage of the Portuguese youths' potential and the resources spent by schools and EEP's promoters that, judging by the intentions expressed by students, will not have the desired returns in terms of business creation. Encouraging is the assumption that raising the students' enterprise potential will normally allow them to meet the challenges of the current labour market (Walstad & Kourilsky, 1998; Gibb, 2002; Hitty & O'Gorman, 2004).

It is of note that the Portuguese students' preference in terms of future career option goes to a professional occupation rather than working in a large organisation or a small business, or even being self-employed. This finding might mean that young people appreciate the fact of having a profession, provided that it is exercised as an employee. Hence, there is an important work to be done by teachers and, specifically, by trainers in vocational courses, in promoting the desire for self-employment.

A limitation of our study may be the circumstance that participants in *EMPRE* Program could have a predisposition towards entrepreneurship prior to their participation, since this was on a voluntary basis. Another limitation has to do with the impossibility of conducting a longitudinal study that would allow monitoring the same individuals before and after their participation in the EEP. This would have ensured compliance with the main recommendations for training evaluations' design, referred by Athayde (2009).

To conclude that the EEP implemented in Portugal have a meaningful contribution to influence youths' intention to start their own business, such as in other countries where those programs were successfully undertaken, it will be necessary to evaluate other programs, similar in objectives but distinct in terms of methodology, using the ATE test. Any discrepancies in results achieved in Portugal and abroad may be due to the national culture or the way the programs are implemented, particularly with regard to the specific training of teachers assigned to conduct those programs (Fatoki & Chindoga, 2011) and the monitoring provided by technicians from the EEP promoters.

References

Athayde, R. (2009), "Measuring Enterprise Potential in Young People", *Entrepreneurship Theory and Practice*, Vol 33, Issue 2, March 2009, pp 481-500.

Auken, H. V., Fry, F. L. and Stephens, P. (2006), "The Influence of Role Models on Entrepreneurial Intentions", *Journal of Developmental Entrepreneurship*, Vol 11, Issue 2, June 2006, pp 157-167.

Dabic, M., Basic, M. and Novak, I. (2010), "The Role of Gender Differences on Students' Entrepreneurial Attitudes: A Cross-country Comparative Study of Croatia and Poland", *The Business Review*, Summer, Vol 15, No. 1, pp 97-103.

Fatoki, O. and Chindoga, L. (2011), "An Investigation into the Obstacles to Youth Entrepreneurship in South Africa", *International Business Research*, Vol 4, No. 2, pp 161-169.

GEM (2004), Global Entrepreneurship Monitor, "GEM 2004 Portugal Executive Report".

Gibb, A. (1987), "Enterprise Culture — Its Meaning & Implications for Education and Training", *Journal of European Industrial Training*, Vol 11, No. 2, pp 2–38.

Gibb, A. (1993), "The Enterprise Culture and Education", *International Small Business Journal*, Vol 11, No. 3, pp 11–34.

Gibb, A. (2002), "In Pursuit of a New 'Enterprise' and 'Entrepreneurship' Paradigm for Learning: Creative Destruction, New Values, New Ways of Doing Things and New Combinations of Knowledge", *International Journal of Management Reviews*, Vol 4, Issue 3, pp 233–269.

Hansemark, O.C. (1998), "The Effects of an Entrepreneurship Programme on Need for Achievement and Locus of Control of Reinforcement", *International Journal of Entrepreneurial Behaviour and Research*, Vol 4, Issue 1, pp 28–50.

Hofstede, G. H. (1980), *Cultures's Consequences,* Sage Publications, Beverly Hills.

Hofstede, G. H. (1991), *Cultures and Organisations: Software of the Mind*, McGraw-Hill, London.

Hytti, U. and O'Gorman, C. (2004)," What is 'Enterprise Education'? An Analysis of the Objectives and Methods of Enterprise Education Programmes in Four European Counties", *Education and Training*, Vol 46, No. 1, pp 11–23.

Kourilsky, M.L. and Walstad, W.B. (1998), "Entrepreneurship and Female Youth: Knowledge, Attitudes, Gender Differences and Educational Practices", *Journal of Business Venturing,* Vol 13, No. 1, pp 77-88.

Krueger, N.F. and Brazeal, D.V. (1994), "Enterprise Potential and Potential Entrepreneurs", *Entrepreneurship Theory and Practice*, Vol 18, No. 3, pp 91–104.

Lee, L. and Wong, P. K. (2005), "Entrepreneurship Education - A Compendium of Related Issues". Available at SSRN: http://ssrn.com/abstract=856227, accessed September 10, 2011.
Littunen, H. (2000), "Entrepreneurship and the Characteristics of the Entrepreneurial Personality", *International Journal of Entrepreneurial Behaviour and Research*, Vol 6, Issue 6, pp 295–309.
McClelland (1961), *The Achieving Society*, Van Nostrand, New York.
McCline, R.L., Bhat, S. and Baj, P. (2000), "Opportunity Recognition: An Exploratory Investigation of a Component of the Entrepreneurial Process in the Context of the Health Care Industry", *Entrepreneurship Theory and Practice*, Vol 25, pp 81–144.
Peterman, N.E. and Kennedy, J. (2003), "Enterprise Education: Influencing Students Perceptions of Entrepreneurship", *Entrepreneurship Theory and Practice*, Vol 28, pp 129–144.
Rego, A. (2004), "Uma Visão Peculiar Sobre a Cultura Nacional: A 'Tourada Portuguesa' como Metáfora", *Gestão e Desenvolvimento*, Vol 12, pp 105-121.
Robinson, P.B., Stimpson, D.V., Huefner, J.C. and Hunt, H.K. (1991), "An Attitude Approach to the Prediction of Entrepreneurship", *Entrepreneurship Theory and Practice*, Vol 15, pp 13–31.
Shapero, A. and Sokol, L. (1982), "The Social Dimensions of Entrepreneurship", *in* C.A. Kent, D. Sexton and K. Vesper (Eds.), *Encyclopedia of Entrepreneurship*, Prentice-Hall, Englewood Cliffs, NJ, pp 72-90.
Simões, J. (2010), "A Dinâmica da Criação de Empresas Impulsionada por Instituições de Ensino Superior em Redes de Inovação", Ph.D. Thesis, Universidade da Beira Interior, Covilhã.
Thomas, A.S. and Mueller, S.L. (2000), "A Case for Comparative Entrepreneurship: Assessing the Relevance of Culture", *Journal of International Business Studies*, Vol 31, No. 2, pp 287–301.
Walstad, W.B. and Kourilsky, M.L. (1998), "Entrepreneurial Attitudes and Knowledge of Black Youth", *Entrepreneurship Theory and Practice*, Vol 13, pp 5–18.
Westhead, P., Storey, D.J., and Martin, F. (2000). "The Shell Technology Enterprise Programme: Student Outcomes", *Education & Training*, Vol 42, Issues 4/5, pp 272–281.

Entrepreneurship's Contribution to the Local Economic Development of Romania's North-West Development Region through trade

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Abstract: Trade, as a common form of entrepreneurship, was and remains an engine of economic development. According to European Commission statistics, in the 90's, commercial enterprises represented 30% of all enterprises and trade provided 16% of total employment, while representing over 13% of EU's GDP. There were about 5 million businesses producing 640 billion ECU and 21.5 million jobs divided between retail, wholesale and intermediaries. As a link between producers and consumers, trade is nowadays a dynamic sector that generates about 11% of the EU's GDP. One in three companies in Europe is active in the trade sector, which is a major source of job creation: more than 30 million Europeans work in commerce, being one of the few sectors in Europe that creates jobs constantly. It also supports millions of correlated jobs across the supply chain, from small local suppliers to international companies.Trade is a growth factor contributing through its quality of service activity to the GDP and to the formation of companies' and state's financial resources used for development. Through its contribution to the employment of the active population, trade can be considered one of the factors of economic development and of higher living standards of people.The commercial sector is the second largest supplier of jobs within the European Community, which was able to create jobs in the last decade where other sectors lost them.Trade is one of the main channels of innovation and technology transfer. The EU has an important position in the global market for innovative products. Trade has been an intrinsic element of postwar economic growth and trade levels today have no precedent in history. Commercial activity has reached a very high level of development, both as absolute value and reported worldwide. Trade is an essential mechanism of movement of goods and services worldwide, being also the central link in the transfer of technology.According to a study of the Urban Development Unit of the World Bank from 2006, entitled "Local Economic Development.Quick Reference", local economic development is the process in which public, private and non-government sectors work together to improve conditions for economic growth and employment of the labor force. Because of the globalization process, trade has seen a significant development, especially due to the expansion of large chain stores.This paper focuses on the study of trade's evolution in the North-West Development Region of Romania, and aims to determine the influence of entrepreneurship, namely the expansion of large stores, on the employment of the labor force in the region and thereby, its effect on local economic development.

Keywords: entrepreneurship, trade, employment, regional development

JEL classification codes: M21, M11, D24, O18

1. Introduction

Nations and also local and regional governments have become more and more aware of the importance of local and regional development along with the changes in the pattern of economic activity and with a more internationalized, intensive and competitive economic system (Pike, 2006).

According to a paper prepared by the Urban Development Unit of the World Bank in 2006, entitled "Local Economic Development. Quick Reference", local economic development (LED) is the process in which public, private and non-governmental sectors work together to improve conditions needed for economic growth and employment of labor. The purpose of local economic development, according to this paper, is to build the economic capacity of territorial administrative units to improve their economic future and to improve the quality of life for all residents.

Parlagi (2000, in Matei, Anghelescu and Săvulescu, 2009) defines the local development as the process manifested in a certain region or territorial administrative unit which increases the quality of life locally. Moreover, Lucica Matei (1998) believes that the definition of "local" is not only about the administrative-territorial units, commune, city or county, but also at inter-communal, inter-regional and even cross-border level.

Coffey and Polese (1985) however used to believe that local development is a particular form of regional development, one in which endogenous factors occupy a central position. Starting from this premise they proposed a staged model of local development, as follows: 1) the emergence of local entrepreneurship; 2) the "take off" of local enterprises; 3) the expansion of these enterprises beyond

the local region; and 4) the achievement of a regional economic structure that is based upon local initiatives and locally created comparative advantages. The model underlined the roles of the entrepreneur and human capital in the process of economic growth, and the spatial effects of the expansion of the firm.

Matei, Anghelescu and Săvulescu (2009) consider that local development refers to the capacity of local or regional economy to stimulate stable economic and social growth, intended to lead to the creation of new jobs and the conditions for making the most of opportunities arising from changes in economic, technical and social fields.

Profiroiu, Racovițeanu and Țarălungă (1999) believe that local development can take two forms, namely: development of enterprises, respectively strengthening the power of communities by increasing employment and income of its population and possibly reviving the economy. The authors consider that local development funding is the responsibility of local government, the use of private financing being performed only when they have exhausted the usual ways of financing public expenditure (Profiroiu, Racovițeanu and Țarălungă, 1999, p.27).

According to Matei and Anghelescu (2009), local development means boost and diversification of economic activities, stimulation of investment as well as contribution to reducing unemployment and improving living standards. Also in their opinion, local development is the result of combined efforts made by representatives from all sectors of government, civil society and business environment in order to create favorable conditions for economic growth and new jobs. The authors consider that the meaning given to local development lately is the one linking quantity growth of resources to social changes involving individuals and groups, in processes that will improve quality of life and environment, marked by strong social cohesion.

Regarding local economic development objectives, Parlagi (2000, in Matei, Anghelescu and Săvulescu, 2009) believes that these are represented by the economic prosperity and social welfare creating a favorable business environment, along with the integration of vulnerable groups in the community, use of endogenous resources and private sector development.

Townroe (1979) has a different perspective on these objectives, arguing that they refer to the decreasing local unemployment rate at local level below its national level, reducing fluctuations in unemployment, as well as social assistance to vulnerable groups. The author believes that achieving these objectives of local economic development can be achieved by removing barriers to industrial development and economic efficiency, by active promotion and ongoing search for investors and investment opportunities, by developing different types of facilities, and also by supporting investment in industry through loans, grants, etc.

Matei and Anghelescu (2009) think that the main objective of local development is the removal of barriers to the development and improvement of efficient market mechanisms. Besides this, the authors also mention the assistance for businesses, encouraging new businesses and attracting local investments.

A crucial part of the well-functioning of a region's economy is considered to be small firms since research has demonstrated the close relationship between entrepreneurship and regional and local development. This relationship has at its core innovation: innovativeness developed within local inter-firm networks both supports existing firms and presents opportunities for starting new businesses in order to serve newly identified markets. Networks of firms complement and sometimes substitute for a firm's own technological capability (Maleki, 2009). Innovation, as Dawkins (2003) says, will attract investors, which in turn will attract inventors, which in turn will attract innovators. This is the way a "local innovative environment" (Wysoka, 2009) is born.

The same idea is supported by Gioacchino Garofoli (2002) who considers that local productive systems, through productive linkages and interaction among local actors, produce external economies to local firms and also collective efficiency. The author also believes that the creation of dynamic competitive advantages is therefore the crucial factor for a sustainable local development.

In the past decade, trade and retail grew steadily and peaked in early 2008. The growing trend of retail activity was interrupted by the economic crisis that caused a decline in its evolution, which

lasted until mid-2009. Since then, commerce has again increased, and after a year returned to the values recorded for 2007. With regard to the European Union, trade volume has increased generally, but its magnitude differs substantially from one region to another. Trade, as the common form of entrepreneurship, has an important contribution to local economic development.

This paper focuses on the study of trade's evolution in the NW development region of Romania, and aims to determine the influence of entrepreneurship, namely the expansion of large stores, on the employment of the labor force in the region and thereby, its effect on local economic development.

2. The importance of the commercial sector for economic development of the North-West Region of Romania

Trade is an important activity in its role of public supply and contributing to local quality of life, creating and maintaining links between people in the community, preventing the exodus of population and encouraging new diversifying activities (White Paper on Commerce, 1999).

With EU enlargement a gap occurs between organizational forms and the trade in existing EU member and candidate countries. European policy makers are considering a number of issues which must be solved to an acceptable level to maintain cohesion within the enlarged EU trade, including: the need for modernization and logistics management systems, improving the financial situation of commercial companies (improving financial structures), not accepting forms of business cooperation in the same field, poor development of intermediate structures involving representatives of retailers and which could be a lever for promoting collective modernization tools, insufficient recognition of trade role by local authorities, poor use of funds to help modernize the sector (White Paper on Commerce, 1999).

2.1 Description of the region

Therefore, traders who operate globally face different markets, with appropriate structures for the developing stage of the country. A local market, namely North-West Region, Romania, is an emerging market, corresponding to an average stage of development, characterized by the expansion of major retailers. It is a market where market share is equally divided between traditional forms of trade and department stores (Competition Council, 2012). Increasing competition in the sector represented by hypermarkets determines market leaders to develop large format stores in order to achieve further growth. However, there are still growth opportunities for large stores, which continue to gain market share.

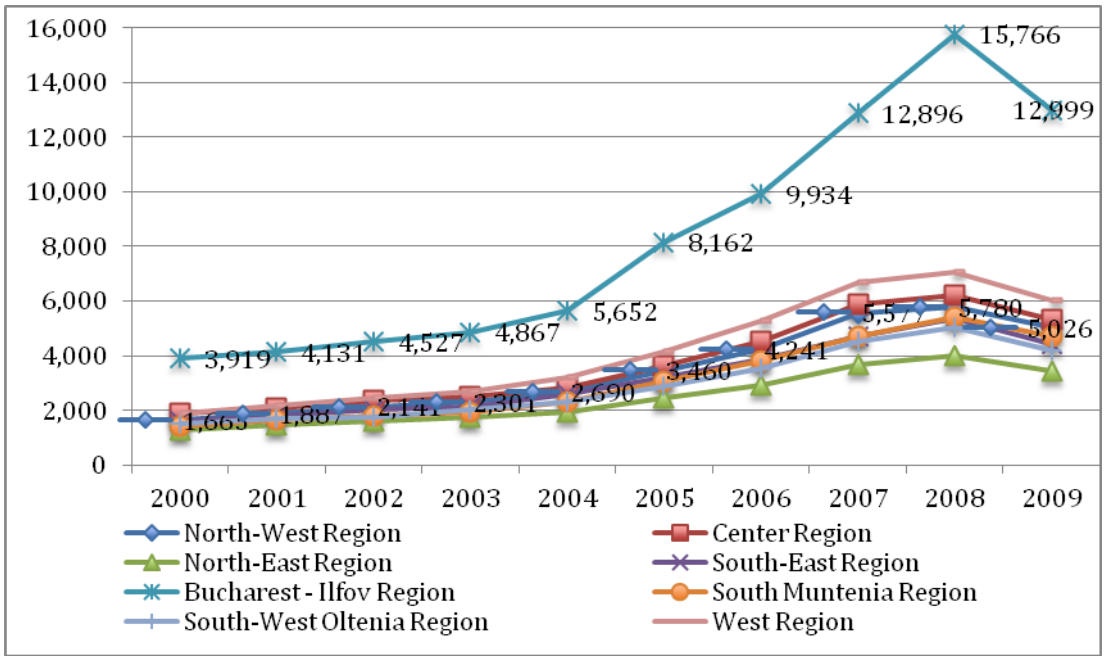
North-West Region (Northern Transylvania) is one of the 8 development regions of Romania and includes six counties: Bihor, Bistrita-Nasaud, Cluj, Maramures, Satu Mare, Salaj. The surface area is 34,159 square kilometers representing 14.32% of the country, with a total population of 2,744,914 inhabitants (North-West Regional Development Agency).

The economy of the Region is booming, with a dynamic growth in recent years in sectors like construction, textiles, machinery and equipment. Almost all industries are represented here as well as a growing number of major foreign companies, some of them located in industrial parks in the region - Tetarom Cluj, Bors, Jibou, Satu-Mare (North-West Regional Development Agency).

Real engines of regional economic growth, SMEs were around 90,000 in 2008, about 14,18 % from all SMEs from Romania, in second place after the Bucureşti-Ilfov region where the percentage of SMEs was 23,20% (Romanian National Council of SMEs, 2011). Business support infrastructure is developing in the region especially as public and private industrial parks: Cluj-Napoca, Jibou, Satu-Mare, Borş.

The indicator most frequently used to measure the wealth of a region is regional gross domestic product (GDP), usually expressed in purchasing power standard (PPS) per inhabitant to make the data comparable between regions of differing size and purchasing power. GDP is the total value of goods and services produced in a region by the people employed in that region, minus the necessary inputs. Sometimes alternative or complementary measures of development are also used, such as per-capita consumption, poverty rates, unemployment rates, labor force participation rates or access to public services (Nijkamp and Abreu, 2009).

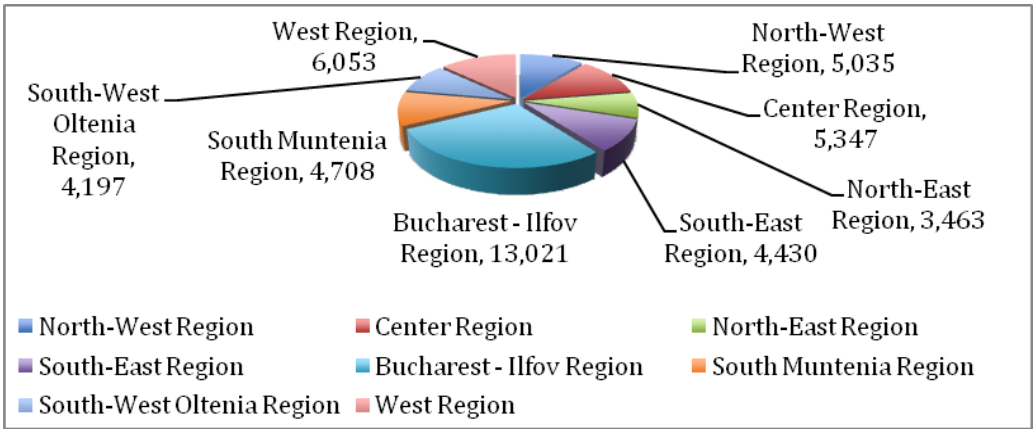
With a medium term perspective, Figure 1 shows the changes in GDP since 2000 for Romania's development regions. The figure presents the evolution of GDP per capita in the North-West region of the country during 2000-2009. In the analyzed period, the GDP per capita in Romania's North-West region had a positive evolution, close to the national average but still far from the EU average of -27. North-Wwest Development Region (Northern Transylvania) is, after Bucharest-Ilfov, West and Center Region, the most attractive in terms of economic development of Romanian regions.



Source: The authors according to the data available on the Romania's National Institute of Statistics

Figure 1: Evolution of Romania's development regions GDP per capita in 2000-2009 (Euro)

The fact is due to labor and wages, foreign investment, but also due to private sector, market competition and modern technology inputs. It is relevant that the service sector has reached a large share of total regional economy, nearly 50%, with significant branches such as trade and tourism.

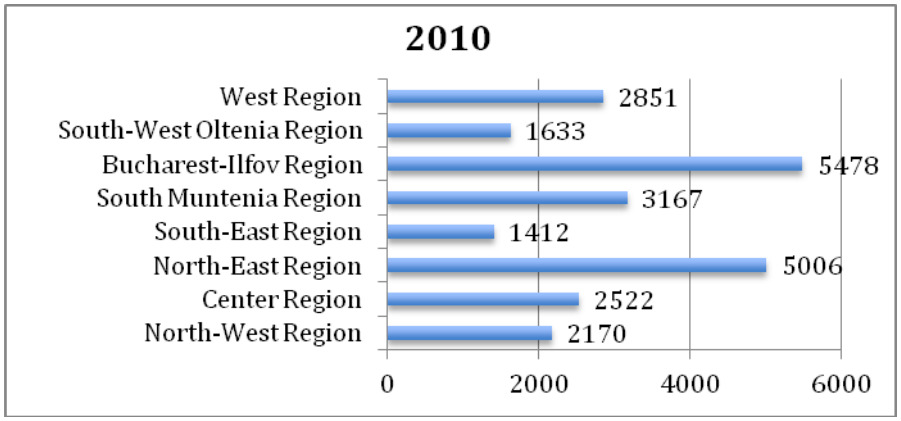


Source: The authors according to the data available on the Romania's National Institute of Statistics

Figure 2: Romania's development regions GDP per capita in 2009 (Euro)

Job creation figures often hit the headlines during supermarket planning campaigns. Even during prosperous times, claims regarding significant increases in local employment are surely persuasive as planning applications cross the desks of council officials up and down the country.
Retail is a barometer of the nation's economy — the point where the efforts of many other industries get turned into cash. Increases in retail translate into the creation of new jobs all along the huge supply chain that brings products to store shelves (Shay, 2011).

Moreover, as the UK economy continues its tentative crawl out of a damaging recession, and the onus is put on the private sector to provide employment while the public sector contracts, we consider that any opportunity to improve the local labor market deserves proper consideration.
Further on we shall evaluate the hypothesis that trade is an important sector which provides a significant number of jobs. The North-West Region had in 2010 the most vacancies in commerce and retail out of Romania's development regions, meaning that there is a big labor demand, therefore many available jobs.



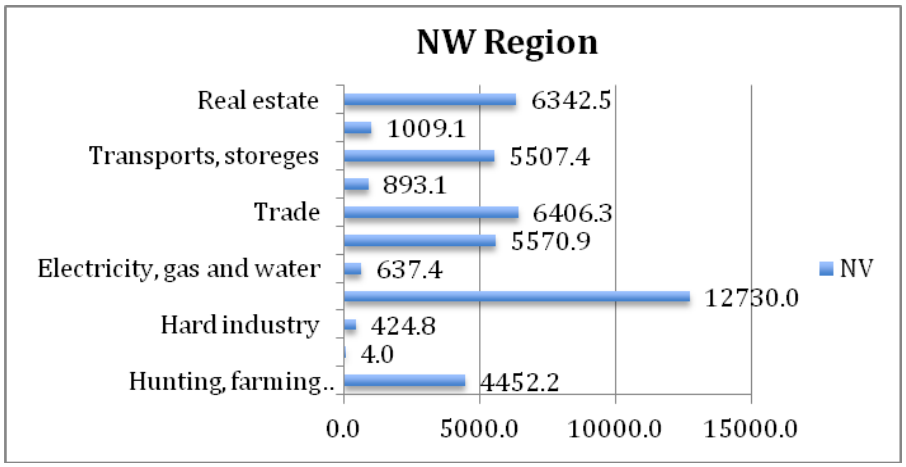
Source: The authors according to the data available on Romania's National Institute of Statistics

Figure 3: Vacancies in commerce and retail in Romania's development regions

Also, out of the total of 752,216 employees from the trade sector in 2010, 99,490 representing 13.23% are in the North-West Region of Romania.

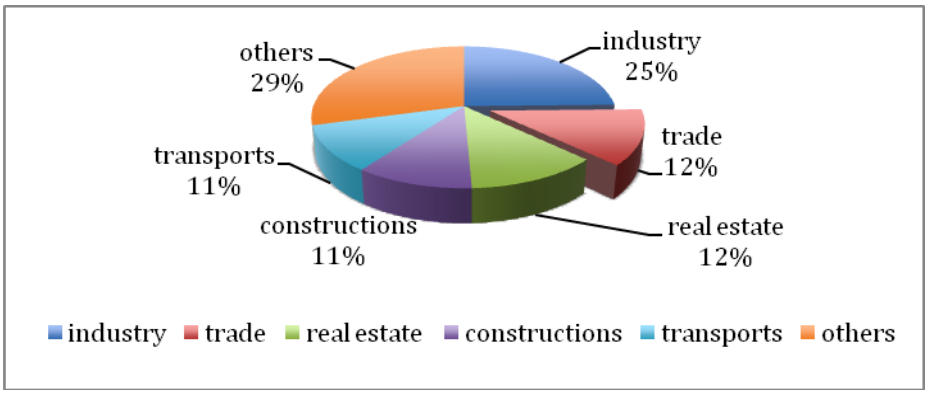
2.2 The importance of the commercial sector in the economy

In order to highlight the importance of the commercial sector in the economy, we chose to analyze the main economic sectors contributing to GDP in 2008. We examined the following categories of activities: real estate, financial services, construction, tourism, trade, energy, mining and quarrying, manufacturing, fishing and agriculture.



Source: The authors according to the data available on the Romania's National Institute of Statistics

Figure 4: Monetary contribution of major economic sectors to GDP, at the North-West Region's level in 2008



Source: The authors according to the data available on Romania's National Institute of Statistics

Figure 5: Percentage contribution of major economic sectors to GDP, at the North-West region's level in 2008

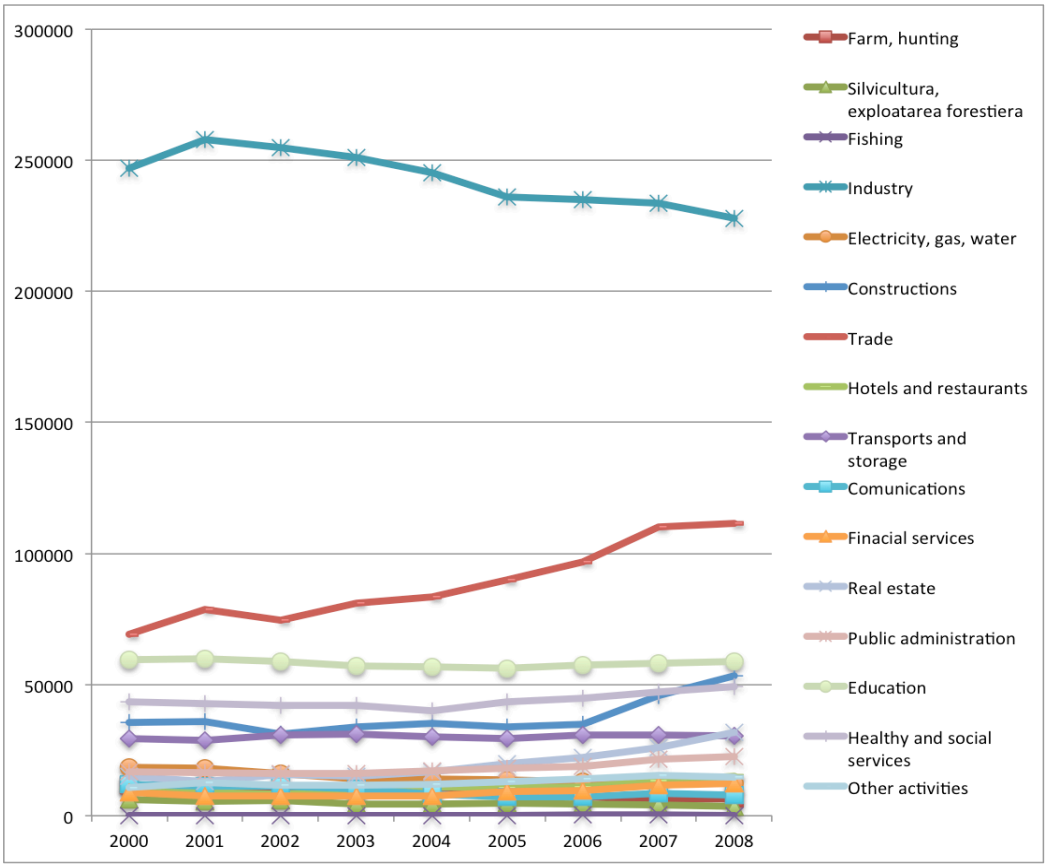
From the graphs above it can be seen that in 2008 the manufacturing industry had the greatest contribution to regional GDP, with a gross value added of 12,730 million lei, namely 24.68% of BIP. Trade is the second sector contributing to GDP with 6,406.3 million lei, with a share of 12.43% of GDP. Being closely interlinked with real estate transactions that contributed to GDP with 6,342.5 million lei, representing12.2%, the construction sector is the next important contributor to GDP with 5,570.9 million lei, respectively 10.8%, because of the investments of the real estate developers in this market.

At national level, the contribution of economic sectors to the formation of regional GDP indicates a share of 16.3% for agriculture, 35% for the secondary sector and 46.7% for tertiary sectors, with services growth and reducing agricultural activities in terms of evolution. Significant increases were noted in civil and industrial building: housing, shopping centers. Some differences between counties can be also noted: some of them are more industrialized; others are based on primary activities, especially agriculture and farming (Romania's National Institute of Statistics data).

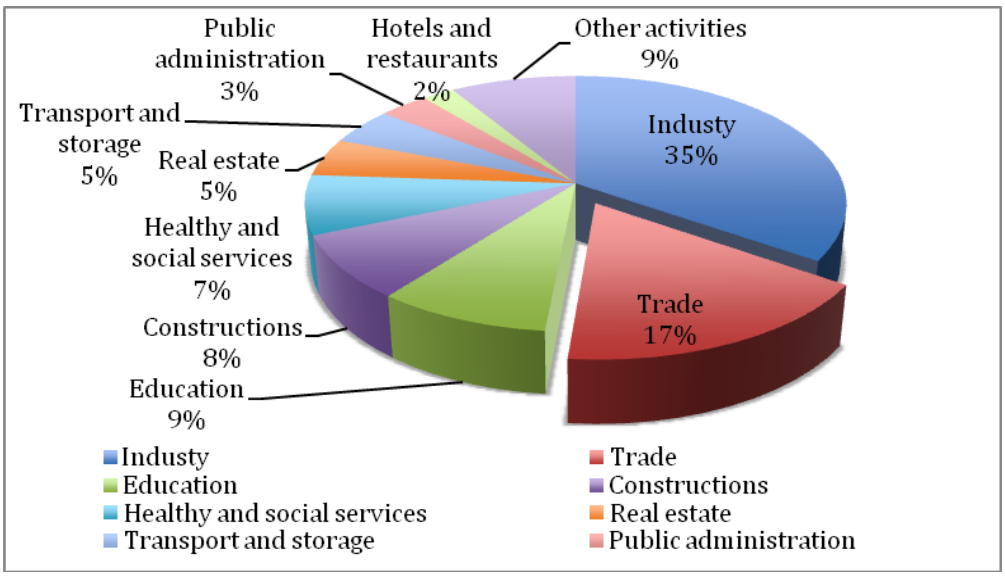
2.2 The importance of the trade sector for the labor market

According to Karel De Gucht (2012) Trade Commissioner from European Commission, trade is working for Europe's economic recovery by ensuring growth and jobs. The European renewed trade strategy will open markets and connect Europe to the main sources and regions of global growth. The aim is to ensure that European business gets a fair deal and that countries' rights are respected so that all of them could enjoy the benefits of trade.

Clearly, trade is a sector that offers a large number of jobs. To strengthen this assertion we examined to what extent the main economic sectors have reduced unemployment by attracting labor. The study includes the number of employees drawn by the analyzed economic sectors during 2000 - 2008.



Source: The authors according to the data available on Romania's National Institute of Statistics
Figure 6: The evolution of employees' numbers in different economic sectors in Romania during 2000 - 2008



Source: The authors according to the data available on Romania's National Institute of Statistics
Figure 7: Employee distribution in Romania's main economic sectors in 2008

As can be seen from the graphs above, trade is the second sector that provides most jobs in Romania's North-West Region, after manufacturing. In the commercial sector, in 2008 there were 111,480 employees, representing17% of total employed persons in the region.

2.3 Influence of supermarket expansion on labor

In order to analyze the influence of entrepreneurship on the employment of the labor force in Romania and in the North-West Region, we chose to study the expansion of four main large stores, namely Metro Cash & Carry Romania, Real,- Hypermarket Romania, Carrefour Romania and Billa Romania.
METRO Cash & Carry is part of METRO Group, one of international retail leaders. The company has a total of approximately 280,000 employees and operates in over 2,100 locations in 33 countries (METRO Cash & Carry website). The company operates through its sales divisions which operate independently in the market: Metro Cash & Carry, Real,- hypermarkets, Media Markt and Saturn, the market leader in electrics and household electronics in Europe, and Galeria Kaufhof department stores.

METRO Cash & Carry International, the leading player on the cash & carry international market, opened its first store in Romania in October 1996, being also the first company which introduced a local cash & carry sales system, the modern form of wholesale with cash payment when buying and picking up goods. In later years, thanks to the success of the new system on the Romanian market, the company expanded its network rapidly, reaching its own 32 stores in Romania, with total sales of approximately 190,000 square meters. According to Romania's Finance Ministry, in 2010, METRO Cash & Carry Romania had about 6,132 employees, recording a turnover of 1.25 billion Euros, down with 8% as compared to 2009.

Real,- Hypermarket is also a sales division of METRO Group. Since the opening of the first store on the Romanian market in 2006, Real,- has invested over 500 million Euros developing one of the largest network of hypermarkets in Romania, which currently brings together 25 stores in 18 cities. In 2010, the company recorded a turnover of 780 million Euros, with a total of 7,530 employees. Real,- Hypermarket plans to continue expansion in 2012 and 2013, with new stores in Bucharest and the country. Each new store creates 250 jobs, of which 30 are in managerial positions (Real,- Hypermarket Romania website).

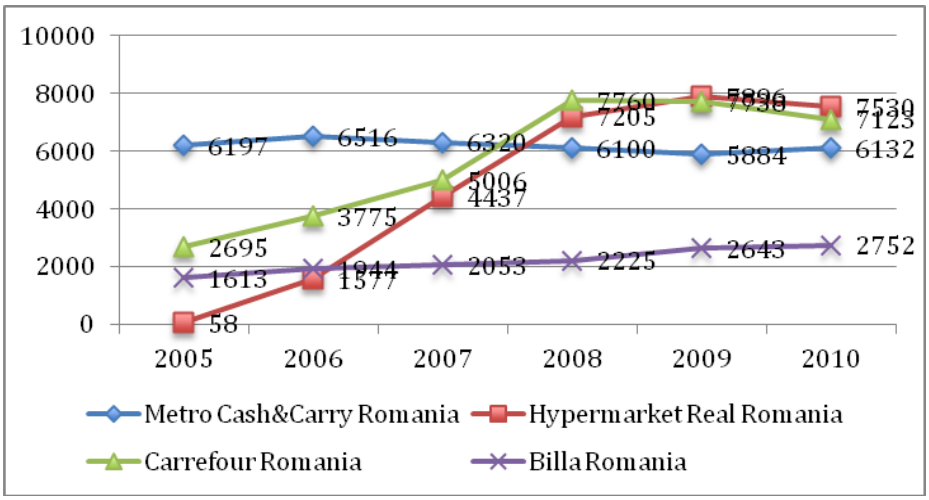
Over the 5 years on the local market, Real,- tried to bring their contribution to local economic development, supporting local suppliers. Thus, today, Real,- Hypermarket sells about 70,000 food and non-food products from 1,700 suppliers, of which 90% are from Romania. At the same time, Real,- is also aimed at local manufacturers whether it be food or non-food (Real,- Hypermarket Romania website).

In Oradea, one of cities in the North-West Region, Real,- invested about 38 million Euros for the two hypermarkets that operate here and have created a total of over 500 jobs.

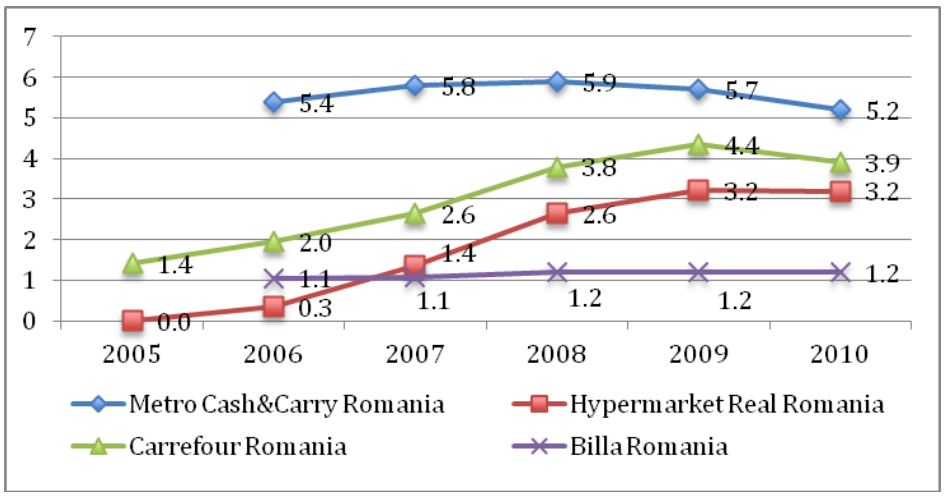
The Carrefour group used its 40 years of activity to become the world's second-largest retailer and the largest in Europe, operating four main grocery store formats: hypermarkets, supermarkets, hard discount and convenience stores. According to the information on its website, the group currently has over 15,500 stores, either company-operated or franchises in three major markets: Europe, Latin America and Asia. Being present in 34 countries, over 57% of group turnover derives from outside France, where it was originally founded. The group plans further international growth in the future, particularly in large national markets such as Turkey, Brazil, China and Indonesia.

Carrefour describes itself as being actively committed to promoting local economic development by emphasizing local recruitment and management and staff training on the job of its employees, and by being one of the leading private employers in any country where it operates, like France, Brazil, Argentina, Colombia, Italy and Greece. The group also prides itself on supporting local suppliers, with about 90% of the sold products sourced locally, depending on the country.

In Romania, Carrefour operated in 2010 a network of 23 hypermarkets and 34 supermarkets, which brought it a turnover of around 931 million Euros and a number of 7,123 employees. In Oradea, one of the cities from the North-West Region, Carrefour created around 500 working places.



Source: The authors according to the data available on Romania's Finance Ministry website
Figure 8: Evolution of the number of employees of Romania's main large stores



Source: The authors according to the data available on Romania's Finance Ministry website

Figure 9: Romania's main large stores' turnover evolution (mil.lei)

A downward trend of the stores surveyed can be noticed, from the turnover point of view, but also regarding the number of employees. This has as cause the job cuts and difficult economic situation in 2010 characterized by massive layoffs, reduced salaries and pensions and price increases.

No.	Indicator	2011	2012	2013	2014
1	Real GDP	2.5%	1.7%	3.1%	3.6%
2	Real GDP N-W	1.5%	3.9%	4.5%	4.6%
3	GDP/capita N-W	6.09%	10.92%	10.71%	10.55%
4	Final private consumption	1.4%	1.7%	3.2%	3.6%
5	Unemployment rate N-W	-1.69%	-6.90%	-5.56%	-9.8%
6	Average number of employees N-W	0.3%	0.5%	0.4%	0.8%

Source: The authors according to the National Commission of Prognosis' data

Table 1: Prognosis of the evolution of Romania's main macroeconomic indicators

According to the National Commission of Prognosis data which we presented in the table above, a general improvement of Romania's economic situation was estimated for the period 2011-2014.
Real GDP was forecast to grow by more than 3% in the years 2013 and 2014 over the previous years. The same can be said about the real GDP in the NW region, for which forecasts were better, with more than 4% increases in the years 2013 and 2014 compared to previous years. Forecasts for GDP per capita in the NW region, show more than 10% annual growths over previous years since

2012. For private consumption, the trend was also expected to be positive, with increases of 1.7% in 2012, 3.2% in 2013 and 3.6% in 2014 compared to previous years.

It also expected an improvement of the labor's market situation, with small increases in the number of employees at the regional level, of 0.4% in 2013 and 0.8% in 2014 over the previous years.

These trends cause a positive impact on the unemployment rate, which is expected to decline by 5.56% in 2013 and 9.8% in 2014 over the previous years.

Given the estimated increases of GDP, both at national and regional level, and private final consumption, we expect a positive impact on trade generating good financial results of the main large stores.

Taking into consideration that trade provides about 17% of the total number of jobs, being exceeded only by the manufacturing sector, we estimate that this sector will have a major contribution to the positive trend of unemployment rate and average number of employees from the NW region of Romania, as projected by the National Commission of Prognosis.

3. Conclusions

Located in the cente of trade relations regardless of their place, trade is an important pillar for economic development. Being characterized by a complex activity, trade is structured in multiple areas: storage and supply, distribution, import-export companies, suppliers, all of which contribute to economic welfare by the generated turnover, the provided jobs, know-how, technology and management transfer, etc.

In this paper we studied the importance of commercial enterprises, of entrepreneurship represented by big business, respectively large chain stores to the development of Romania's North-West Region. The North West Region of Romania is the most developed region in Romania after Bucharest, West and Center Region.This region (Northern Transylvania) is one of the 8 development regions of Romania and includes six counties: Bihor, Bistrita-Nasaud, Cluj, Maramures, Satu Mare, Salaj. The surface area is 34,159 square kilometers representing 14.32% of the country, with a total population of 2,744,914 inhabitants (North-West Regional Development Agency).

The economy of the Region is booming, with a dynamic growth in recent years in sectors like construction, textiles, machinery and equipment. Almost all industries are represented here and a growing number of major foreign companies, some of them located in industrial parks in the region - Tetarom Cluj, Bors, Jibou, Satu-Mare (North-West Regional Development Agency).

Following the study regarding the trade sector's contribution to GDP, the results show that this sector is one of the most important contributors to the North-West Region's GDP, the second after manufacturing, which had an important share in the last decade due to entrepreneurship. As with trade, industrial companies are foreign-owned companies who have chosen to invest in Romania because of lower production costs: cheaper labor, lower maintenance costs, and have chosen to invest in the North West Region due to its proximity to Romania's border with developed countries.

Following the study regarding the trade sector's contribution to the labor market, the conclusions are that this sector has provided a significant number of jobs, being second after manufacturing. In 2008 one could find in the trade sector 111,480 workers, representing 17% of total employed persons in the region. Another 35% were people employed in manufacturing, 9% in education and 5% in construction.

Certainly we face the phenomenon of job creation in the light of supermarket developments within a constantly changing environment. The upward trend, both in terms of turnover and number of employees of large chain stores, both national and regional, was affected by the economic crisis, which after the second half of 2008 and beginning of 2009 caused decreases.

The effects of the economic crisis were largely psychological in Romania, causing consumers to diminish their spending, which affected the supermarkets' sales. They were forced to take measures to reduce costs, among which was to lower their number of employees.

Taking into account the estimations made by Romania's National Commission of Prognosis regarding the main macroeconomic indicators for 2012-2014, the turnover and number of employees of large chain stores will be positively affected by the evolution of those indicators.

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References

Carrefour Group, [online] http://www.carrefour.net;

Coffey J William, Polèse Mario (1984) The Concept of Local Development. A Stages Model Of Endogenous Regional Growth, Papers in Regional Science, Volume 55, Issue 1, pp. 1–12;

Dawkins, J. Casey, Regional Development Theory (2003) Conceptual Foundations, Classic Works, and Recent Developments, Journal of Planning Literature, Vol. 18,No.2 pp.131-172 ;

European Union, [online] http://www.europe.eu;

European Commission Communication to the Council, European Parliament, the Economic and Social Committee (1999), White Paper on Commerce, [online], http://eur-lex.europa.eu;

Garofoli Gioacchino (2002) Theoretical Models and International Comparisons, European Urban and Regional Studies, vol. 9 no.3 pp.225-239;

Matei, A., Anghelescu, S. and Săvulescu, C. (2009) *Theoretical and Empirical Models of Local Developement,* Economics Publishing, Bucharest;

Maleki, J. Edward, (2009) Technology and Economic Development: The Dynamics of Local, Regional, and National Change, *Social Science Research Network,* [online], (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496226;

Matei, L. and Anghelescu, S. (2009) Local Developement, Concepts and Mechanisms. Economics Publishing, Bucharest;

Matei, L. (1998) *The management of local developement. Decentralization. Innovation.Risk.* Economics Publishing, Bucharest;

Metro Cash & Carry, [online] http://www.metro.ro;

National Council of SMEs from Romania (2011), [online], http://www.cnipmmr.ro/despre.htm;

Nijkamp, P. & Abreu, M. (2009) Regional developement theory, Serie Research Memoranda 0029, VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics;

North-West Regional Development Agency, [online], http://nord-vest.ro;

Pike Andy, Rodríguez-Pose Andrés, John Tomaney (2006) *Local and Regional Development*, [online] http://www.amazon.com/Local-Regional-Development-Andy-Pike/dp/0415357179;

Profiroiu, A., Racovițeanu, S. and Țarălungă, N. (1999) *Local Economic Development*, Economics Publishing, Bucharest;

Romania's Finance Ministry, [online], http://mfinante.ro;

Real Hypermarket, [online] http://www.real-hypermarket.ro;

Shay Mathew (2011) The Future of Retail, *Posted on Harvard Business Review,* [online], http://www.businessweek.com/management/the-future-of-retail-12202011.html;

Townroe, P. M. (1979). "The Design of Local Economic Development Policies", The Town Planning Review, Vol. 50, Nr. 2, [online], Jstor, http://jstor.org;

National Statistics Institute, [online] http://www.insse.ro/cms/rw/pages/index.ro.do;

Comission, communication to the Council, European Parliament, (1996) White paper on commerce; http://eur-lex.europa.eu

The use of Multi-Criteria Analysis to Evaluate Innovative Solutions

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Abstract: Innovation processes are an important factor determining the development of enterprises. According to the philosophy of Continuous Innovation, companies should continuously seek out and pursue innovation. Usually there are many variants of innovation solution. The article concerns the evaluation of innovative solutions, which should indicate the solution to ensure the greatest benefits and the chance on the success of implementation. The uniqueness and complexity of innovation processes, the accompanying uncertainty and interdisciplinary knowledge makes evaluation of solutions difficult. Evaluation of solutions is based on a set of deterministic and fuzzy criteria. They will be concerned primarily benefits that innovation brings. Achieving the intended benefits is often associated with high costs. Therefore, the criteria should also include evaluation of the implementation process of innovation. In this article a multi-criteria analysis is proposed to apply in order to conduct the evaluation of innovative solutions. The criteria were presented that should be included in the assessment process and assumptions of this method. In the proposed solutions may find the variants among the different types of innovation. It is extremely difficult to compare the innovations of a different nature. Therefore, another problem discussed in the article is a narrowing of the proposed solutions to those types that can be evaluated on the basis of identical criteria. This problem can be solved using well-known theory of production management, Theory of Constraints .Identification of constraints ensures that implementation of innovation in this place will be beneficial. The proposed variants of innovative solutions for the constraints can be assessed together due to the convergence of goals. This approach to the evaluation of innovative solutions is the result of the first part of the study, which relate to ongoing innovation processes in Polish enterprises. So far, the analysis of 40th innovation processes were carried out in 12 companies.

Keywords: innovation process, evaluation process, multi-criteria analysis

1. Introduction

Innovation processes are critical in the development of businesses in highly competitive conditions of the global market. This is an important part of business activities enabling the development of produced goods, processes and activities implemented to achieve an organizational competitive advantage. According to the Continuous Innovation philosophy (Drucker 1985), companies should continuously seek and pursue innovation, through which it is possible to improve the performance in these areas of activities which constitute barriers for further development. Such proceedings lead to business activities in the area of looking for innovation areas and generate ideas of innovative solutions. Analyzing the innovation process models that can be found in the literature it can be seen, that these phases are present in all models of these processes (Rothwell 1994). Determination of ways to identify the areas of innovation is an important issue in the context of improving the functioning of companies. Another element that influences undertaking decisions in the scope of innovation is the choice of the right solution that will guarantee the implementation of the goals and will allow to achieve the intended benefits. This article attempts to identify methods that will allow companies to meet these challenges in innovative activity.

2. Assumptions concerning the classification of innovation processes

In relation to the subject of innovation, companies can introduce innovations of a product, process, organizational and marketing nature, in accordance with the classification set out in the Oslo Manual. Each of them may also be either radical or incremental in nature (Tushman 1986). When performing innovate business activities companies have to choose innovation, which will grant them the highest benefits. This decision can not only be based on the anticipated benefits. An important factor influencing the choice of innovation is the knowledge of the process of innovation. The size of the process in its complexity and its costs may reduce the anticipated benefits. For this reason, the classification presented in relation to making the right decision is not sufficient. It is essential here also to take the time horizon of innovation into account. Such division was proposed by G.A. Moore. It includes three types of innovation: short, middle and long term (Moore 2007). The short term Innovations, which can be treated in terms of current needs, are characterized by a short implementation period, which does not require the involvement of large financial resources. The implementation process of this type of innovation is not complicated. It focuses mostly on improving existing processes that require improvement as a result of detected errors and defects. Short term innovations are characterized by low levels of risk that is why decisions of their implementation are

made at lower levels of management. Medium term innovations include several budget periods. Because they involve making decisions that could affect the functioning of the entire company, they are subject to approval at a higher level of management. They concern the fundamental changes in the scope of manufactured products and processes under implementation. Last time horizon is related to innovations, which require a complex process, planning adequate financial resources for this purpose and also require the cooperation of companies and external organizations. These are innovations of creating new business and are related to strategic planning in the company. They are related to long-term development of the company. Planning this kind of innovations is the most difficult, but also most relevant from the strategical point of view. Their meaning is associated with long-term consequences of decisions taken and their financial requirements. This affects the level of risk in relation to these innovations. Difficulties in the implementation are related primarily to the dynamics of changes in the surroundings of the company and the way to conduct strategic analysis and its relevance.

3. The issue of innovative solutions evaluation

With the introduction of innovation, companies must make decisions regarding the solutions belonging to different innovation groups according to the proposed classification. The analysis of the proposed concept of innovation and evaluation of solutions is complex and difficult. Especially if they are innovations in different categories are considered together. Besides the benefits that are expected as a result of innovation, we can not forget about the processes of innovation, which in a decisive way to distinguish innovations between each other. The complexity of innovation processes consists of two main distinct phases innovation processes. The first phase is called Front-End (Cooper 2001). It is characterized by nonlinearity of performed tasks. Front-End is based on collecting ideas, their development, analysis and evaluation. This should end with a choice of solutions, which will be developed in later stages of the process. In turn, among these solutions should be chosen one that will eventually be implemented. The steps that make up the Front-End phase are repeated several times. Equally often relapses to earlier stages are required. Such pattern results from the parallel analysis of multiple solutions that are in the circle of interest. This instability is also associated with a large number of uncertainties that accompany the proposed solutions. The evaluating team has to make a choice at a high level of uncertainty and risk, which arises from the lack of information, because the innovation process are unique and their effects are poorly predictable. The second phase, which is presented as Stage-Gate (Cooper 2001), requires the implementation of further steps in the process of innovation in an arranged in series. It includes stages of: developing a chosen solution, which takes the form of design, its implementation and commercialization. Important is here the consequence and quick response to the disruptions, because the execution time is important in this phase. The sooner all the stages of Stage-Gate will be completed, the sooner the benefits of innovation will be present. Due to the uniqueness of the innovation process, differences in the tasks should be expected, comparing to the planed tasks. This, in turn forces continuous decision-making.

Stage-Gate phase should be implemented for a chosen option of innovation project. Stages included in its scope are highly cost-intensive and should be completed as soon as possible. This excludes the parallel execution of several options of innovation within the stages of Stage-Gate.

Innovation processes comparing to the processes of current business activities is distinguished by several important features. They cause, that the development of implementation plans and evaluation of expected benefits is associated with making decisions based on the number of variables:

- The uniqueness. Innovation processes are not repeatable. Each one is a separate project, in which there are different tasks to perform. Different sets of resources are also used, they require the involvement of different groups of implementers and have different realization times.
- Uncertainty and risk. The Innovations that affect the application of new solutions, never used in the company in its business activities, due to its originality are bounded with the uncertainty of success. Lack of patterns, incomplete knowledge and lack of experience does not allow for a guarantee that the implemented innovation will give assumed benefits. Prepared plans for the innovation processes are associated in turn with a high degree of risk for the implementation of planned activities and the occurrence of unforeseen events. Under such conditions it is necessary to constantly make decisions in situations of disturbance during the implementation of innovations.
- Assumed process. Innovation processes contain many stages of different nature. Each of these stages has other priorities. Front-End stage requires creativity in creating the concept of

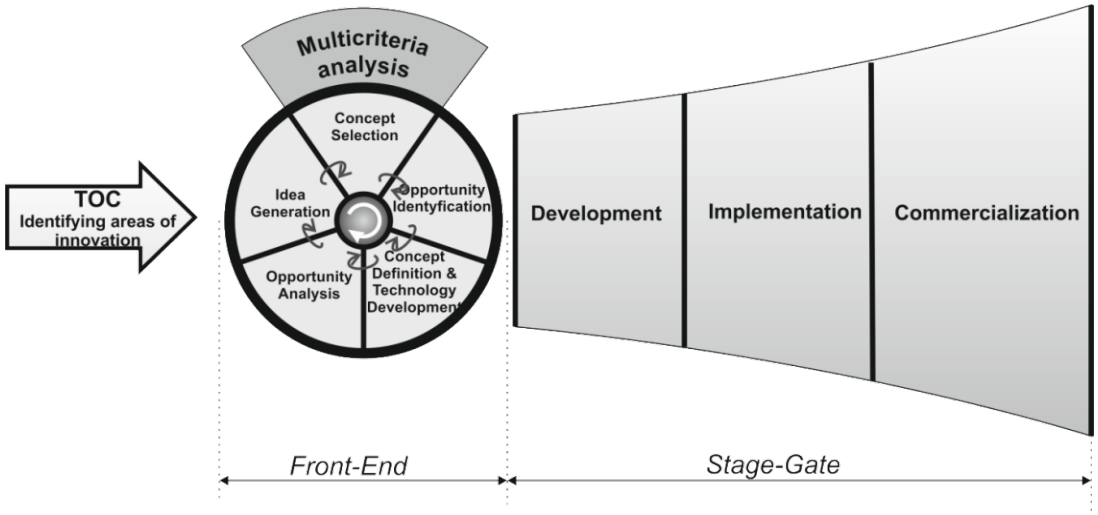
innovation. Stage-Gate treats of speed task implementation, the effectiveness of decision making and requires regular monitoring of costs as a priority.

- Interdisciplinarity of a team. Multiple stages innovation process include tasks of different nature, it requires the involvement of a team that must be characterized by the expertise of many disciplines. Often for individual tasks other composition of the executive team is called, there also might be a need to use expertise of people from outside the company.

Above mentioned features require an individual approach to each of the innovation processes.

Innovation processes should thus be analyzed and assessed in two ways. The first should address the benefits, which can be achieved through introduced innovative solutions. The second one should concern the assessment of the innovation process.

Assessment of the proposed solutions of innovation should be carried out in the initial phase of the innovation process, ie. during the Front End stage (figure 1). An evaluation of solutions at this initial stage of the innovation process is difficult. Too much information is missing, for the choice to be clear. Therefore it is necessary to rely on the experience and knowledge of those entrusted with carrying out this assessment. While making a choice, the benefits obtained as a result of implemented innovations should be evaluated. They may include tangible and intangible benefits. It should be recognized as a criteria.



Source: own study based on (Cooper 2001)

Figure1: Application of the theory of constraints and methods of solution assessment in the innovation process

4. Narrowing the set of innovative solution concepts

In search of innovation, companies often have an activity in the area of environmental monitoring. This particularly concerns companies that do not perform research and development studies. To meet the demands of today's market and the needs of potential customers, they are trying to find opportunities in the diffusion of innovation. Therefore, these companies actively participate in conferences and symposiums, collaborate with research centers, take part in fairs, analyze the market, and watch the actions of the competition, trying to see the innovations that transposed to the company will allow further development. The adaptation of this kind of innovation is a big challenge for companies. This is often concerns radical changes in the functioning of the company, reservation of a large budget and requires a major effort during the implementation process. These innovations also characterized by large uncertainties and risks that are associated with the implementation of tasks ever undertaken in the past. This way of searching for innovation seems, however to be easier.

Other approach is based on the search for innovation by monitoring and analyzing the processes implemented the company. It is a task that requires great creativity of employees who are developing innovative solutions for these areas of activities, where there are constraints to increase efficiency and quality of processes. In general they do not require big budgets and their implementation process is not so complicated. These are innovations, which usually are streamlining in nature. Only

companies having their own R & D departments with a strong potential can afford the generation of radical innovations.

Usually there are many variants of innovative solutions. Carrying out their evaluation in order to select promising solutions to grant the greatest benefit is the problem, especially when the solutions from different categories of innovation are evaluated. Often it is impossible to establish common criteria for evaluating such a set of innovations, among which are the proposals of product , process, organizational, or market innovations. It is therefore necessary to limit the number of proposed solutions to those that will be connected to only one area. To determine the area of innovation is proposed to apply the Theory of Constraints (Goldratt 1986), which has already been noticed as a method of supporting innovation processes (Dalton 2009). This method is tested in the management of production processes and allows to identify the bottlenecks that limit the development potential of the company. It can therefore also be an excellent tool for identifying areas for improvement in the way of innovation. Focus on what constitutes a restriction of the companies development also allows to narrow the proposed innovations to a single genus. If the limitation is, for example, one of the positions, the ideas will involve different versions of process innovation, in turn if the constraints are structural defects occurring in the product, innovation of the product will be the solution. It can not be ruled out that despite using the Theory of Constraints, innovation concepts of a different nature will arise. Above mentioned product defects can be eliminated by a change of product's design or by changes in the manufacturing process. But even in this case, will be easier to compare these solutions considering common benefits from these innovations to be achieved. The fact can not be excluded, that innovation directed to the designated area will not differ in time horizon. In this case, the common comparison of these solutions would also not give clear-cut results. Due to the large differences, which clearly distinguish innovations from different horizons, can be at the stage of generating the concept of innovation reduced to a single horizon. The criterion of implementation time of innovation and the expected level of the budget explicitly confine the set of concepts at the stage of pre-selection of solutions. Its the company's management, knowing its potential, should decide which of the types of innovations to prefer. If, however, the concepts of innovations are considered, belonging to all time horizons, there should be made a division to mentioned three groups, leading the evaluation process of innovations separately for each of them.

5. Method of assessing innovation solutions

Variants of the proposed solutions of innovations are evaluated on the basis of criteria that can be divided into two groups. The first concerns the benefits to be achieved after the implementation of innovation. They concern the extent to which an intended purpose will be achieved. The benefits can be divided into those that can be defined in a measurable way. They will be concern improving the performance of performed processes, increase of sales revenue, number of processed information, etc. The nature of these criteria will therefore be deterministic, because their values will be possible to calculate on the basis of changes, which are brought by the innovation. For example: the proposed innovative solution should lead to changes in machine operating parameters on the workstation. It is also known what levels of these parameters will be achieved after the implementation of this solution. Therefore it is possible, on the basis of the known dependencies, to accurately calculate eg processing time, which may be one of the criteria. Another type of criteria is present in the case of benefits that can be evaluated only in a subjective manner. They may be limited to: improving working conditions, improving the quality of products or services or to improve the company's image. At the evaluation stage of concepts, the approximate assessments by such criteria can not even be determined. These will be the criteria of a blur nature, in relation to which the knowledge and experience of the people who will evaluate should be trusted.

The second group of criteria should include evaluation of the implementation process which should be carried out for the innovation to be implemented successfully. Due to the individual nature of each of the processes of innovation, this group of criteria will be only blurred.

Because of the criteria of blurred nature in the process of evaluating solutions, should be involved individuals who have experience in the field of innovation processes. If the company lacks such persons, the expertise of external experts should be used. The importance of this stage is huge. The right choice will reflect on the success of the entire project.

The process of evaluating innovative solutions requires a method that will allow taking into account the specificities of innovation processes, the possibility of using various criteria and would allow for

participation of a team of experts involved in the evaluation. In terms of decision making, there are many methods that could help in deciding which innovation to choose. However, few of them allow to apply the criteria of different nature with the use of the opinion of the expert group. Most of the methods are focused on the participation of experts in the evaluation of solutions based solely on one type of criteria: deterministic or blurred. However, there is a method that meets these requirements. It's the Knosala method (Knosala 1989). Proceedings in accordance with this method require:

- the selection of criteria for evaluating the project and to defining their character. Criteria can be chosen from deterministic, probabilistic and blurred,
- formulation of a list of options for assessment,
- selection of experts involved in the evaluation,
- determine the weights for each criterion
- of evaluation,
- Result analysis.

The Knosala method uses multi-objective optimization, which includes all the defined criteria for assigning them the level of importance. This can be done in two ways. The criteria are compared with each other or they are described using linguistic terms. Most frequently is used the first of the methods. On the basis of the assessments of the criteria done by each expert, it receives a validity matrix of the criteria according to the method described by Saaty (Saaty 1980).

Each of the experts makes an independent assessment of each of the evaluated alternatives by assigning the corresponding point value of the range established by the person supervising the whole process. On the base of the evaluation of the options are created triangular membership functions (figure 2.).Triangular membership functions are constructed based on the following parameters:
Lower assessment value α:

$$\alpha = \min_{1 \ll e \ll p} \vartheta_{ij}(e)$$

Upper assessment value β:

$$\beta = \max_{1 \ll e \ll p} \vartheta_{ij}(e)$$

Average evaluation value υ:

$$\upsilon = \frac{1}{p} \sum_{e=1}^{p} \vartheta_{ij}(e)$$

where:

e – expert index

p – number of experts

$u_j(e)=[u_{1j}, u_{2j}, \ldots , u_{nj}]$ – assessment matrix, in which j – number of criteria, n – number of assessed options.

Blurred criteria cause, that obtained membership functions can take various forms. A special case is set by the function no.4, which indicates the oneness of experts. It's is a very rare case. The narrower the base of triangular membership function, the greater the oneness of experts, wide base indicates a large disparity of assessments. As can be seen the assessments of variants, thanks to the affiliation functions, receive a values of a range <0,1>.

In the case of deterministic criteria in the Knosala method there is also a transformation of the entered values in the range of assessments <0,1>. For this purpose are used corresponding functions, which are defined independently by each expert.

The next step bases on combining assessments of individual options taking into account the weights of criteria. For this purpose is used an aggregate function that describes the preference of a certain variant in regard to all criteria. After combining the assessments, is obtained subsequent affiliation function (Fig. 3), which presents the degree of preference of a given variant. Now it is possible to evaluate if a certain option is more preferred (function value Z (z) = 1 is closer to z = 1), or is less preferred (function value Z (z) = 1 is closer to z = 0) .

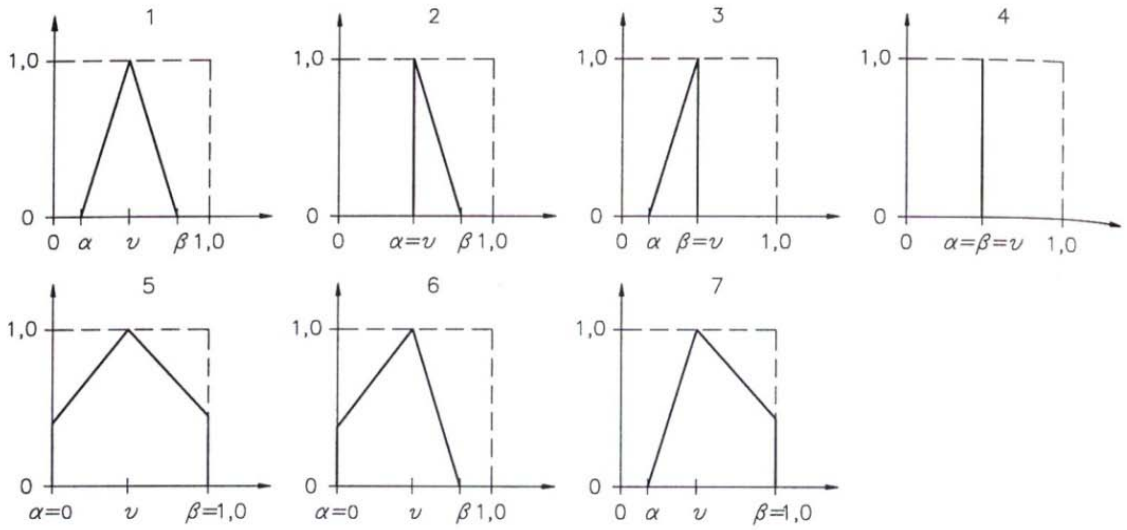


Figure 2: Possible membership functions (Knosala 1989)

Knosala method was presented in the Expert software, which, thanks to simple and comprehensible interface allows each of the experts, even without having advanced knowledge of multi-criteria optimization, go through the whole process. The only person for whom such knowledge is required, it is called the lead expert. His task is to define the problem, prepare variants for the evaluation and determine the criteria. He also ensures the correctness of the whole process according to the described method. This software, in a very readable form, presents the results obtained in the alphanumeric and graphic form (affiliation functions). The analysis of the obtained results it is also possible by comparing affiliation functions for each variant as a result of the imposition of these charts on each other (figure3). It facilitates spotting the differences between options and allows to make an objective assessment while selecting the best solution.

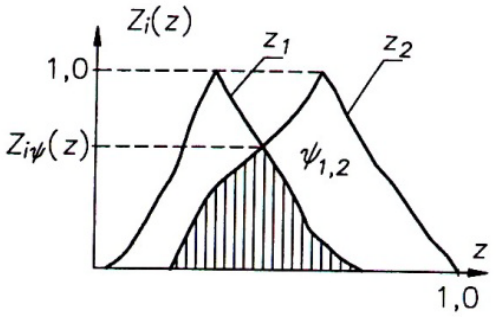


Figure 3: Comparison of membership function for variants 1 and 2 (Knosala 1989)

6. Summary

Today's world is characterized by almost dizzying pace of change. That and the increase of the number of factors affecting the company led to the fact that even the most efficient managers have trouble noticing the factors which have a real impact on the company. It should be, therefore, expected the necessary development of systems supporting managerial decisions, even those at the highest level. In this article the proposed solution is possible to implement in relation to the problem of assessment and selection of innovative solutions. It was shown that the method developed by prof. Knosala can serve as a tool to systematize and make decisions based on expert's opinions, often differing from each other. The idea of implementing a system of continuous innovation involves introducing a systematic analysis of trends in the proximal and distal environment. It is therefore necessary to determine a set of methods and tools, which will be able to serve this purpose. The versatility and flexibility of this method allows to use it in evaluation of the innovative solutions wielding a mixed set of criteria and contributing with assessments of a team of experts, what allows to obtain reliable results. Additionally the existence of such tool in the form of a computer program allows to quickly and efficiently carry out the evaluation process. The necessary condition is the

properly conducted assessment of the proposed solutions for innovations belonging to a common time horizon and on the same area of innovation, in which the Theory of Constraints can be useful.

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References

Cooper, R. G. (2001) Winning at new products: Accelerating the process from idea to launch, Basic Books, New York.

Dalton, M.A. (2009) What's Constraining Your Innovation?, Research-Technology Management Magazine, Vol. 1, Sept.

Drucker, P. (1995) Innovation and Entrepreneurship: Practice and Principles, Harper & Row, New York.

Goldratt, E. M. and Cox, J. (1986)The Goal: A Process of Ongoing Improvement,North River Press, New York.

Knosala, R. (1989)MethodenzurBewertung von BauelementenalsVoraussetzungfür die Entwicklung von Baukastensystemen,TechnischeUniversitat Dresden.

Moore, G.A. (2007)To Succeed In the Long Term, Focus on the Middle Term, Harvard Business Review, July-August.

Rothwell, R. (1994)Towards the Fifth-generation Innovation Process, International Marketing Review, Vol. 11 No. 1, 1994.

Saaty, T.L. (1980)The Analytic Hierarchy Processes, McGraw-Hill, New York.

Tushman, M.L. and Nadler D.A. (1986)Communication and Technical Roles in R&D Laboratories: An Information Processing Approach, In Dean, B.V. and Goldhar, J.L. (eds.), Management of Research and Innovation, Vol. 15. Amsterdam, Holland.

Barriers to Innovation Amongst Small and Medium-Sized Enterprises (SMEs) in Portugal

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Abstract: The importance of innovation on the survival and competitiveness of organizations is an undeniable fact. Small and Medium enterprises (SMEs) represent 99,99% of all Portuguese firms. This reality is shared by other European countries and therefore it is relevant to study their innovative behaviour and attitudes in order to achieve competitiveness and sustainability. The present study inquires about barriers to innovation, namely, what are the barriers faced by domestic companies, which barriers are easier to recognize and overcome and what is the level of importance they have on the firm point of view. The course of the investigation consists primarily in undertaking literature review on topics such as innovation, barriers to innovation, SMEs, strategy and competitiveness. The theoretical support, resulting therefrom leads to the building line of work that is embodied in two surveys. The results achieved made possible the creation of two new models of classification and segmentation of the barriers. The BARINOV Model that evidences the existence of internal or external barriers and flashes upon the concept of deviation barrier. The BARIFASE Model embodies the innovation process through three phases and evidences the occurrence of the barriers to innovation during these stages.

Keywords: SMEs, innovation, barriers to innovation, BARINOV model, BARIFASE model, Portugal

1. Introduction

The importance of innovation for the survival and competitiveness of organizations is an undeniable fact. The explosion of shared information, the growth of a more globalized economy and the rising crisis has changed the rules. Innovation is fundamental on the quest of profitable and sustainable growth. So organizations need to innovate to face the current downturn and survive.

New technologies, new products, new services, whole new industries have emerged. Since the Industrial Revolution, businesses rely upon technology as a driver of their progress. Innovation, understood as the sustainable implementation of improvements and new ideas, depends on other factors rather than this breakthrough technology, despite the fact that the technological improvements have consistently provided, in the past, opportunities from which were made and sold products and enhanced services (Dearing, 2000).

The economic environment is an ever-changing reality. Firms are forced to adapt rapidly, the speed and intensity of events make this concern a critical condition for the survival of businesses. The global markets and high-speed technological improvements have changed the competitive environment, making it more complex, more uncertain and forcing change in organizations.

Despite all this instability, economic crisis brings about opportunities as well as the need to adapt strategies and plan actions. Companies need to ensure that they are able to compete with emerging countries, that their products and services fit the market needs.

Crisis forces to peep into short-run problems, the immediate future. All the same, firms cannot forget that today's decisions have impacts on the future. Also true is the existence of more space for small and medium enterprises (SMEs) with innovative spirit, to stand out. The deepening crisis since 2007 and the competition in the current world market, where emerging economies grow faster than the others, require European countries to puzzle out products and services of higher quality and more innovative.

Are companies prepared for this stage? What sustains the survival and sustainability of European SMEs, and especially the Portuguese ones?

Thus, the urgency and relevance for the companies, whatever the market in which they operate, to drive process improvements or changes involving their future sustainability is the current theme. The question that every business faces is in which way, using which tools and applying what attitudes and actions, will promote this claim.

Companies should endeavour processes towards sustainable innovation. This road is long and difficult since the available resources, mainly financial ones, are more and more scarce. This scarcity of resources swells the need to develop strong investment returns that contribute to cost structures cut and trigger market innovative products and services. Despite the development of this effort there is no guarantee that it is sufficient to achieve the competitiveness.

On this context remains to companies, almost exclusively, the pursuit of differentiation resulting from the practice of innovation (in any of its types), or more broadly, conducting proceedings of Research, Development and Innovation (RD&I). This broad need for innovation, supporting the diversification, that companies feel is also cause and effect of the reduction of product life cycles. Undoubtedly, companies must align innovation with its guideline and its strategic objectives.

Overlooking at Portugal, the country never needed so much its firms to be able to compete externally. Enterprises know that the call for innovation is more intense than ever.

2. Literature review

The Portuguese entrepreneurial is mostly composed of small and medium-sized firms. SMEs are companies with fewer than two hundred and fifty employees, turnover of up to fifty million and balance sheet total less than forty-three million Euros, under the Commission Recommendation 2003/361/EC on the 6th May two thousand and three.

According to the National Statistics Institute (INE, 2011), the number of non-financial corporations in Portugal at the end of 2009 was 1 060 906. Only 888 of them employed more than 250 workers (about 0.0837% of total). On the other hand, the number of companies that have less than 10 employees reaches 1 014 103 (95.59%). This data for the year 2009, reflecting the national trend, by itself justifies the importance of this national study on SMEs. Moreover, supports the usefulness of the results emerging from the sample.

Schumpeter (1939) portrays the importance of innovation for long-term profitability, considering innovation as a process of "creative destruction." To the author innovation creates competitive advantage by avoiding changes in the achievement of the balance, through the destruction of businesses and business models.

Carayannis et al. (2006) mention that SMEs are characterized by their ability to react quickly to changing market conditions, which represent a competitive advantage. In addition, SMEs are recognized by their growing participation in terms of employability and development of output. Notwithstanding that fact, SMEs suffer from lack of technology adoption as standard practice, despite their greater tendency for product innovation after applying technological innovation processes.

However, SMEs, according to previous authors, face critical economic challenges such as increasing competition driven by globalization, restrictions on access to finance, developed networks with foreign partners, imperfect access to the transfer of research results and technology, speed of change in the technological environment, and the uncertainty of sustainability.

For Tidd and Bessant (2009) organizations with more success in the market are leading innovation. Despite the competitive advantage could result from the size or ownership of assets, among others, there is favouritism, increasingly, to organizations that mobilize knowledge, technological skills and experience to the creation of novelty. This innovation is reflected in their offers and / or the way they create and integrate them in the product range. The theme of survival / growth raises the problem for established firms but provides a huge opportunity to rebuild the new rules of the game.

To Demirbas (2010) SMEs hold an important role in national economies because of their number and engaged workforce. However, despite recognizing its importance, some key barriers to innovation for SMEs prevent them to succeed in driving innovation processes.

Therefore the world faces extraordinary challenges. The effects of the crisis will have an impact in the coming years. In general, the measurement of welfare is based on the Gross Domestic Product (GDP) per capita, and changes in welfare can result from changes in labour productivity (GDP per hour worked) and labour utilization (hours worked per person employed). The erosion and

deceleration of labour productivity growth performance is already a pre-crisis (2007-08), which makes it even more imperative for countries to find new and sustainable sources of growth.

Portugal is no exception to this. According to statistics from OECD Productivity (2009), between 2001 and 2007, GDP per capita grew, by about 0.3% annually between 2007 and 2008 and about (-) 0.3% per year. It could already be noticed, in labour productivity, from 2001 to 2007 the growing at an annual rate of 1.1%, while from 2007 to 2008 it grew by about (-) 1.4% per year. More even, the use of manpower, at an annual decrease of 1% between 2001 and 2007, and an increase of 1% from 2007 to 2008. This reading supports and corroborates the existence of resources accompanied by a low productivity promoted by their use.

Undoubtedly, innovation is a key required for improving productivity, growth and business sustainability. Given this environment, knowledge of the factors that lift innovation is the key. This study identifies and presents the barriers to innovation perceived and experienced by the Portuguese companies who have participated.

According to Hadjimanolis (2003), there are factors or constraints that inhibit innovation: barriers to innovation. The study of the barriers to innovation focuses on the problems that can occur throughout the complex and delicate process of innovation. These factors, which place obstruction or inertia in innovation, termed barriers to innovation, can arise for various reasons. The identification and categorization is fundamental since it will create mechanisms to reduce its existence, minimizing them, deleting them or converting them into facilitators of innovation.

For most authors their categorizations divide into internal and external barriers (Stanislawsky & Olczak, 2010; Madrid-Guijarro *et al.,* 2009; Hadjimanolis, 2003; Piatier, 1984). Internal barriers are those that arise inside the company and external barriers, those that arise from the external environment. This classification is also assumed in the course of this study.

Piatier (1984) describes the lack of government support as an important barrier to innovation in the European countries analysed. The study conducted for Accenture by the Economist Intelligence Unit (2007) over a population of 601 senior managers revealed the following barriers to innovation: (1) the necessities related to the frequency, timing and speed of innovation, (2) the organizational culture mutation and reducing time to market as a permanent challenge in the assumption of innovation objectives and (3) the Chief Executive Officers (CEO) of full age have a greater departure from the view against the goals of innovation and innovative capacity of the organization. In addition to this, evidence, pointed out the following additional barriers to innovation reported in order of importance (highest to lowest importance within companies surveyed). Firstly, the organization seeks to follow the current line extensions rather than developing new business models. Next, the organization assigns top priority to short-term rather than long-term investments. Furthermore, opportunities to explore untapped markets or areas die for lack of those who foster. Additionally, the entity seeks for the next "chicken with golden eggs" rather than pursuing a portfolio of opportunities. And finally, the organization does not include in the learning process the past error modified due to a growing aversion to risk on new ideas.

According to Madrid-Guijarro et al. (2009), the barriers to innovation that Spanish SMEs face are essentially the external environment, the human resources, the risk and financial position. The same authors conclude that the cost of innovation affects more the SMEs and that different barriers have different impacts on different types of innovation.

Segarra-Blasco, Garcia-Quevedo and Teruel-Carrizosa (2008) present barriers to innovation in Catalonia. The Barriers to innovation identified are divided between cost barriers, barriers of knowledge and market barriers. With regards to cost barriers are presented the high cost of innovation, and the lack of internal and external funds. The barriers of knowledge are the lack of qualified staff, the low information on technology, the poor information about markets and the difficulty in finding partners. Finally, market barriers cited are: the market dominance by the incumbent, the uncertainty of demand and lack of demand for innovation.

The UK companies face three main barriers to innovation, to be precise the time of development of innovation, the risk aversion and the poor market knowledge (Tovstiga and Birschall, 2007).

The German reality shows as being the more frequent barriers: the low budget, the difficulty in recruiting adequate human resources, the bureaucracy and poor cooperation between enterprises (Tiwari and Buse, 2007). Buse, Tiwari and Herstatt (2010) also emphasize the lack of the target market, bureaucratic constraints, and inability to find or decide for the better partner for strategic cooperation.

A study carried over SMEs in Cyprus showed the following conclusions: the internal most significant barriers are the lack of time, inadequacy of the R&D activities, design and testing within the company, and also inadequate financial resources (Hadjimanolis, 1999). The author also identified the more expressive external barriers to innovation: the ease of copying the innovation, the government bureaucracy, lack of government support, lack of qualified human resources policies and bank lending.

Demirbas (2010) conducted a study on barriers to innovation in Turkey and reached some conclusions as follow. The entrepreneurs who are innovative are those with greater perception of barriers to innovation. The results show as barriers to innovation in Turkey: (1) the lack of state policies to support technology and R&D; (2) the negative impact of the economy in the level of investment, (3) the high cost of innovation, (4) the lack of appropriate means of financing and (5) the lack of qualified personnel.

Necadova and Scholleová (2011) identified as barriers to innovation in the Czech Republic the items described: (1) the high cost, (2) the lack of specialists, (3) the payback period of investment extremely long, (4) the equipment technology, (5) standards and legislation, (6) lack of capital, (7) the lack of consumer response, (8) resistance to change, (9) the fear of risk, (10) ignorance of the market and (11) the infrastructure of the business.

According to Comtesse, Hodgkinson and Krug (2002) the Swiss business sector faces the following barriers to innovation. The cultural level, are: (1) risk aversion, (2) public complacency, (3) non-recognition of high-value innovation, (4) the provincialism and (5), closed networks. In educational level are: (1) the inability of framework tools for innovation in education, (2) limited human capital, (3) the absence of functional models and (4) the lack of entrepreneurial mindset. At the political level: (1) poor access to financing, (2) legal barriers, (3) insufficient political vision and growth, (4) the infrastructure and intellectual capital and underutilized (5) too many restrictions on the innovation.

The observation of the Portuguese business community in order to understand the longevity of companies allowed to establish the following barriers to innovation: the high economic cost and risk associated with innovation, lack of funding, organizational rigidity, lack of skilled human resources, lack of market information and technology, government regulation and weak capacity to approach the client (Silva et al., 2007), as well as the lack of cooperation with centres of learning (Vieira, 2007).

3. Goals

Due to the great contribution of the innovative activities to firm competitiveness and success, it is of great interest to identify the barriers and obstacles that prevent innovation in firms.

The objective of studying the barriers to innovation relates to the discovery of its nature, origin and significance. It is equally relevant to group them and try to understand their effects on innovation processes. Even more important is to identify ways to mitigate their negative effect, enabling organizations to overcome the negative impact resulting from its existence. Having identified the barriers or inhibitors of innovation, it may take measures that will lead to their elimination, favoring the flow of innovation in the circuit of companies.

The present investigation intends to answer the following questions: (1) What barriers to innovation do Portuguese enterprises face?; (2) What is the relevance of each barriers attributed to the barriers identified by the firms?; (3) How are the barriers classified and grouped?

The current study reports the results of a study that examined barriers to innovation among a sample of thirty-five Portuguese enterprises.

4. Methodology

The data for this study was gathered from two questionnaires surveyed to a sample of thirty five enterprises.

The surveys were sent by mail to managers which answered the same way. In this questionnaire the firms were asked to present their perception about their own innovative attitude. The questions aimed at recognizing what prevents firms from innovating, if mainly internal or external factors. Subsequently the CEOs should point out what are the main refrains of innovation identified in the internal and external environment of the firm, in other words the innovation barriers faced. The studied firms were also asked to show what is easier to overcome if internal or external innovation barriers.

In the first questionnaire the main concern was not to influence the firms on their answers and letting them present their own convictions. The first group of questions intended to characterize the firms on dimension, geographic headquarters and activity. The dimension follows the European recommendation making it possible to compare the results with those obtained in others studies in other countries.

After collecting this data a second questionnaire was surveyed and the main goal was to determine if firms faced the barriers obtained in the first questionnaire and what level of importance, they recognized, as preventing innovation.

The sample is the same and the CEOs had to sentence if they felt the barrier and if so, what relevance (using a Likert scale) they recognize, so that the relevance of the barrier was known. Furthermore, firms were asked to declare where they felt these barriers. Later, looking at the innovation process compounded by three phases (conception, implementation and feedback), to declare in which of the phases are these obstacles more evident for the firm context. Finally, to compare the results to the ones obtained in the critical review of literature.

5. Results achieved

Lengthways the course of this investigation interesting results appeared on the topic of innovation. The surveys conducted counted with the participation of fourty-five companies. Four are large companies, eight medium-sized enterprises, twelve small companies and twenty one micro enterprises. The companies headquarters are located in the cities of Braga (five), Bragança (two), Lisbon (one), Oporto (thirty six) and Viana do Castelo (one) and develop a wide variety of activities such as farm activities, wholesale traders, retail traders, manufacturers and service providers.

When asked about their attitude towards innovation, 53,3% stated to hold it and 46,7% that they do not promote this innovative approach. Whether taking an innovative approach or not, companies have identified the most significant barriers to innovation faced. For 57,77% of those surveyed both the internal and the external barriers are significant, while 33,33% of the companies pointed out internal barriers as most important, and 8,88% declare to face only external barriers. Additionally, 80% of the companies said they were more successful in overcoming the internal barriers, this means facing and dealing with the barriers to innovation that emanate from within the company.

Fifty five barriers named by participants were listed. The same sample of companies was asked to designate those which are recognized as obstructing the process of innovation and afterwards to provide them with a degree of importance in obstruction. For this purpose we used a Likert scale of six levels (reduced, little, some, enough, lot and huge).

The more alluded barriers were the current economic environment, the limitation of monetary resources, the reduced risk-taking culture, the mechanical performances, the routine and cemented processes, the organizational and human resources resistance to change, the lack of incentives and compensation for innovation, the high cost of new tools and processes, the small size of the company and the owner's profile of leadership and risk taking. Heeding the importance attributed to the barriers showed that those with higher degrees of obstruction to the recognition of innovation do not match with the most universally cited by the companies. However, a common factor to most difficult barriers to overcome is that they arise from the external environment of companies. As a result, many companies can understand the difficulty in managing the barriers for the reason that they do not depend on the performance of the company.

With this work, further than attaining the knowledge of innovation barriers at the studied companies, it is possible to categorize them in an alternative way through BARIFASE and BARINOV Models now developed which display different views of the classifications existing so far. The BARINOV Model stresses the awareness or not of the barriers to innovation by firms. This model points out the capacity of firms to identify correctly the barriers they face. Some companies cannot recognize the existence of barriers to innovation. In this case the barriers are not perceived, regardless of being internal or external. The other barriers are acknowledged by firms. Analysing the answers of the participants it is possible to perceive that some firms are mistaken about the origin of the barriers they face. Although recognizing the barriers (perceived barriers) and understanding well the split on internal and external barriers they advocate internal barriers has being born outside the company. By doing so, they downplay their existence, and do not set off mechanisms to avoid, minimize or eliminate them. On the other hand, some of the external barriers are considered to rise inside the organization. In this case, the effort carried out in order to treat, reduce or eliminate the barrier is of no value.

The usefulness of the model goes beyond the aforementioned characteristic and signs in the appearance of wrong-way (deviation) barriers. These represent a misreading of the source barrier. Therefore it may contribute to an effort to combat a barrier flagged as internal, but in genuineness external. In other words a totally pointless waste of resources. Or alternatively, the validation of a barrier to innovation as external, not being driven the mechanisms of correction, when in reality, it is internal and should be taken the decision on whether or not to fight it.

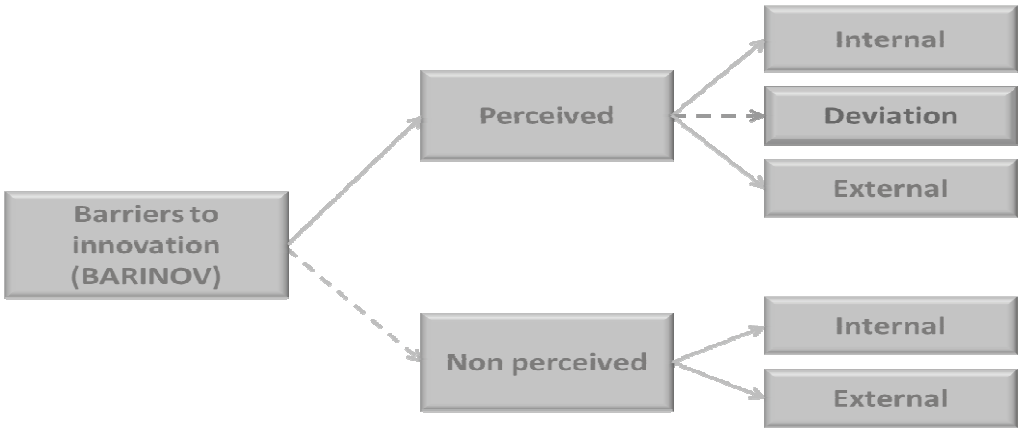


Figure 1: BARINOV model

Beyond the model portrayed before the answers collected allowed the appearance of another model: the BARIFASE Model that targets this topic on a dissimilar prism. It conceptualizes innovation in a three-phase process and evaluates the most important phases in terms of appearance and recognition of the barriers to the companies. These phases are labeled as: (1) perception, conception and ideation; (2) implementation and (3) feedback, control and performance. The first phase contemplates the creation of something that supports innovation, its embodiment. The second, named implementation exposes the diffusion of innovation through the organization and its frequent practice. At long last the third, consisting of monitoring and measurement, and if necessary or applicable, its correction or improvement.

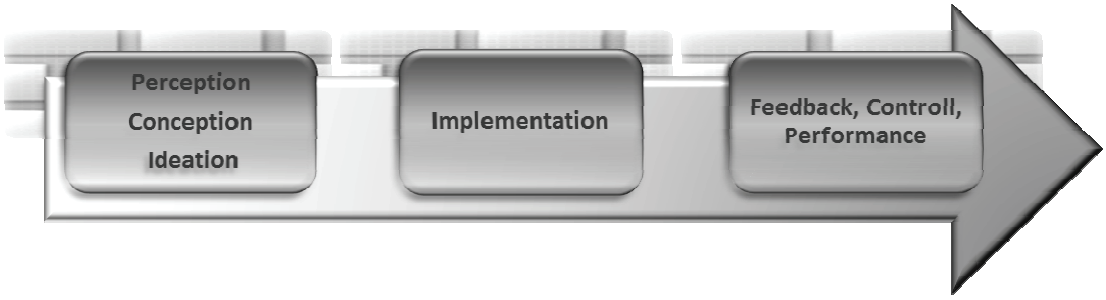


Figure 2: BARIFASE model

The usefulness of the BARIFASE Model consists of exposing the problem or retractor of the innovative process in different moments and allowing managers or decision makers to interpose in that specific moment and developing measures to promote innovation. This model evidences the possibility of taking care of innovation processes in the firm. If the problem arises along the first phase the company should promote the environment that promotes the birth of innovation. If, on the other hand, the retraction of innovation occurs during the implementation, the company must emphasize the benefits and need of the implementation of innovation, not only in favour of the company but of all her stakeholders. Lastly, if the third phase does not develop correctly the firm cannot grow and add value through its own performance. Knowing the stronger moment enables the firm to improve by innovating.

The results obtained from the participants showed that they feel the most the inhibition of innovation along the phase of conception and creation. Afterwards, the phase most significant hereafter is the third phase - feedback and improvement. These conclusions attained illustrate the difficulty to create or develop innovation and to recognize its application over the firm.

6. Conclusions

The results brought by this study revealed the barriers to innovation faced by the participants, namely the current economic environment, the limitation of monetary resources, the reduced risk-taking culture, the mechanical performances, the routine and cemented processes, the organizational and human resources resistance to change, the lack of incentives and compensation for innovation, the high cost of new tools and processes, the small size of companies and the owner's profile of leadership and risk taking. It also allowed the acquaintance of barriers importance perceived by firms, and made it possible to understand that some factors born outside the firm are considered more difficult to overcome and the more important barriers that firms face.

Innovations reflect a critical way in which organizations react to the challenges they face. Knowing their perception of the innovation barriers is an undeniable advantage to promote their maintenance in the market. The results show that companies consider themselves not to be very innovative, that they essentially face internal and external barriers. And also that external barriers to innovation are more difficult to overcome than internal ones.

In addition the BARINOV Model stresses the perception or not of the existence of barriers, it also exposes the capacity of understanding internal and external barriers and brings about the concept of deviation barrier, which in the limit represents a total waste of resources by the firm.

When regarding the BARIFASE Model it enables companies to treat the phase of the innovation process that is weaker for that specific company, and lightens the more important and profitable measures to be carried out.

The conclusions reached by the study can help firms overcome problems along innovation process, give information for their CEOs to conduct innovation process in a different way, and help firms understand what is wrong in their innovation process. Mainly, what needs to be improved, where are they spending their resources sometimes without obtaining return, and what are the more frequent barriers they face. By doing so, they are free to spend their time and resources in other themes over the corporation. It also helps spreading innovation.

Despite all the work that has been developed, the authors will extend the study to further SMEs and enlarge the sample in order to obtain other valuable information and continue lightning the innovation path.

References

Accenture (2008). Overcoming barriers to innovation. Emerging role of the chief executive. www.accentur.com/innovation_eiu.

Buse, S., Tiwari, R. and Herstatt, C. (2010). "Global innovation: an answer to mitigate barriers to innovation in small and medium sized enterprises?", *International Journal of Innovation and Technological Management*, vol. 7, no. 3, pp. 215-227.

Carayannis, E. G., Popescu, D., Sipp, C. and Stewart, M. (2006). Technological learning for entrepreneurial development (TL4D) in the knowledge economy (KE): Case studies and Lessons Learned. *Technovation*, 26, pp. 419-443.

Comtesse, X. L., Hodgkinson, A, and Krug, E. (2002). Success factors and barriers to innovation in Switzerland. Avenir Suisse and Enterprise Forum of Switzerland.
Dearing, A. (2000). Sustainable innovation: Drivers and barriers. World business council for sustainable development. Geneva.
Demirbas, D. (2010). How do entrepreneurs perceive barriers to innovation? Empirical Evidence from Turkish SMEs.
European Commission. European Commission Recommendation 2003/361/CE on the 6th May 2003, Jornal Oficial da União Europeia, Bruxelas, 2003.
Hadjimanolis, A. (1999). Barriers to innovation for smes in a small less developed country (Cyprus). Technovation, vol. 19, pp. 561-570. Oxford, UK: Elsevier Science.1999.
Hadjimanolis, A. (2003). "The barriers aproach to innovation", in Larisa V. Shavinina (ed.) The International Handbook in Innovation (pp. 559-573). Oxford, UK: Elsevier Science. 2003.
INE (2011). Informação estatística/empresas. Disponível em http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&indOcorrCod=0004041&contexto=pi&selTab=tab0
Madrid-Guijarro, A., Garcia, D. and Auken, H. V. (2009). Barriers to innovation among Spanish manufacturing SMEs. *Journal of Small Business Management*, vol. 47, no.4, pp. 465-488. 2009.
Necadová, M. and Scholleova, H. (2011). Motives and barriers of innovation behavior of companies. University of Economics. Praga.
OECD (2009). Measuring innovation: a new perspective. Productivity Database 2009. At www.oecd.org/statistics/productivity, Marh 2010.
Piattier, A. (1984). Barriers to innovation. Frances Printer. London and Dover NH.
Schumpeter, J. A. (1939). The theory of economic development: an inquiry into profits, capital credit, interest and the business cycle". Cambridge: Harvard Business Press.
Segarra-Blasco, A., Garcia-Quevedo, J. & Teruel-Carrizosa, M. (2008). Barriers to innovation and public policy in Catalonia. *International Entrepreneur Manager Journal*, 4, 431-451.
Silva, M. (2008, Dezembro). Barreiras à inovação. Rede 2020, vol. 4 no. 6, p. 15.
Silva, M., Leitão, J. and Raposo, M. (2007). Barriers to innovation faced by manufacturing firms in Portugal: How to overcome it?. MunichpersonalRePEcArchive. Acedido a 20 de dezembro em: http://mpra.ub.uni-muenchen.de/5408/.
Stanislawski, R. and Olczak, A. (2010). Innovative activity in the small business setor of the textile and clothing industry. Fibres& Textiles in Eastern Europe, vol. 18, no. 1, 78, pp. 13-16.
Tidd, J. and Bessant, J. (2009).Managing innovation: integrating technological, market and organizational change (4a Ed.). Chichester, UK: John Wiley & Sons, Ltd.
Tiwari, R. and Buse, S. (2007). Barriers to innovation in SMEs: can the internationalization of R&d mitigate their effects?. Concord 2007, Proceedings of the first european conference on knowledge for growth: role and dynamics of corporate R&D (CONCORD 2007)", Seville, Spain.
Tovstiga, G. and Birschall, D. (2007). Henley SME Innovation Study 2007. Proceedings of PICMET 2008, 27-31 July, Cape Town, South Africa.
Vieira, F. (2007). Distritos industriais e inovação: O setor dos moldes em Portugal. Tese de Doutoramento.

Portuguese Social Stock Exchange – Assessment of Sustainability

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Abstract: Social organizations have an important role detecting and exploring social opportunities. Frequently they are the solution to social problems where market and government fail. The social entrepreneurs identify and solve social problems where the others just see barriers, identifying and evaluating opportunities, disseminating new approaches and proposing sustainable solutions that contribute to create social value. This article, firstly presents a literature review about social entrepreneurship, social innovation and social entrepreneur, considering different approches and perspectives. Secondly, through a qualitative methodology, it is studied the projects included in Social Stock Exchange (BVS). BVS replicates the atmosphere of a stock exchange and its role is to approach civil society organizations and social investors that are available to support these organizations by purchasing their social shares. This project is developing innovative approaches to attract financial resources in order to solve social problems, including the eradication of poverty and other social risks. Through the promotion of social investment, the BVS proposes an innovative financial model supported not in a philanthropy or charity perspective, but deciding according with the social profit of each project. The empirical study based on interviews applied to key-informers from social projects included in BVS. The interviews have three main objectives: 1-Identify the degree of project attractiveness; 2-Understand the reasons of project attractiveness in terms of funding; 3-Assess the sustainability of the projects, concerning economic dimension (eg job creation), social dimension (eg, resolution of a social need for a vulnerable group) and environmental dimension (eg, reduction of impacts on the environment). Finally we believe that this paper contributes to a better understanding of the factors that promote the attractiveness of social projects and highlight the importance of improvement concerning management practices.

Keywords: case study, social entrepreneurship, social stock exchange, social value, sustainability

1. A framework of social entrepreneurship

The conceptualization of social entrepreneurship, similarly to what occurs with the definition of entrepreneurship is not consesual. This is an area of knowledge that is still young, which is reflected in the variety of definitions in the literature (Seelos and Mair 2005).

Another peculiarity of this approach refers to the possibility of social entrepreneurship emerge in various contexts; however, most studies refers to the public domain (Lewis, 1980; King and Roberts, 1987).

As Venkataraman (1997, p. 120) noted, “there are fundamentally different conceptions and interpretations of the concept of entrepreneur and the entrepreneurial role, consensus on a definition of the field in terms of the entrepreneur is perhaps an impossibility.” In this context we can identify different approaches in the literature on social entrepreneurship.

To better understand social entrepreneurship, Austin et al. (2006) differentiate two types of entrepreneurship. For these authors, commercial entrepreneurship represents the identification, evaluation, and exploitation of opportunities that result in profits. In contrast, social entrepreneurship refers to the identification, evaluation, and exploitation of opportunities that result in social value. Social entrepreneurs have a sensitive understanding of social needs, and answer to these needs through creative solutions. This attention on social value is present in various definitions of social entrepreneurship (e.g., Peredo and McLean, 2006; Shaw and Carter, 2007). The main difference between these two definitions of entrepreneurship (commercial and social) is the focus on social value versus private value...

Other perspectives can be found in the literature. According with Dees (1998a), social entrepreneurship refers to new non-profit ventures, as well as business ventures for social purposes, including community development banks and for-profit hybrid organizations. Austin et al. (2006, p. 2) define social entrepreneurship as “innovative, social value creating activity that can occur within or

across the nonprofit, business, or government sectors". These authors consider three primary ways to distinguish between commercial and social entrepreneurship.

First, new commercial and social ventures diverge in terms of overall mission. While commercial entrepreneurs are primarily concerned with private gains, social entrepreneurs are more interested in creating social value. Nevertheless, commercial entrepreneurs may also produce social value in the process of creating private gains, and on the other hand, social entrepreneurs may produce private gains in the process of creating social value (Emerson and Twersky, 1996). However, with the exception of secondary gains, these two types of organizations are guided by two very different missions.

Second, commercial and social entrepreneurship differ severely in terms of performance measurement (Austin et al., 2006). In the first type the performance is measured in terms of financial performance (i.e., profitability, sales growth) and in the second type performance measures is less standardized and more particular to a certain organization (the measure can vary by type of organization, i.e., eduaction ou other). However, an effort has been made to minimize this difficulty, through the development of mechanisms that can help to alleviate this subject and the creation of new metrics to quantify value in the social sector (Young, 2006). The performance metrics, such as, sales, profits, or other traditional financial measures are mostly more suitable to commercial entrepreneurship. Social entrepreneurship includes more esoteric measures, such as, lives touched, trees saved, or percent of emissions reduced. However it's important that social entrepreneurship measure their impact in society or environment. Most social projects must identify their own non-financial metrics of success based on mission, industry, and ideal impact. Clearly, metrics measured need to be positively correlated with the traditional financial measures, or the venture will not sustain over time.

Third, commercial and social entrepreneurship diverge in terms of resource mobilization (Austin et al., 2006). Regarding the ability to obtain financial resources, business entrepreneurs have an advantage over those social entrepreneurs: the perspective of potential profits. That is the motivation of business angels and venture capitalists. Other advantage is related with human resources, commercial entrepreneurs are able to hire employees based on the same factor: potential returns. When individuals decide to work for commercial entrepreneurs, they hope to expect to be in turn of their performance financial rewards such as wages, benefits, future windfalls (i.e., stock options), or others. Costa and Carvalho, 2011, tried to group the various definitions of social entrepreneurship having found three major groups:

- First group: social entrepreneurship refers to the initiatives of social organizations in the search for alternative financing strategies or as a way of creating social value through management practices (Dees, 1998a; Austin, Stevenson and Wei-Skiller, 2006; Boschee, 1998).
- Second group: social entrepreneurship considers the independent initiatives of social entrepreneurs who seek to alleviate a social problem and catalyze social transformation (Alvord, 2002; Alvord, 2004).
- Third group: social entrepreneurship includes a set of practices of social responsibility of companies involved in partnerships with other sectors (Sagawa and Segal, 2000; Waddock, 1988).

In conclusion, and despite the differences between social and commercial entrepreneurship, organizations can pursue commercial entrepreneurship, social entrepreneurship, or some combination of both (Austin et al., 2006; Peredo and McLean, 2006). In fact, some scholars advocate that organizations can have both commercial and social objectives, can be as *hybrids* (Davis, 1997) and in this case have two bottom lines, one related with profits and other related with social value.

2. Social entrepreneurship and social innovation

Phills Jr., Deiglmeier and Miller (2008) expand the field of investigation from social entrepreneurship to "social innovation". According with these authors social innovation is a novel answer to a social problem that is more effective, efficient, sustainable, than the existing solutions, that creates value added to society as a whole rather than to private individuals. This first approach creates a great differentiation between private problems and social problems, as well as between private value and social value. This restricted view of social innovation evolved. This evolution was made through the defining of social value of these authors. They defined social value as the creation of benefits or

reductions of costs for society, trying to meet social needs and problems in a way that goes far beyond the private gains and general benefits of market activity.

According with Leadbeater (2007, p:2), "All innovation involves the application of new ideas – or the reapplication of old ideas in new ways – to devise better solutions to our needs. Innovation is invariably a cumulative, collaborative activity in which ideas are shared, tested, refined, developed and applied. Social innovation applies this thinking to social issues: education and health, issues of inequality and inclusion."

For Mulgan*,et al*. (2007), social innovation refers to innovative activities and services that are moved by the goal of meeting a social need and that are mainly developed and diffused through organisations whose primary purposes are social. This definition differentiates social innovation from business innovations. The last ones usually focused on profit maximisation and diffused through organisations that mainly moved by profit maximisation. However we can find some borderline cases, such as models of distance learning that first appeared in social organisations but then were adopted by businesses. For these authors the most interesting innovations are those that take the form of replicable programmes or organisations, referring to as good examples of social innovation, the spread of cognitive behavioural therapy of Aaron Beck in the 1960s and then tested empirically in the 1970s, and later extend to professional and policy networks. Also Social Stock Exchange, can be refereed as an example of social innovation. In this case, the replication is made based on the atmosphere of a stock exchange. This environment creates a network that facilitate the relationship between Civil Society Organizations that creates social value in the area of Education and Entrepreneurship, and social investors (donors) that support these organizations by purchasing their social actions.

3. Sources of opportunities and resources cooptation

The recognition and exploitation of opportunities is a key issue in social entrepreneurship (Austin et al., 2006; Mair and Marti, 2006). Considering that social entrepreneurship has particular features, distinguished from the commercial opportunities (Austin et al., 2006; Dorado, 2006; Mair, 2006; Robinson, 2006). Several authors point out the uniqueness of social opportunities in comparison with commercial opportunities:

- Social entrepreneurship opportunities are focused on social problems and they involve attempts to create social value (Dees, 2001; Thompson, 2002). Social value creation is concerning with the resolution of social issues such as generating income for the economically disadvantaged or delivering medical supplies to poverty-stricken areas of the globe and requires innovation just as economic value creation in the commercial sector does (Dees, 2001, 2007). Opportunities to create social value surface through philanthropic activities, social activism such as fair trade importing, and through notions of self-help that engender systems enabling people to help themselves similar to the microfinance movement (Hockerts, 2006).
- Social entrepreneurship opportunities can be distinguished according the context where these opportunities surface and could be recognized, and exploited.

In fact, social problems (people) and environmental problems (planet) presented as opportunities for social entrepreneurs (Neck et al, 2009). The identification and exploitation of opportunities provides solutions to social problems, such as, healthcare, education, poverty, hunger in the case of social problems, and new technologies and innovations to solve environmental problems such as energy, water, and global warming.

Entrepreneurial projects require resources, as the traditional entrepreneurs, social entrepreneurs must found a range of tools and strategies to attract the resources. Entrepreneurship literature (Aldrich and Zimmer, 1986; Birley, 1985; Johannisson, 2000) provides several studies on entrepreneurial networks and their fundamental role in providing access to knowledge, information, and resources. Some of those studies highlight strategies followed by entrepreneurs in order to attract resources, such as, the use of networks and social resourcing, financial bootstrapping, strategies of effectuation (Domenico et al, 2010).

Some studies in field of social entrepreneurship exemplify cases of the resources acquisition through networks are tangible (the case of capital and physical assets) and others are relational. Its possible note that frequently entrepreneurs use personal networks such as kinship ties and family mentors in

order to access support, skills, and experience, thereby facilitating market penetration (Domenico et al, 2010).

4. Methodology

This empirical research applies the case study methodology. According with Yin (1994) case study method is most suitable for the investigation that search questions such as "how" and "why" about which the researcher has little or no control. Yin (1994) defines the case study research method as an empirical study that investigates a contemporary phenomenon within its real-life context; when the limits between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1994, p. 13).

This exploratory study adopted an iterative process of data collection in conducting a case study built on the results of a semi-structured interviews (see Annex 1 – Interview guide) applied to key-informers involved with projects included in BVS. The interviews were applied during March and April of 2012. The study also used documental sources of information available in BVS and projects websites and other documents.

5. Empirical study

5.1 Portuguese social stock exchange - BVS

The BVS includes several projects in various areas with results in education and social entrepreneurship. Through the analysis of the projects it was possible to find solutions to solve social needs in different contexts mostly in disadvantaged or excluded social groups. The model of funding proposed by BVS allows the attraction of financial resources with transparency and creativity. This social stock market re-creates the social environment of a stock exchange involving the civil organizations and social investors.

Thus it is possible to promote social investment, challenging the social investor not to participate from the perspective of philanthropy and charity, but given the choice of investment that should generate social profit.

5.2 Analysis of BVS projects

The data analyses of information collected allowed the achievement of the main objectives of the study. The interpretation of the information is organized according with the three objectives listed. Table 1 organize the information related with the degree of project attractiveness, table 2 structure the reasons of project attractiveness in terms of funding and finally table 3 presents the assessment of sustainability projects.

In order to understand the degree of project attractiveness, table 1 identifies the projects currently available in BVS, in April 2012, presenting the value project. Shares sold and the percentage of funding generated.

Table 1: Value and funding of BVS projects (data results)

Project name	Project value	Shares sold	% Funding
"Centro ABCReal Portugal"	50.000,00	160,00	0,32%
"Polo Social Manto”	42.872,00	20.677,00	48,23%
"Projeto Viver, Crescer e Integrar"	22.100,00	2.034	9,20%
"Social Innovation Challenge"	15.200,00	5.549,00	36,51%
“A Vida Vale”	50.000,00	10.469,00	20,94%
“Agência ODM”	160.000,00	71.100,00	44,44%
“Audiodescrição.pt – ouço, logo vejo”	20.000,00	20.000,00	100,00%
“Capital Aldeia”	94.500,00	1.295,00	1,37%
“Casa da Cidadania”	150.000,00	1.490,00	0,99%
“Centro de Interpretação da Abelha”	229.765,00	43.445,00	18,91%
“Cidadania Plena”	72.720,00	571,00	0,79%
“Cozinhar o Futuro”	165.000,00	165.000,00	100,00%

“Crescer Com Afetividade”	68.500,00	650,00	0,95%
“Crescer dos 8 aos 80”	80.648,00	21.556,00	26,73%
“EC3, Eco-Centro de Compostagem Caseira”	38.644,00	135,00	0,35%
“Educação é a Melhor Prevenção”	200.000,00	2.885,00	1,44%
“EfeitoD”	97.388,00	48.128,00	49,42%
“Formar Campões para a Vida”	53.880,00	1.240,00	2,30%
“Lar Telhadinho”	200.000,00	4.441,00	2,22%
“Lavandaria Solidária”	164.733,00	46.935,00	28,49%
“Mais Cuidados, Mais Integrados”	20.470,00	15,00	0,07%
“Passos de Tempo”	46.420,00	12.364,00	26,64%
“Piscina Terapêutica os 4 Elementos”	118.000,00	1.856,00	1,57%
“Por ti” – Projecto de Apoio a ti	14.835,00	2.636,00	17,77%
“Porto de Abrigo”	129.600	2.855	2,20%
“Retalhos de Esperança”	5.000,00	5.000,00	100,00%
“Rir é o melhor remédio?”	134.000,00	28.988,00	21,63%
“Saúde a Sorrir”	112.376,00	2.148,00	1,91%
“Semear o Futuro”	100.000,00	27.012,00	27,01%
“Serviço de Intervenção e Apoio à Criança”	58.469,00	4.633,00	7,92%
“UMAD”	50.000,00	50.000,00	100,00%

Source: Authors

It is possible to verify that 48% of the projects have less than 10% of funding (15 projects), 7% (2 projects) have funding higher than 10% and lower than 20%, 19% (6 projects) have funding higher than 20% and lower than 30%, 3% (1 project) have funding higher than 30% and lower than 40%, 10/ (3 projects) have funding higher than 40% and lower than 50% and finally 13% of the projects (4 projects) have 100% of funding.

This analysis suggests that the attractiveness of the projects can vary, and its funding may depends on several factors, such as the social entrepreneurs’ proactivity, the stakeholders’ involvement, the age of the project, region and type of public target.

In order to understand the reasons of this attractiveness it was also studied some features of the projects: initial date, region, scope of activities, type of organization (Social Solidarity Institutions – public or private), entrepreneur proactivity, stakeholders’ participation and public target (see Table 2).

Table 2: Assessment of project attractiveness (data results)

Project name	Public target	% Funding	Date	Scope activity	NUT II	Geographic scope	Public Institution
"Centro ABCReal Portugal"	Autistic children and young	0,32%	2011	Education / Special Education	Lisbon	National	Yes
"Polo Social Manto”	Disadvantaged communities	48,23%	2011	Social entrepreneurship /Socio-Economic development	Lisbon	National	Yes
"Projeto Viver, Crescer e Integrar"	Imigrant population	9,20%	2011	Education for citizenship	Lisbon	National	No
"Social Innovation Challenge"	Students high school	36,51%	2011	Education/ education for sustainability	Lisbon	National	Yes
“A Vida Vale”	Elderly population	20,94%	2011	Entrepreneurship/Socio-Economic development	Alentejo	Regional	Yes
“Agência ODM”	Students in higher education	44,44%	2009	Education for citizenship	Lisbon	National	Yes
“Audiodescrição.pto”	People with visual disabilities	100,00 %	2010	Education/ education for sustainability	Lisbon	Regional	No

Project name	Public target	% Funding	Date	Scope activity	NUT II	Geographic scope	Public Institution
"Capital Aldeia"	Rural population of the village of Safara	1,37%	2009	Social entrepreneurship /Socio-Economic development	Alentejo	Regional	No
"Casa da Cidadania"	Different social groups	0,99%	2010	Education for citizenship	Algarve	Regional	Yes
"Centro de Interpretação da Abelha"	Beekeepers in the village of Terra Chã	18,91%	2009	Social entrepreneurship /Socio-Economic development	Centro	Regional	No
"Cidadania Plena"	Women immigrants - Brazil and African countries (portuguese language)	0,79%	2010	Education for citizenship	Lisbon	Regional	No
"Cozinhar o Futuro"	Teenager mothers	100,00 %	2010	Social entrepreneurship / Funding	Lisbon	Regional	Yes
"Crescer Com Afetividade"	Marginalized youth	0,95%	2011	Social entrepreneurship	Norte	Regional	No
"Crescer dos 8 aos 80"	Families of disadvantaged classes	26,73%	2010	Education for citizenship	Lisbon	Regional	Yes
"EC3, Eco-Centro de Compostagem Caseira"	Children from kindergarten to secondary	0,35%	2011	Education/ education for sustainability	Alentejo	Regional	No
"Educação é a Melhor Prevenção"	Children, parents and grandparents	1,44%		Education/ education for sustainability	Centro	Internacional	Yes
"EfeitoD"	Patients with trisomy 21	49,42%	2009	Social entrepreneurship	Lisbon	National	Yes
"Formar Campões para a Vida"	Children and youth in risk	2,30%	2011	Education for citizenship	Lisbon	National	No
"Lar Telhadinho"	People with disabilities and their families	2,22%	2010	Social entrepreneurship /Socio-Economic development	Lisbon	Regional	Yes
"Lavandaria Solidária"	Vulnerable social groups	28,49%	2011	Social Entrepreneurship / Job creation	Centro	Regional	Yes
"Mais Cuidados, Mais Integrados"	Ethnic minorities	0,07%	2011	Social entrepreneurship /Socio-Economic development	Centro	Regional	Yes
"Passos de Tempo"	Elderly population	26,64%	2010	Education for citizenship	Lisbon	Regional	No
"Piscina Terapêutica os 4 Elementos"	People with disabilities	1,57%	2010	Education / Special Education	Centro	Regional	Yes
"Por ti" – Projecto de Apoio a ti	Families with low incomes	17,77%	2010	Education for citizenship	Lisbon	Regional	Yes
"Porto de Abrigo"	Youth and adults from 16 years with intellectual development problems and disadvantaged	2,20%	2010	Social entrepreneurship	Lisbon	National	Yes
"Retalhos de Esperança"	Unemployed women	100,10 %	2011	Social entrepreneurship /Socio-Economic	Madeira Region	Regional	Yes

				development			
Project name	Public target	% Funding	Date	Scope activity	NUT II	Geographic scope	Public Institution
"Rir é o melhor remédio?"	Hospitalized children, families, health professionals	21,63%	2009	Entrepreneurship	Lisbon	Regional	Yes
"Saúde a Sorrir"	Disadvantaged communities, excluded or marginalized	1,91%	2010	Social entrepreneurship	Norte	Regional	Yes
"Semear o Futuro"	People with hearing impairments and autistic	27,01%	2010	Social entrepreneurship / Funding	Lisbon	Regional	Yes
"Serviço de Intervenção e Apoio à Criança"	Children with disabilities	7,92%	2010	Special Education	Lisbon	Regional	Yes

Source: Authors

The analyses of table 2 don't allow the recognition of a similar pattern between the projects in BVS. Nevertheless, the analysis of total funding projects allows the identification of some common vectors. The four projects 100% funding are:

- "Cozinhar o Futuro": is an innovative project that aims to prepare the future for young mothers - mostly single mothers belonging to disadvantaged social classes. The project provides professional training and support teenage mothers providing to these young mothers a sustainable living project.
- "UMAD": it is a van equipped with a doctor's office with medical staff. The project provides home health care to children, keeping in their homes, and simultaneously, helping families to gain autonomy in the processes associated with the treatments.
- "Audiodescrição.pt": this project aims the implementation of audio description in all artistic and cultural events in the country. This technological resource allows understanding scenarios and environments, facial expressions, body language, input and output of characters from the scene, as well as other types of action, used in television, film, theater, museums, exhibitions and other art forms, to complement the sense of artistic and cultural expression for the blind.
- "Retalhos de Esperança": through this project unemployed women from Madeira Island recycle donated clothing and produce new home clothes.

The first two projects are projects with a higher involvement of different stakeholders and sponsors. The third project also as an important involvement of different stakeholders. They are linked with reputable organizations which have a wide contact network and a historical of well success .projects, suggesting some variables, such as, historical and organization seniority, entrepreneur proactivity, stakeholders participation.

The fourth project with a more regional scope and a small dimension in terms of funding and public target, suggest that the local participation are crucial for the success of these kind of projects, where the community is the main partner.

This analyse concerning the reasons of this attractiveness also suggest similar tendencies with other studies cited in literature review that reveals the importance of the strategies followed by entrepreneurs in order to attract resources, such as, the use of networks and social resourcing, financial bootstrapping, strategies of effectuation (Domenico et al, 2010).

Finally it was assessing the sustainability of these projects considering economic dimension (eg job creation), social dimension (eg, resolution of a social need for a vulnerable group) and environmental dimension (eg, reduction of impacts on the environment). Table 3 presents the results of this analysis

Table 3: Sustainability assessment of BVS projects (data results)

Project name	Public target	Social	Economic	Enviromental
"Centro ABCReal Portugal"	Autistic children and young	x		
"Polo Social Manto"	Disadvantaged communities	x	x	
"Projeto Viver, Crescer e Integrar"	Imigrant population	x		
"Social Innovation Challenge"	Students high school	x		
"A Vida Vale"	Elderly population	x		
"Agência ODM"	Students in higher education	x		
"Audiodescrição.pt – ouço, logo vejo"	People with visual disabilities	x		
"Capital Aldeia"	Rural population of the village of Safara	x	x	
"Casa da Cidadania"	Different social groups	x		
"Centro de Interpretação da Abelha"	Beekeepers in the village of Terra Chã	x	x	
"Cidadania Plena"	Women immigrants - Brazil and African countries (portuguese language)	x	x	
"Cozinhar o Futuro"	Teenage mothers	x	x	
"Crescer Com Afetividade"	Marginalized youth	x		
"Crescer dos 8 aos 80"	Families of disadvantaged classes	x		
"EC3, Eco-Centro de Compostagem Caseira"	Children from kindergarten to secondary	x		x
"Educação é a Melhor Prevenção"	Children, parents and grandparents	x		
"EfeitoD"	Patients with trisomy 21	x	x	
"Formar Campões para a Vida"	Children and youth in risk	x		
"Lar Telhadinho"	People with disabilities and their families	x		
"Lavandaria Solidária"	Vulnerable social groups	x	x	
"Mais Cuidados, Mais Integrados"	Ethnic minorities	x		
"Passos de Tempo"	Elderly population	x		
"Piscina Terapêutica os 4 Elementos"	People with disabilities	x		
"Por ti" – Projecto de Apoio a ti	Families with low incomes	x		
"Porto de Abrigo"	Youth and adults from 16 years with intellectual development problems and disadvantaged	x	x	
"Retalhos de Esperança"	Unemployed women	x	x	x
"Rir é o melhor remédio?"	Hospitalized children, families, health professionals	x		
"Saúde a Sorrir"	Disadvantaged communities, excluded or marginalized	x		
"Semear o Futuro"	People with hearing impairments and autistic	x	x	
"Serviço de Intervenção e Apoio à Criança"	Children with disabilities	x		

Source: Authors

The information about sustainability dimensions is organized according with table 3, in a simplified method that expresses a global perspective of the three dimensions assessed. The reason for this approach is related with the difficulty in collecting more objective indicators shared by all organizations, as well as in the divergence of these organizations, concerning its activity and the availability of public information. These difficulties, concerning with the definition of finance and social measures, are also referred by several authors (Austin et al., 2006). According with Young, (2006), an effort has been made through the development of mechanisms that can support the creation of new metrics in order to quantify value in the social sector; however this cases study didn't allowed the identification of different metrics.

Also about this subject, and according with classification presented in the literature review (Costa and Carvalho, 2011) the the social organizations studied are include in the first group, i.e., social entrepreneurship refers to the initiatives of social organizations in the search for alternative financing strategies or as a way of creating social value through management practices (Dees, 1998a; Austin, Stevenson and Wei-Skiller, 2006; Boschee, 1998).

The analysis of table 3 indicates that the most relevant value created by these projects, is social, nevertheless some of them indirectly also create some economic value particularly through the job creation and services revenues. These findings confirm literature review that refers that social entrepreneur may produce private gains in the process of creating social value (Emerson and Twersky, 1996).

6. Concluding remarks

This article consolidated the theoretical approach to the topics of social entrepreneurship. The work enabled the following considerations:

- The various organizations that constitute the social economy can contribute to the involvement of various actors and interest groups.
- The valuation of economic activity serving social needs, the more equitable distribution of income, job creation and wealth solidarity and corrections of imbalances in the labor market are key factors for intervention in this area.
- This sector begins to have increasing importance because of increasing social needs unmet by the government.

Through the empirical study it was possible to understand that the attractiveness of the projects and its funding depends on some factors, namely, the social entrepreneurs proactivity, the stakeholders involvement, the age of the project, region and type of public target. We expected to find some patterns between these factors that could justify their attractiveness to possible investors, but that didn´t happen. However it was possible to identify some common vectors concerning the four projects 100% funding. So it was possible to conclude that a higher involvement of different stakeholders and sponsors, the linkage with reputable organizations which have a wide contact network and a historical of well success, historical and organization seniority, entrepreneur proactivity and stakeholders participation are issues quite important for the projects attractiveness.

It was also possible to understand that the social organizations involved don´t have metrics to quantify the value created. The existence of this type of metrics could improve the performance of the organization. A more organized and transparent performance, through the availability of public information could lead to better results and better recognition of their activity from community, possible investors and other stakeholders.

We also conclude that the most relevant value created by these projects, is social, however some of them indirectly also create some economic value particularly through the job creation and services revenues.

Finally this study presented a diversity of projects that demonstrate a strong creativity of social entrepreneurs, particularly in the fields of social cohesion and regional development, revealing that social entrepreneurship and its key players can definitely make a strong contribution to improving the welfare of populations.

Appendix 1: Interview guide

Main objectives	Specif objectives
Understand degree of project attractiveness	Project value
	Shares sold
	% Funding
Understand the reasons of project attractiveness	Initial date
	Region
	Scope of activities
	Type of organization
	Entrepreneur activity
	Stakeholders participation
	Public target
Assess of project sustainability	Economic dimension
	Social dimension
	Environmental dimension

References

Aldrich, H.; Zimmer, C. (1986). Entrepreneurship through social networks. In D. Sexton & R. Smilor (Eds.), *The art and science of entrepreneurship,* New York: Ballinger, pp 3-23

Alvord, A. S., D. Brown e C. W. Letts (2002), "Social Entrepreneurship and Social Transformation: An Exploratory Study", *Hauser Center for Nonprofit Organizations: The Kennedy School of Government*, Harvard University.

Alvord, S. H., Brown, L. D., e Letts, C. W. (2004), "Social entrepreneurship and societal transformation", *Journal of Applied Behavioral Science*, 40(3), pp 260–282.

Austin, J., Stevenson, H., Wei-Skillern, J. (2006). "Social and commercial entrepreneurship: Same, different, or both?" *Entrepreneurship Theory and Practice*, *30*(1), 1–22

Birley, S. (1985). "The role of networks in the entrepreneurial process". *Journal of Business Venturing*, *1*, pp 107–117.

Bolsa de Valores Sociais disponível em http://www.bvs.org.pt/view/viewPrincipal.php

Boschee, J. (1998), "Merging mission and money: A board member's guide to social entrepreneurship", disponível em: http://www.socialent.org/pdfs/MergingMission.pdf, 20 de Octubro 2010.

Costa, Teresa, Carvalho, Luísa (2011), "Empreendorismo social: estado de arte", *Revista Gestin*, forthcoming.

Dees, J.G. (2001). The meaning of "social entrepreneurship". Available at http://www.fuqua.duke.edu/centers/case/documents/dees_SE.pdf

Dees, J.G. (2007). "Taking social entrepreneurship seriously" *Society*, *44*(3), pp 24–31.

Domenico, L.; Haugh, H.; Tracey, P. (2010) "Social Bricolage: Theorizing social value creation in social enterprises" Entrepreneurship Theory and practice, 681-703

Dorado, S. (2006). "Social entrepreneurial ventures: Different values so different processes of creation, no?" *Journal of Developmental Entrepreneurship*, *11*(4), pp 319–343.

Emerson, J. and Twersky, F. (eds), (1996), New social entrepreneurs: the success, challenge and lessons of non-profit enterprise creation, San Francisco: Roberts Foundation, Homeless Economic Development Fund.

Hockerts, K. (2006). Entrepreneurial opportunity in social purpose ventures. In J. Mair, J. Robinson, & K. Hockerts (Eds.), *Social entrepreneurship.* London: Palgrave, 142-154

Johannisson, B. (2000). Networking and entrepreneurial growth. In D. Sexton & H. Landstrom (Eds.), *Handbook of entrepreneurship,* , London: Blackwell, 368–386

King, P. J., e Roberts, N. C. (1987), "Policy entrepreneurs: Catalysts for policy innovation", *Journal of State Government*, 60, pp 172–178.

Leadbeater, C. (2007), "Social enterprise and social innovation: Strategies for the next ten years", CabinetOffice, Office of the Third Sector, November 2007, available at http://www.charlesleadbeater.net/cms/xstandard/social_enterprise_innovation.pdf

Lewis, E. (1980). Public entrepreneurship: Toward a theory of bureaucratic power. Bloomington, IN: Indiana University Press.

Mair, J. (2006). Introduction to part II: Exploring the intentions and opportunities behind social entrepre- neurship. In J. Mair, J. Robinson, & K. Hockerts (Eds.), *Social entrepreneurship.* New York: Palgrave Macmillan, 89-94

Mair, J.; Marti, I. (2006). "Social entrepreneurship research: A source of explanation, prediction, and delight". *Journal of World Business*, *41*, pp 36–44.

Mulgan, G.; Tucker, S.;Sli, R.; Sanders, B. (2007), "Social innovation - what it is, why it matters and how it can be accelerated", The Young Foundation:Oxford available at http://www.sbs.ox.ac.uk/centres/skoll/research/Documents/Social%20Innovation.pdf.

Neck, H.; Brush, C. Allen, E. (2009) "The landscape of social entrepreneurship" *Business Horizons*, 52, 1, pp 3-19

Peredo and McLean, (2006), Social entrepreneurship: A critical review of the concept, *Journal of World Business* 41 (1), pp 56–65.

Phills Jr, James, Deiglmeier, Kriss and Miller, Dale T. (2008), "Rediscovering Social Innovation," Stanford Social Innovation Review", *6*(4), 34.

Robinson, J. (2006). Navigating social and institutional barriers to markets: How social entrepreneurs identify and evaluate opportunities. In J. Mair, J. Robinson, & K. Hockerts (Eds.), *Social entrepreneurship*. New York: Palgrave Macmillan, pp 95-120

Sagawa, S and Segal, E. (2000), Common interest, common good: creating value through business and social sector partnerships, Boston, MA: Harvard Business and Social Sector Partnership.

Seelos, C. and Mair, J. (2005), "Entrepreneurs in service of the poor – models for business contributions to sustainable development", *Business Horizon*s, Vol. 48 No. 3,,pp 241-6.

Shaw and Carter, 2007 E. Shaw and S. Carter, Social entrepreneurship: Theoretical antecedents and empirical analysis of entrepreneurial processes and outcomes, *Journal of Small Business and Enterprise Development* 14 (3) (2007), pp 418–434.

Thompson, J. (2002). "The world of the social entrepreneur". *International Journal of Public Sector Management*, *15*(5), pp 412–431.

Venkataramann, S. (1997), The distinctive domain of entrepreneurship research: An editors perspective, J. Katz & R. Brockhaus (Eds) *Advances in Entrepreneurship firm emergence and growth*, 3, pp 119-138, JAI Press.

Waddock, S. A. (1988), "Building successful social partnerships", *Sloan Management Review* 29(4), pp 17-22.

Yin, R.. (1994). *Case Study Research. Design and Methods,* London, Sage Publications.

Young, R. (2006), For what it is worth: Social value and the future of social entrepreneurship. In: A. Nicholls, Editor, *Social entrepreneurship: New models of sustainable social change*, Oxford University Press, Oxford, UK (2006), pp 56–73.

Does it Make Sense to go Against "Shadow Entrepreneurs"?

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Abstract::The relationship between entrepreneurship and economic development is now widely recognized. Under an appropriate institutional environment, human creativity and inventiveness -in other words, entrepreneurship- is the basis of economic progress. Entrepreneurship can thus be expected to lead to higher income levels and a reduction in poverty. In this paper we argue that this result also holds when we consider the activities of "shadow entrepreneurs", that is entrepreneurs who undertake their activities in the informal sector of the economy. More generally here we claim that informal activities are truly entrepreneurial in nature. Informality represents an individual's best response to an environment with sub-optimal institutions and, therefore, high costs of doing business. At the same time, the specter of poverty is an additional Incentive to engage in self-employment or to participate in the informal sector of the economy. We are aware that greater informality is a reflection of a bad institutional environment, as noted above, and thus has a negative effect on economic development. But this is, in effect, a comparison with a first-best institutional environment. In a second-best world, informality also represents an important part of a country's entrepreneurial activity. It is in this sense that we hypothesize that the size of the shadow economy may have a positive impact on economic development, where we view this term in a broader sense than a simple measure of economic growth. To test our hypothesis we examine the relationship between informality and economic development empirically. Our work involves using different measurements of informality: an indirect index on informality as well as straightforward data on self-employment collected by the International Labor Organization. We also consider necessity-based entrepreneurship, as estimated by the GEM consortium, as a new proxy of informality. Overall, we are concerned with the effects of these variables on measures of economic development, specifically, the United Nation's Human Development Index. This is a variable that has been used successfully before as a general indicator of wellbeing. Our econometric results provide evidence of a positive relationship between informal entrepreneurial activity and economic development, and confirm claims that living with some level of informality may be an efficient choice.

Keywords: informal economy, entrepreneurship, wellbeing, development, global entrepreneurship monitor

1. Introduction

In this paper we propose to analyze the relationship between the size of the informal economy and economic development at the country level. Our aim is to contribute to the merging literature that examines the relationship between development indicators and rates of entrepreneurial activities. In their important essay on the economic lives of the poor Banerjee and Duflo (2007) described the relationship between poverty (i.e. low levels of economic development) and entrepreneurship in the following way: "All over the world, a substantial fraction of the poor act as entrepreneurs in the sense of raising capital, carrying out investment, and being the full residual claimants for the resulting earnings" (Banerjee &Duflo, 2007: 151). In general terms the poorest population has few labor skills and little capital, and the option to be an entrepreneur could be easier than finding a stable remunerated job. These factors may help to explain why in relative terms 'poor countries' have more entrepreneurs up to the point that Scott Shane states "…if you want to find countries where there are a lot of entrepreneurs, go to Africa or South America" (Shane, 2009: 143).

Amorós and Cristi (2011) is a recent example of the current efforts to bridge the literatures on poverty and entrepreneurship,and examine this relationship formally. There it was shown that entrepreneurial activities do contribute to a better performance of the social and economic development in poor and less-developed countries.

Considering the shadow economy, or informality, it is important for our analysis as it represents an expression of entrepreneurial creativity in an environment where there is a lack of institutions or a situation where the existing institutions cause an excessive burden on entrepreneurship. It is important to consider, at the same time, that the decision to engage in an informal activity involves some calculation on the economic agent's side which, to the extent that it is truly voluntary, must be

respected. We will explain these issues with more detail immediately below. In subsequent sections we will present the data and variables we use, the proposed econometric models and estimation strategies, and our results. We conclude with some brief comments about the implications of our work.

2. Economic development and Informality: An analytic framework

In many countries the informal sector represents an important fraction of the official gross domestic product. At the same time, however, important variations across countries exist regarding the relative size of such informal economies. Recent studies that have examined the determinants of informality have found that the size of the so-called informal sector in an economy depends on the extent of tax-burdens and labor market restrictions, as well as on the quality of government institutions (Loayza, 1996; Servén, Oviedo &Loayza, 2005; Schneider, Buehn& Montenegro, 2010). Thus, informality can be said to be a consequence of weak institutions, a way to avoid expensive regulations, and to prevent poverty and starvation (de Soto, 1989).

Following most of the literature on the subject here we define shadow economy or informality as the use of illegal means to pursue legal activities that have a positive economic value (Gerxhani, 2004; Schneider, Buehn& Montenegro, 2010).

It is especially interesting to us to note that in a very significant sense informality also represents an entrepreneurial activity. It represents an individual's best response to aspecific environment of weak institutions, corruption, or regulations that limit an agent's opportunities in terms of obtaining a formal job, or opening a small business in the formal sector of the economy. Before we continue it is important to explain that considering these constraints does not mean that there is no explicit choice on the economic agents part when they decide to engage in an informal activity. This is, indeed, a result of the equilibrium approach of a segmented labor market (Harris &Todaro, 1970). Economic decision-making always takes place in the context of specific restrictions or constraints.

Hernando de Soto's (1989) work provides classic illustrations as to the issues involved in the informal economy analysis. Consider, for example, his examination of the state of affairs of the public transport industry in Lima, Peru; where more than half of the industry is part of the shadow economy. These activities are organized in this way because of the excessive burden of regulations of this sector. These informal activities surely are entrepreneurial in nature, as de Soto convincingly argues.

We are aware that de Soto and other authors have argued that the problem of informality has multiple dimensions. Some of the related issues are social in character and concern the lack of opportunities some people have and the impact this has on poverty and living conditions in general. Others are related to the rationality, or irrationality, of many economic regulations that impact on the size of the informal sector. Finally, the efficiency of an entrepreneurial economy in this context has also been questioned. This is an important point that we should consider more carefully.

In an important paper LaPorta and Shleifer (2008) have shown that firms established in the formal sector are the main sources of productivity in the economy. This is consistent with a view that mainly sees informality as a transitory alternative. This 'survival' aspect of informality also points to an overall vulnerability of shadow entrepreneurship (Tokman 2007).

This evidence does notpreclude our argument in the sense that undertaking an entrepreneurial activity informally represents an explicit decision by an acting agent. This decision may involve both truly voluntary and other not so voluntary components. The 'forced' character of informality may, however, be over-emphasized. Like this, agents voluntarily decide to work in the informal sector in many cases, as explained by Maloney (2004).

At any rate we are really concerned with the 'macro' consequences of these 'micro' motives.In other words, the question we are interested in examining here relates to the effects of informality on economic development. Apparently, the way we measure 'informality' is key here. Our precise understanding of the concept of 'economic development' is likewise very important in terms of our analysis. Before we go into these issues, it is important to consider the precise avenues through which we expect to find the effects of informality on economic development.

In short, this influence comes about because of the entrepreneurial nature of informal activities, although here we must pay close attention to the heterogeneity of entrepreneurial activities. The motivation to engage in entrepreneurial activities -whether it is motivated by 'necessity' or by 'opportunity'- must be taken into account as the relationship between poor agents and entrepreneurship is studied. Labeling entrepreneurship as 'necessity-driven' has no negative connotation, but simply denotes the fact that the entrepreneurial activity is not based on the high-growth potential of a given business opportunity; it is in this sense that these activities are expected to be less productive (Cotter, 1996). Focusing on the behavior of individuals, poor agents can thus be expected to be necessity-driven entrepreneurs, which in most cases correspond to informal activities.

As noted above, the relationship between entrepreneurship and poverty has only recently started to be considered in the literature. In this respect the empirical evidence indicates that higher levels of entrepreneurship have a positive effect on poverty reduction trends (Amorós & Cristi, 2011). This result is consistent with the arguments advanced by Larroulet and Couyoumdjian (2009), who state that entrepreneurial abilities are not exclusive to wealthy agents or to advanced societies but are more or less uniformly distributed. Moreover we can argue that under an appropriate institutional environment, human creativity and inventiveness, that is entrepreneurship, is at the basis of economic progress (Baumol, Litan& Schramm, 2007).

In all, we expect that informality will be associated with a reduction of poverty levels. In other words, informality may well have a positive impact on economic development. We are aware, however, that greater informality also reflects a bad institutional environment at work, and thus has a negative effect on economic development. This is the relationship we propose to examine empirically.

3. Methods

3.1 Data and variables

When working on the problem of the informal economy, researchers have to face the challenge of having accurate measurements of the scope of these activities (see Alderslade, Talmage and Freeman, 2006). Current methods in this sense include indirect estimation (Schneider, Buehn&Monetegro, 2010); labor force statistical profiles(ILO), as well as direct estimation measures such as labor force and household surveys.In order to address the problem under examination in the most exhaustive fashion, in this paper we consider three proxies of the informal economy: data onnecessity-based entrepreneurs obtained from the Global Entrepreneurship Monitor (GEM) project, data on self-employment from the *LaborSta* database of the International Labor Organization (ILO), and the *Shadow Economic Index* built by Schneider et al. (2010).

The GEM project provides harmonized, internationally comparable data on entrepreneurial activity at country level. By the end of 2010, 84 different economies have participated in GEM. The GEM project estimates the percentage of adult population that is actively involved in starting a new venture as anemerging entrepreneur or as an owner–manager of a business not more than 42 monthsold (Reynolds et al, 2005). This rate is referred to as the Early-stage Entrepreneurial Activity Index (*TEA*). The GEM methodology disaggregates *TEA* according to two main entrepreneur motivations, as examined above. To summarize, the first category is related to opportunity-based entrepreneurs; the second category is formed by necessity-based entrepreneurs (*NECs*), who are 'pushed' into entrepreneurship because 'being an entrepreneur' is the only option for subsistence.

Although many studies recognize that the majority of entrepreneurial activity is the result of the search for business opportunities (Kolvereid 1996; Feldman and Bolino 2000; Carter et al. 2003; Hessels, van Gelderen and Thurik 2008; Bosma et al. 2008), there is a relatively high prevalence of *NEC* entrepreneurs starting new endeavors in many low and middle-income countries. The main reason of this relative high-prevalence of NEC entrepreneurs in less developed countries is because *NEC* captures many of the informal activities that (survivalist)entrepreneurs need to accomplish to obtain sources of subsistence (Shane, 2009). For this reason *NEC* could be a good proxy of the informal sector or at least the shadow-economy's side that is involved in the creation of micro-enterprises.

Data on self-employment (*SE*)has been used by Saavedra and Tommasi (2007) in their analysis of informality in Latin America. The specific data we use is obtained from the *LaborSta* database of the ILO and it corresponds to the ratio between total self-employment and total workers in the economy. In order to make our analysis comparable with the previous sources we only consider data for

countries participating in the GEM project. Self-employment jobs are defined as those jobs where "the remuneration is directly dependent upon the profits (or the potential for profits) derived from the goods and services produced".

The*Shadow Economic Index* (*SEI*) built by Schneider et al. (2010) estimates the size of shadow economy in 162 countries from 1999 to 2007. This measurement uses data on a set of variables that may cause a shadow economy: share of direct taxation; size of government; fiscal freedom; business freedom index; government effectiveness, unemployment rate and Gross Domestic Product per capita. Here the size of the shadow economy is expressed as a percentage of Gross Domestic Product.

For a country's level of economic developmentwe use the *Human Development Index*(*HDI*) calculated by the United Nations Development Programme and published in the Human Development Reports. The *HDI* is a composite index that measures average achievement in a country by evaluating three dimensions of human development: life expectancy at birth (long and healthy life), adult literacy rate (education and knowledge) and Gross Domestic Product per capita in purchasing power parities (decent standard of living). These dimensions reflect the major themes and topics related to poverty definitionsas described by Misturelli and Heffernan (2008). The *HDI* takes values from 0 to 1 where 1 stands for the highest attainment.

3.2 Proposed model and estimation procedures

We are interestedin modeling a country's development trend, i.e the changes of this variable through time, as a function of a country's moving average values of informality,as well as othercountry-specific characteristics such as institutional variables. We define our variables like this with the purpose of accounting for the lagged effects of the informal economy on development. In general, our model takes the form:

$$Development\ index_{it} - Development\ index_{it-s} = \alpha_0 + \alpha_1 Average\ size\ informal\ sector_{it} + \alpha_i + \varepsilon_{it}$$

where *t* and *s* denotes years; i denotes a country; α_0 *and* $\alpha_1$are unknown parameters; parameters $\alpha_i$are country-specific effects that capture unobserved country´s institutional settings; and ε_{it} are random disturbances distributed with 0 mean ($E[\varepsilon_{it}]=0$).

We use two alternative measures of changes in development for each country: the change in *HDI* and the change in a Non-Income Human Development Index *(NIHDI).* The *HDI* is calculated as the geometric mean of normalized indices for life expectancy, education, and income per capita. As a result, a country's per capita GDP is correlated with *HDI* directly and also indirectly through the impact of income on life expectancy and education. In fact, the correlation coefficient between HDI and per capita GDP for our sample is 0.85. However, the fact that the correlation between these variables is not perfect suggests that there are factors other than achieved GDP that drive human development. In addition, some countries are better than others at translating income into human development. Our *NIHDI* is important because it captures the fraction of *HDI* that is not due to *GDP*. Appendix A describes in detail the procedure used to calculate this *NIHDI.*

Measures for the average size of the informal sector, as we discussed in the previous sections are: a) each country's moving average of NEC; b) each country's moving average of SE; and c) each country's moving average of *SEI.*

For empirical purposes we consider the change in *HDI* over a five year-period for each country as function of the each country's five years moving average of *NEC* . We choose a five year period to be consistent with the Human Development Index report that calculates the short-term progress of human development as the change in the *HDI* over that same time period. In the case of changes in *HDI* as a function of the moving average of SE and of changes in *NIHDI* as a function of the moving average of *SEI* we test the relationships for a four year period to avoid losing too many observations. We do not test for the relationship between changes in *HDI* and changes in *SEI* due to collinearity issues since both indexes are a function of GDP per capita.

In our proposed models there may exist a bi-directional causality between the different measures of informal economy and *HDI* or *NIHDI*. Suspicion of this problem arises from previous studies that show an effect of Gross Domestic Product per capita, which is included on *HDI*, upon entrepreneurial

activity (Amorós & Cristi, 2008; van Stel, Carree&Thurik,,2005). If this is the case, we will have an endogeneity problem on our regressors and our econometric estimation will provide non-consistent estimates of the parameters of our proposed models. Thus, we perform a set of tests on the endogeneity of the regressor (Wu-Hausman test, Davidson and MacKinnon test and Hausman test). These tests require a set of instruments for the possible endogenous variables. As instruments we use a set of Institutional Variables that are related to the governance and general business environment in each country: *Government Effectiveness (GEF)*, *Regulation Quality*(*RQ*) and *Economic Freedom(EF)*. The first two come from the World Bank's Worldwide Governance Indicators that has developed aggregate and individual governance indicators at a country level (Kaufmann, Kraay&Mastruzzi, 2008). *GEF* is defined as measuring perceptions of the quality of public services, the quality of the civil service and its degree of independence from political pressures. This variable has scores between -2.5 and 2.5, with the higher scores corresponding to better outcomes. More effective governments may be associated to lower costs of starting a new business and this promotes entrepreneurship. Nevertheless it is also true that more effective governments reduce the likelihood for the citizens of starting a business in the informal economy and this may reduce some entrepreneurial activity, mainly the one motivated by necessity. *RQ* is related to the capability of the government to formulate and implement programs, policies and regulations that permit and promote private sector development. In this sense, better quality regulation is an incentive to "abandon" the shadow economy. The *economic freedom* variable comes from the annual Index of Economic Freedom produced by The Wall Street Journal and The Heritage Foundation that tracks economic freedom around the world. The Index covers 10 freedoms –from property rights to entrepreneurship. Here we use the overall score of the total *Economic Freedom Index (EF).* Tables 1 and 2 summarizes the descriptive statistics and correlation matrix of the full set of variables used in the estimation process.

Table 1: Descriptive statistics of all variables used in the estimation process

	Variable	Obs	Mean	Std. Dev.	Min	Max
1	HDI	704	0.79	0.10	0.40	0.94
2	GDP per capita	704	19698.89	13933.66	1046.24	58714.30
3	Overall freedom index	686	62.83	15.77	0.10	90.00
4	Regulation quality	777	33.79	76.27	-177.67	196.55
5	Government effectiveness	777	41.94	79.51	-143.78	226.72
6	Shadow economy index (Schneider et al. ,2010)	622	27.91	12.60	8.10	67.70
7	NEC	406	2.77	2.94	0.09	19.55
8	Percentage of self-employment over total employment	413	0.19	0.11	0.02	0.45
9	HDIit-HDIit-5	384	0.02	0.01	-0.02	0.05
10	Moving average of NEC over 5 years	94	1.51	1.41	0.24	5.97
11	Moving average of overall freedom over 5 years	346	64.29	9.64	42.70	89.68
12	Moving average of regulation quality over 5 years	308	37.19	71.95	-156.91	183.33
13	Moving average of government effectiveness over 5 years	308	44.81	73.76	-115.33	211.20
14	HDIit-HDIit-3	320	0.013	0.009	-0.02	0.036
15	NIHDIit-NIHDIit-3	512	0.00	0.02	-0.03	0.29
16	Moving average of shadow economy index over 3 years	178	7.57	4.18	2.06	28.14
17	Moving average of percentage of self-employment over total employment	240	0.19	0.11	0.05	0.46
18	Moving average of overall freedom over 3 years	462	64.13	10.27	38.03	89.82
19	Moving average of regulation quality over 3 years	462	37.19	72.99	-166.12	185.02
20	Moving average of government effectiveness over 3 years	462	42.8	73.3	-124.7	211.7

4. Results

Tests for the endogeneity of the regressors indicate that we cannot reject the null hypothesis that the regressors are exogenous when we use *NEC* and *SEI*. Thus, we can be confident on the consistency of our estimates. Nevertheless, in the model with *SE* there is evidence of an endogeneity problem; thus we estimate the model using an Instrumental Variable approach in which the instruments for the moving average of *SE* are the moving averages of *GEF, RQ* and *EF.* In our three equations, we include the squared value of the moving average of the informal economy variable. This is meant to capture a nonlinear relationship between development trends and informality such as a decreasing marginal effect of the latter upon the former. Estimates for our model of *HDI* trend as a function of the moving average value of*NEC* were obtained by estimatinga random effect model that we proved to be consistent according to a Hausman test. Moreover, the error terms are allowed to be correlated within countries (clusters).

Table 2: Correlation matrix of the full set of variables used in the estimation process

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1																			
2	0.97	1																		
3	-0.65	-0.61	1																	
4	0.71	0.8	-0.69	1																
5	0.53	0.65	-0.55	0.6	1															
6	-0.85	-0.86	0.84	-0.83	-0.68	1														
7	-0.94	-0.87	0.61	-0.5	-0.46	0.71	1													
8	-0.65	-0.61	1	-0.69	-0.55	0.84	0.61	1												
9	0.1	0.16	-0.19	0.1	0.19	0	-0.23	-0.19	1											
10	-0.9	-0.8	0.61	-0.4	-0.42	0.72	0.95	0.61	-0.24	1										
11	0.63	0.78	-0.29	0.81	0.72	-0.61	-0.43	-0.29	0.05	-0.3	1									
12	0.78	0.86	-0.61	0.98	0.56	-0.83	-0.56	-0.61	0.04	-0.47	0.84	1								
13	0.73	0.76	-0.82	0.89	0.73	-0.86	-0.59	-0.82	0.03	-0.5	0.67	0.86	1							
14	-0.01	-0.04	-0.28	-0.18	0.08	0.11	-0.26	-0.28	0.77	-0.22	-0.27	-0.28	-0.07	1						
15	0.53	0.42	-0.3	0.12	-0.27	-0.27	-0.65	-0.3	0.19	-0.6	-0.09	0.16	0.04	0.34	1					
16	-0.38	-0.24	0.32	0.13	0.12	0.32	0.5	0.32	-0.01	0.62	0.29	0.1	0.12	-0.26	-0.72	1				
17	-0.69	-0.64	1	-0.69	-0.55	0.85	0.66	1	-0.15	0.65	-0.31	-0.62	-0.83	-0.27	-0.34	0.35	1			
18	0.66	0.81	-0.34	0.83	0.75	-0.65	-0.47	-0.34	0.06	-0.34	1	0.86	0.71	-0.24	-0.07	0.25	-0.36	1		
19	0.75	0.82	-0.65	0.96	0.66	-0.87	-0.52	-0.65	-0.02	-0.47	0.83	0.98	0.9	-0.33	0.01	0.13	-0.65	0.85	1	
20	0.69	0.78	-0.74	0.88	0.84	-0.88	-0.54	-0.74	0.1	-0.46	0.75	0.85	0.95	-0.09	-0.04	0.12	-0.74	0.78	0.9	1

This is a clustering estimation and it causes higher efficiency on the parameter estimates (Wooldridge, 2002).

Results are shown in table 3-column 1, and indicate that the coefficients that accompany the moving average value of *NEC* and its squared value are both statistically significant. The lattersuggests that increases in *NEC* cause increases on *HDI,* until it reaches certain threshold after which the relationship between these two variables becomes inverse. Thus the relationship between those variables can be described by a curve that has the form of an inverted U.

Estimates for our model of *HDI,* trend as a function of the moving average value of *SE* were obtainedby using an Instrumental Variable approach, andthe error terms were allowed to be correlated within countries (clustering estimation). The model fulfills the rank conditions and the instruments for the moving average value of *SE* are the moving average values of *EF, GEF* and *RQ*. These estimates are shown in table 3-column 2 and indicate that as *SE* is higher, the increase in the country's *HDI*is also higher. When we include *SE* together with its squared value as regressors, none of the coefficients that accompany these variables are statistically significant, thus we omit this result from the table.

Results for the equation with *NIHDI* as a function of the *SEI* average value, indicate that the efficiency of the estimates is higher when they are obtained from a fixed effect model in which error terms are allowed to be correlated within countries (clustering estimation). Results for this estimation are shown in table 3-column 3 where it can be seen that as the moving average of *SEI* is higher, the increases in a country's *NIHDI* are also higher. When we included the former variable together with its squared value as regressors, none of the coefficients that accompany these variables are statistically significant. Thus we do not report those estimates.

Table 3: Model estimates for *HDI* and *NIHDI* trends as a function of different measures of informal economy

Variable	5 years HDI trend (random effect model with clustering estimation)	3 years HDI trend (instrumental variables approach with clustering estimation)	3 years *NIHDI* trend (fixed effect model with clustering estimation)
Constant	.004* (.002)	.007 *** (.0015)	-0.016** (0.006)
Moving average of NEC	.005 *** (.0021)		
Squared moving average of NEC	-.001** (.000)		
Moving average of SE		.035 *** (.010)	
Moving average of SEI			0.0023** (0.0009)
Number of countries	24	34	23
Number of observations	91	126	96
R-sq overall	0.224		0.014
F Test		11.16***	6.7**
Wald chi2	10.42***		

*,**,***: significant at 10%, 5% and 1% respectively

5. Conclusions

In this paper we have examined the relationship between economic development and the size of the informal economy with entrepreneurship as the bridge connecting these areas. While the different data-sets we have used in our empirical work provide similar results, each has its advantages and limitations. An additional endeavor would consider using specific labor force surveys as measures of informality.

Leaving the methodological questions aside, our results indicate that informality has a positive effect on economic development. When we use *NEC* as a proxy for informality this relationship is positive only up to a given level of *NEC*. This would seem to suggest that the entrepreneurial spirit rules over the effects of a lower institutional quality that is associated with informality. Our work thus implies that there may well be costs and benefits associated to informality. This is, however, an issue that's worth further examination.

Appendix A

From an empirical point of view the *Non-Income Human Development Index (NIHDI)* can be measured at a country level by calculating the deviation of its *Human Development Index (HDI)* from the predicted value for *HDI* given its *GDP* per capita. For this we propose the following equation for *HDI*:

$$HDI_{it} = \chi_0 + \chi_1 g(GDP_{it}) + \varepsilon_{it} \qquad (1)$$

where, χ_0 is an intercept term, χ_1 is a slope coefficient, *g(GDP)* is some transformation of the GDP per capita and ε is an error term. The transformation of income is based on the recognition that the relationship between *HDI* and GDP per capita may be non-linear. We use the Box-Cox transformation for letting the data determine what functional form is more appropriate. This Box –Cox transformation is:

$$g(GDP_{it}) = \frac{GDP_{it}^{\lambda} - 1}{\lambda} \qquad (2)$$

where λ is an unknown parameter.

Then we replace (2) in (1) and we obtain the maximum likelihood estimates for χ_0, χ_1 and λ ($\hat{\chi}_0$, $\hat{\chi}_1$ and $\hat{\lambda}$). Results for these estimates are available upon request.

References

Alderslade, J.,Talmage, J. and Freeman, Y. (2006)*Measuring the Informal Economy: One Neighborhood at a Time*, Discussion Paper, The Brooking Institution Metropolitan Policy Program.http://www.brookings.edu/metro/umi/pubs/20060905_informaleconomy.pdf

Amorós, J.E. and Cristi, O.(2008)"Longitudinal Analysis of Entrepreneurship and Competitiveness Dynamics in Latin America", *International Entrepreneurship and Management Journal,* 4(4); 381-99.

Amorós, J.E. and Cristi, O. (2011)*Poverty and Entrepreneurship in Developing countries"*, in M. Minniti (Ed),*The Dynamics of Entrepreneurship: Evidence from Global Entrepreneurship Monitor Data*: 209-230, Oxford, Oxford University Press.

Banerjee, A. V., and Duflo, E. (2007) "The Economic Lives of the Poor."*The Journal of Economic Perspectives*, 21(1): 141-167.

Baumol, W.J., Litan, R.E., and Schramm, C.J. (2007)*Good Capitalism, Bad Capitalism and the Economics of Growth and Prosperity*, New Haven, CT: Yale University Press.

Bosma,N., Acs, Z.J.Erkko A., Coduras, E.A. and Levie, J. (2008)*Global Entrepreneurship Monitor (GEM) 2008, Executive Report*, Wellesley, MA.,Babson Park M.A and London, UK: Babson College, Universidad del Desarrollo and London Business School.

Carter, N. M., Gartner, W.B., Shaver, K. G. and Gatewood, E. J. (2003) "The Career Reasons of Nascent Entrepreneurs",*Journal of Business Venturing,*18(1):13-39.

Cotter, J. (1996)"Distinguishing between poverty alleviation and business growth."*Small Enterprise Development* 7, 49-52.

De Soto, H. (1989)*The other path: The invisible revolution in the Third World*,New York: Harper & Row.

Feldman, D.C.,andBolino, M.C. (2000) "Career patterns of the self-employed: Career motivations and career outcomes",*Journal of Small Business Management,* 38: 53-67.

Gerxhani, K. (2004) "Informal Sector in Developed and less Developed Countries: A Literature Survey",*Public Choice* 120: 267-300.

Harris, J. R.,andTodaro, M. P. (1970) "Migration, unemployment, and development: A two sector analysis",*American Economic Review* 60 (1), 126-142.

Hessels, J., Van Gelderen, M.W.,andThurik, A.R. (2008) "Entrepreneurial aspirations, motivations, and their drivers",*Small Business Economics,* Vol. 31(3), pp. 323-339.

Kaufmann, D., Kraay A., andMastruzzi, M. (2008)*Governance Matters VII: Aggregate and Individual Governance Indicators, 1996-2007*,WB Policy Research Working Paper 4654. Washington, DC: World Bank.

Kolvereid, L. (1996) “Organizational Employment versus Self-Employment: reasons for Career Choice Intentions”, *Entrepreneurship Theory and Practice,*21(3) Spring, 23-31.
LaPorta, R. &Shleifer, A. (2008) “The Unofficial Economy and Economic Development” ,*Brookings Papers on Economic Activity* 2, pp. 275-364.
Larroulet, C. and Couyoumdjian, J.P. (2009) “Entrepreneurship and Growth: A Latin American Paradox?” *The Independent Review* 14(1): 81-100.
Loayza, N. (1996) “The economics of the informal sector: a simple model and some empirical evidence from Latin America”,*Carnegie-Rochester Conference Series on Public Policy* 45: 129-162.
Maloney, W. (2004) “Informality Revisited”, *World Development* 32 (7), pp. 1159-1178.
Misturelli, F., and Heffernan, C. (2008) “What is poverty? A diachronic exploration of the discourse on poverty from the 1970s to the 2000s”, *The European Journal of Development Research*, 204: 666-684.
Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N. Servais, I., Lopez-Garcia, P. and Chin, N. (2005)“Global Entrepreneurship Monitor: Data collection design and implementation 1998–2003.” *Small Business Economics*, 24(3), 205–231.
Saavedra, J. and Tommasi, M. (2007) “Informalidad, Estado y Contrato Social en América Latina: Estudio Preliminar”,*Revista Internacional del Trabajo* 126 (3-4), pp. 315-349.
Schneider, F., Buehn, A., & Montenegro, C. E. (2010) “Shadow Economies All over the World: New Estimates for 162 Countries from 1999 to 2007”, *The World Bank Policy Research Working Papers*, WPS5356.
Servén, L., Oviedo, A.M., &Loayza, N. (2005) “The impact of regulation on growth and informality - cross-country evidence”.*The World Bank Policy Research Working Paper Series*No. 3623.
Shane, S. (2009) “Why Encouraging more People to Become Entrepreneurs is Bad Public Policy”,*Small Business Economics*, 33(2):141–49.
Tokman, V. (2007)*Modernizing the Informal Sector,* UN/DESA Working Paper No. 42.
anStel, A., Carree, M. andThurik, R. (2005) “The effect of entrepreneurial activity on national economic growth”,*Small Business Economics,* 24(3): 311–321.
Wooldridge, J. M. (2002)*Econometric Analysis of Cross Section and Panel Data*,Cambridge MA: The MIT Press.

Calibrating High Performance in the Ambitious SMEs Using Entrepreneurial Assumptions

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Abstract: Research relating to management assumptions has largely being confined to mature industries where assumptions are readily recognisable as influential business variables in finance, economics, organisational and business development. These studies have primarily considered senior managerial assumptions as part of the cognitive architecture of the firm, driving many developmental and growth processes of the organisation. This perspective of assumptions acting as intellectual assets of the organisation supporting the firm and its development is however largely absent from entrepreneurial and small business research. This is somewhat surprising given that research on the small firm suggests that entrepreneurs tend to operate on a high assumption to knowledge ratio. This paper, which introduces assumptive-led 'growth maps' attempts to addresse this apparent deficiency and considers how entrepreneurial assumptions impact upon the planning and development of ambitious, owner-managed, Indigenous, Irish SME's.

Keywords: assumptions, growth-maps, business models, SMEs, owner-managers

1. Introduction

In many other countries the need to grow and support the creation of new dynamic, high-performance indigenous firms is a constant feature of industrial development (Bridge, O'Neill and Cromie, 2003). Assisting their growth is regarded as crucial to economic regeneration and creates a compelling case for supporting these firms - which is why enterprise agencies are tasked to ensure a constant supply of such firms for the 'enterprise' market (O'Gorman and Cooney, 2007). To enable the supply of effective and robust new firms, the ability to validate and appraise the entrepreneurial idea or proposal becomes a critical business episode for the entrepreneur and the enterprise advisor/investor. This validation has traditionally revolved around the business plan process (Delmar and Shane, 2003) and in this way the business plan has acted as a proxy for entrepreneurial thinking. Recent research has begun to consider the entrepreneurial business model as acting as a proxy for the business plan. (Brown and Proudlove, 2009; Osterwalder & Pigneur, et al, 2009).

However, the fact that entrepreneurial thinking tends to operate on a high 'assumption to knowledge' ratio (MacGrath and McMillan, 2009) has not migrated to small business planning and validation research. This paper argues for this migration. It presents this case by introducing the concept of 'Growth Maps' - a new mapping/visualisation technology based on assumptions and the extension/integration of Drucker's Theory of the Business (1994) and Osterwalder's Business Model Canvas (2009). The paper proceeds to present an overview of assumptions in business/management and enterprise planning literatures, it re-introduces Drucker's 'Theory of the Business', and continues to outline recent field research which demonstrates how assumptive-based 'Growth Maps' successfully challenged entrepreneurial thinking leading to enriched organisation practices and outcomes. Finally, implications for the incorporation of growth maps in the business advisory, planning and investment contexts are outlined and discussed.

2. Business and management assumptions

The most common treatment of assumptions in business management is found in the study of the behavioural and cognitive factors that influence management and is especially evident in motivation studies (McGregor, 1960) interpersonal dynamics/teamwork, (Arygris and Schon, 1978; Tuckman, 1984) organisational culture (Schein,1990: Pettigrew 1979), organisation learning / learning organisations (Senge, 1990; Egan et al, 2004; Murray and Donegan, 2003) change management (Cooperrider, et al, 2008) commitment (Kegan & Lehay 2001) strategy (Omahe, 1982; Kaplan and Norton 2000) and business development (Magretta, 2002) creating a psychological dynamic for assumptions. This dynamic has tended to focus on the individual and collective mindset as part of the firm's 'memory bank' and the impact that this has upon the organisation's development and its management practices. This is clearly evident across cultural, change management, organisational learning and strategy studies. Organisational culture research considered assumptions as part of the

organisation architecture (Pettigrew, 1979; Deal and Kennedy, 1982; Schein, 1990; Wilson, 2000) embedded so deeply with the framework of the firm that they were central to growth and development.

These studies also acknowledged assumptions as drivers of shared feelings, beliefs and values that gave rise to symbolism and aspects of group behaviour. Schein (1996) and others suggested in order to drive the organisation forward we must dig below the organisation's surface, beyond the "visible artefacts" and uncover the basic underlying assumptions at the core of an organisation's culture. Only then can the organisation truly engage with itself and challenge its performance. Change management research engaged cultural assumptions in the change process (Fernandez & Rainey, 2006) and a core finding of the literature was that organisation change began with cognitive change that lead to behavioural change (Well, 2000). In order to accomplish this, the identification and influencing of the individual/organisation assumptions had to be managed and enabled effectively. Thus, surfacing and addressing the assumptive/cultural dynamic was a necessary and vital step in the change management process (Beer and Nohria, 2000; Tsoukas and Chia, 2002; Cooperrider and Whitney, 2005).

These studies argued change had to be influenced and supported by instruction which lead researchers to consider how organisation's learned. Subsequent studies have expanded the change research into organisation development as organisation learning/learning organisations (Arygris & Schon 1978; Senge et al 1999; Jensen, 2005), learning culture (Egan et al, 2004; Murray and Donegan, 2003) and systems thinking (Mitroff, 1988). The potential of assumptions to influence the cognitive and behaviour changes evident in the change literature also became a feature of organisational learning/ learning organisation studies (Senge, 1990: Sinkula, 1994). The key to the learning organisation was the assumptive-based visioning and mental modelling in the process which supported the organisation system's ability to learn and change. Organisation learning, which suggested a systemic role for assumptions, was a theme embraced by business planners and strategists who seemed to appreciate the possibilities suggested by the learning and organisation development studies.

Industrial planners such as Wack (1985), Mason and Mitroff, (1981), Mitroff (1988), Gilad (1994) and strategists such as Ohmae (1982), Whittington, (1993), Johnson and Scholes, (1993), Christensen (1997) Kaplan and Norton, (2004) all acknowledged and built upon assumptions in their work. Hammer and Champy (1993) used assumptions in this way to drive their hypothesis of business re-engineering and discontinuous thinking that became a change management model of choice for so many organisations and managers in the early nineties. Re-engineering championed 'discontinuous thinking' a theme recurring in management literature as 'abandonment' (Drucker 1994), and 'creative destruction' (Abrahamson 2004) that called for the questioning of all business processes beginning with assumptions in order to drive development and competition. Hamel and Prahalad (1994) used this concept of abandonment and the challenge of assumptions to reconfigure the paradigm of competition at the heart of the organisation.

These studies regarded assumptions as 'genetic codes' of the organisation and the key to unlocking mindsets. The authors contended that assumptions, biases and presuppositions set the managerial frame for the individual and corporation alike and these 'frames' gave the context to what the organisation did, how it acted, how it developed. In doing this, they like Drucker (2004), set assumptions at the heart of their management challenge.

3. Ducker's theory of the business

Drucker (1994) contended that "Every organization, whether a business or not, has a theory of the business" (1994:96) that is built upon an assumptive framework which guides and nurtures the organisation's activities and that can be a powerful catalyst for business sustainability and growth. This concept of the 'theory of the business' was based on the architecture of the organisation's primary business assumptions regarding its market choice/position, its stated mission and its competency framework that created valid and invalid propositions for the organisation depending on the reality or otherwise of the assumptions. It is clear he sees the 'Theory of the Business' as the source of the firm's primary intellectual capital.

The assumptions about the environment define what an organisation is paid for. The assumptions about core competences define where an organisation must excel, while assumptions about the

specific mission define what an organisation considers to be meaningful results; in other words they point to how it visions itself making a difference in the economy and society at large. He made clear that when these base organisation assumptions were acting in harmony with one another they created 'valid' theories of business. "Indeed, a valid theory that is clear, consistent and focused is extraordinarily powerful." (1994:96). Drucker detailed the specifications of a valid 'Theory of the Business': The assumptions about environment, mission, and core competencies must fit reality; they have to fit one another; they must be known and understood throughout the organisation; and the 'Theory of the Business' has to be tested constantly.

Valid 'Theories of the Business' can not be taken for granted by the organisation and Drucker warned that a valid 'Theory of the Business' lasting for many years can just as easily lead the firm to collapse, thus requiring constant reflection. "Eventually every theory of the business becomes obsolete and then invalid" (Drucker 1994:101). Drucker indicated that 'Theories of the Business' that were no longer valid could be identified in four ways: when the organisational goals were met; when rapid growth was experienced; when unexpected success or failure was experienced; and when a competitor experienced unexpected success or failure. Once these conditions emerged Drucker argued the firm's 'Theory of the Business' had become obsolete and management had to take corrective action. The deeper these assumptive combinations acted on the organisation, the more comprehensive the management action needed to be to restore the organisation's 'Theory of the Business'.

The most common reaction to an obsolete 'Theory of the Business' was organisational defence that eventually led to 'patching', or superficial treatment of the real deep rooted problems in the enterprise. Drucker argued that the ultimate protection for the organisation against assumptive obsolescence was preventive care built around systematic monitoring of the 'Theory of the Business'. This care system had to 'design-in' a process of 'purposeful abandonment' to force the organisation to continually stress test its working assumptions as a planning and screening programme. It is too late to do this in a crisis. The other preventive cure Drucker talked about was to understand what was going on with the organisation's 'non customers'- as it is in this area that fundamental signs of change take place, not normally with the organisation's current customers. Observing and analysing non customers was as important as researching one's own customers as they normally represented the greater share of the market and more importantly where future customers/trends would likely emerge from. The organisation therefore had to consider balancing existing customer and 'non customer' needs at the same time. The outcomes of conducting diagnosis and preventive care around the firm's 'Theory of the Business' is to ensure that it remains fit for purpose and that re-calibration is an easier proposition than a major overhaul.

Once testing and care was built in to the system, re-defining the firm's 'Theory of the Business' would happen systematically, naturally and frequently as part of the organisation's defence and growth routines. Drucker (1994) argued that traditional growth planning alone was not enough. Growth needs to be nested in a clear sense of mission and, in Drucker's terms, a viable and compelling "theory" (an explanatory framework) of the firm based on its assumptions.

When viewed from this 'new' perspective the 'Theory of the Business' allows any organisation to recognise and engage with the assumptions that underpin the business. The ability to do this, while also managing the existing enterprise and the existing assumptions lies at the heart of Drucker's model and theory. However, despite the arguments put forward by Drucker (1994) and others regarding the major impact assumptions can make across the organisation they appear not to have made a corresponding breakthrough into small business development research. However, recent research regarding entrepreneurial business modelling is breaking new ground.

4. Entrepreneurial business planning and modelling

To enable the supply of effective and robust new firms and to grow the existing stock the ability to validate and appraise the entrepreneurial idea or growth proposal becomes a critical business exercise for the entrepreneur and enterprise advisor. This validation has traditionally revolved around the business plan process (Woods and Joyce, 2003; Delmar and Shane, 2003), given that the business plan has been identified as a factor in business success (Kuratko and Hodgetts, 2004; Burns & Dewhurst, 1996) as beneficial to better performance (Woods and Joyce 2003), as an aid to secure funding (Mason & Stark, 2004) as required by development agencies (Stutely, 2002) and as a strategy planning document to guide the business (Deakins and Freale, 2003). In this way the business plan has acted as a proxy for entrepreneurial thinking. However, despite the perceived and

positive impact business planning has on firm performance, the level of planning in small businesses continues to be poor and practically non-existent (Woods and Joyce, 2003), which is strange considering the emphasis placed on it (Gruber, 2007; Delmar and Shane, 2003). Related studies argued the lack of formal planning does not represent a planning deficit but stresses an unstructured yet analytical approach to planning that may be optimal for the uncertain environments that SMEs often operate in (Aram and Cowes 1990; Olson and Bokor, 1995).

This suggests entrepreneurs and owner-managers did plan, but not along traditional lines and not through business plans (Gibbon and O'Connor, 2005; Yusuf and Nyomor 2002). In 1959, Edith Penrose put this 'entrepreneurial image' at the heart of her theory of the growth of the firm, in which the assumptions made about productive opportunity are seen as the key features in the growth of the firm. The firm in Penrose's view is a collection of potentially productive resources (human and non-human) under administrative co-ordination for the production of goods and services for sale in the market for a profit (1959: 14). Administrative co-ordination and 'authoritative communication' define the boundaries of the 'Penrosian firm' (Pitelis, 2002:23). Recent research has begun to consider this perspective specifically related to the entrepreneurial business model acting as a proxy for the business plan. (Brown and Proudlove:2009). Brown and Proudlove (2009) argue that it is impossible to divorce the business model from the entrepreneur's mindset and called this condition the entrepreneur's business model mindset. Related research by Munive-Hernandez et al, (2004) and Zahra, Korri and JiFeng (2005) also associate the entrepreneur's mindset with the business model. They argue the business model is the entrepreneur's expression of his/her cognition of the firm's opportunity. Amit and Zott (2006) refer to this as the 'overall gestalt' of the business which is generated from business model thinking.

Zott and Amit (2006) and Ireland et al (2001) argue that the mental model of the entrepreneurs as expressed through the business model is a critical organisation or entrepreneurial episode. Magretta (2002) argues that every viable organisation is built on a sound business model that itself is built on assumptions even if the owners/founders or its managers do not conceive of what they do in those terms. "A business model is a set of assumptions about how an organisation will perform by creating value for all the players on whom it depends, not just its customers."(Magretta, 2002:44). Tennent and Friend (2005) suggest the business model helps managers understand complexity and relationship in business because the model can expose the assumptions underpinning this complexity. "The success of any business modelling project depends on getting the various assumptions and relationships (or at least the important ones) as accurate as possible." (Tennant & Friend, 2005:1).

This notion that the business model is an assumptive-design is appealing given that it is suggested that entrepreneurs/owner-managers operate on a high ratio of assumption to knowledge and that assumptions drive much entrepreneurial thought and action (McGrath and MacMillan, 2009). Although these models acknowledge assumptions they do not explicitly plan them into their designs or frameworks which provided the impetus for the research.

5. Research methodology – intergrating the theory of the business and the business model canvas

More recently Osterwalder and Pignuer (2004) and Osterwalder/Pignuer et al (2009) presented the business model as a 'canvas' of nine key activity blocks that were deemed essential to business success. The canvas also possesses a more intrinsic value as the design of the canvas reflected Drucker's (1994) more abstract theory of the business and became the basis of our research programme (Daly & Walsh, 2010). The canvas is aligned across internal and external axis that reflects the value proposition, key competencies and customer-facing activities that are remarkably similar to Drucker's mission, core competencies and environmental (market) assumptions of the 'Theory of the Business'(1994) as depicted in Fig 1.

The business model canvas framework is designed around the value proposition of the firm as the model's foundation, around which are built; customer-facing activities (customer relationships, customer segments and channels) that generate revenue streams. These are delivered by the internal processes (key activities, key resources and key partners) that are managed through the firm's cost structure. In Osterwalder's canvas, the value proposition sits in the middle of the model and rests upon the cost structure and revenue stream supporting the internal processes and external, market facing activities. The Canvas lacked the assumption footprint in common with many models (BSC, Strategy Maps, Business plans) which was the opportunity for the study. What was required

was to find a way to incorporate the owner-manager's growth assumptions. This was done by incorporating assumptions onto to the canvas as a 'diagnostic Map' that would evolve into a growth map once the connections were made between the organisation's growth practices and the assumptions. Having registered to use the Canvas it was modified to include assumptions as outlined in Fig 2.The Diagnostic & Growth Map Template.

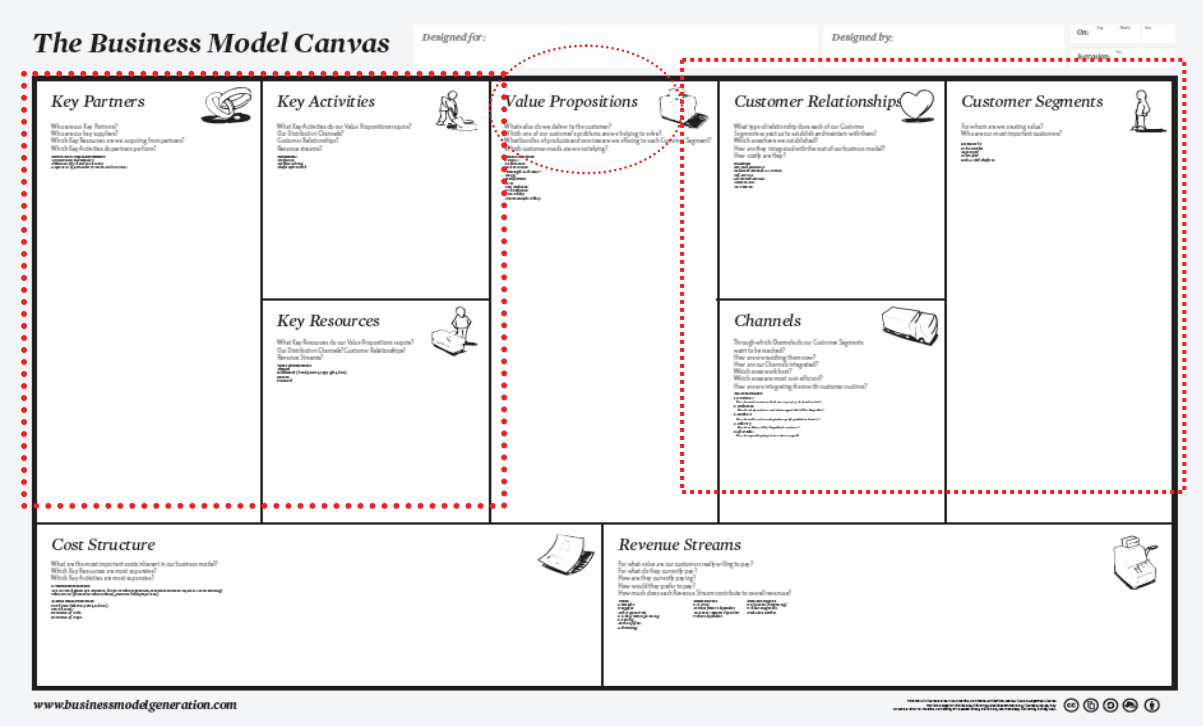


Figure 1: Integrating the business model canvas and the theory of the business

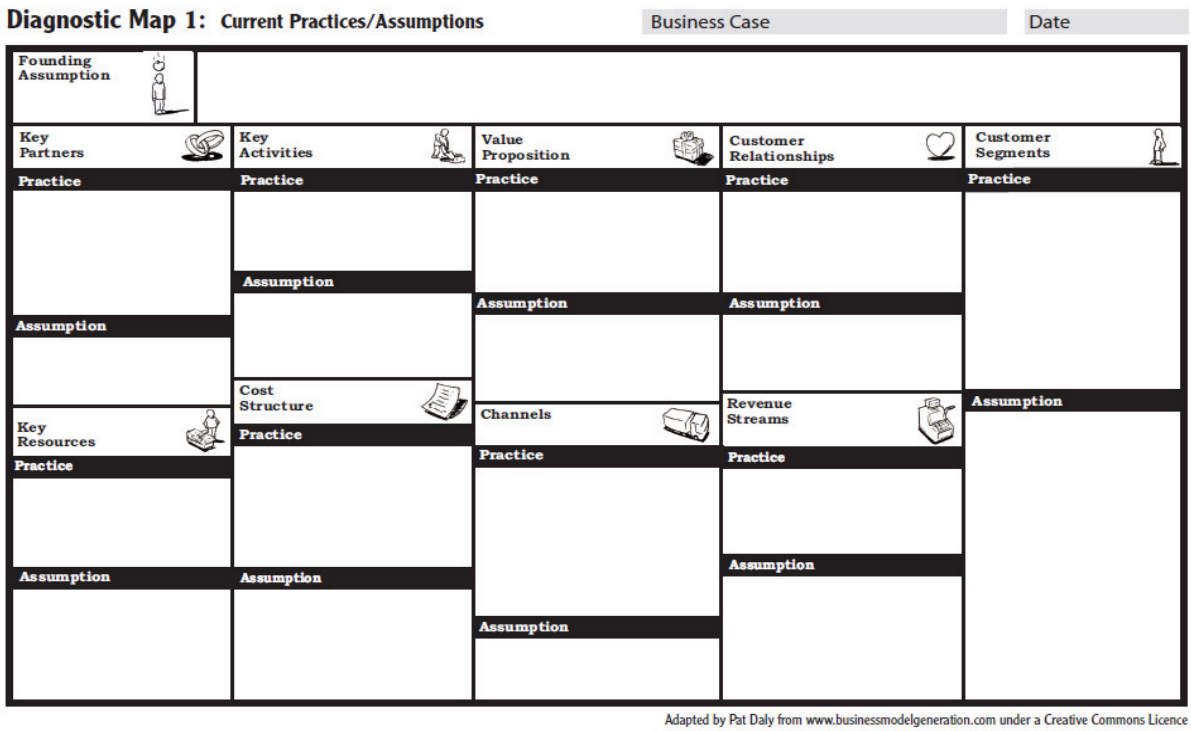


Figure 2: The diagnostic and growth map template

Having integrated the Business Model Canvas and the Theory of the Business into a single diagnostic map, the data collection process took place as a organisation case study and proceeded in four stages. Stage one was dedicated to discussing and mapping the growth intentions/thinking of the entrepreneur/owner-manager in order to identify the current key practices and more importantly the assumptions that underpinned the practices. Stage two tested this map for 'fit' against the growth intentions held by the owner-manager. The third stage of the process was the challenging by the participating owner-managers of the mapping in order to arrive at a new and more robust business propositions leading to stage four, the rollout of the firm's new growth map. The first three stages generated firm specific diagnostic maps which lead to the fourth stage, the growth map.

Eight ambitious, indigenous, Irish, owner-managed SMEs were pre-qualified for the study according to national policy guidelines. The firms participating in the study were all in receipt of, or about to receive financial/other supports to assist in the growth of the organisations. The participating firms represented a cross-section of indigenous SME firms in the media, mobile-technology, software, engineering, food and services sectors. The research took place over the summer 2010.

6. Findings

The key findings suggest that the entrepreneurs who participated in this study did consider their assumptions when planning the growth of their firms and did operate on a high level of assumption to knowledge which is in line with the extant research (McGrath and Macmillan, 1995). However, it was also clear that the assumptions considered by the participants remained largely implicit and invisible in the growth planning process of the firm. Being largely invisible these assumptions therefore were not available for self-analysis/diagnosis as a critical phase in the development of the organisation (Dewar, 2002). The study also reveals that the owner-managers tended to produce plans mainly to satisfy external advisors or financiers rather than themselves as a development tool (Wickham 2001; Mason and Stark, 2004).

On average each owner-manager in the study changed at least 40% of their proposed growth plans once the assumption/practice axis was identified and introduced. We concluded that the identification, visualisation and reflection of the assumptions during a growth planning episode are powerful and enlightening in terms of the entrepreneur's thinking.

This change in thinking is captured in the evolution of the organisation's diagnostic/growth-maps that demonstrates the powerful effect that the explicit treatment of the growth assumptions as novel variables had on the entrepreneur when imported directly into the process.

This outcome also suggests that gaining a better "fit" between the assumptions and the practices could ensure a better link between the entrepreneur's/owner-manager's growth aspiration and business outcomes, thereby helping to support a stronger assumption-knowledge-practice linkage.

7. Discussion and concluding remarks

This paper presented an integrated process that allows entrepreneur (or advisor/investor) to challenge their growth plans and businesses using assumptions. The incorporation of the assumptive–led diagnosis and growth maps could be a new step in the validation, evaluation and assessment of the SME's business plan. This novel step extends that part of the literature which is focussed on the need to build flexibility and visibility into the business plan process (Osterwalder and Pigneur, 2009). With continued refinement the diagnosis/growth maps presented in this paper should find new application in the relevant business and management advisory and research communities. It is hoped that the dynamic capabilities of entrepreneurial growth assumptions, may as a result of this study find a new significance in the SME sector, a sector that is so critical to our future economic development and growth.

References

Abrahamson, E. (2004). Change without pain: How managers can overcome initiative overload, organisation chaos and employee burnout. Boston, MA: Harvard Business School Press.

Amit, R., C. Zott. (2001). Value creation in e-business. Strategic Management Journal. Vol 22 No. 6-7, pp 493 - 520.

Aram, J.D. & Cowes, S.S. (1990). Strategic Planning for Increased Profit in the Small Business. Long Range Planning Vol 23, No 6, pp 63 – 70.

Arygris, C. & Schön, D. (1978). Organisational Learning: A Theory of action perspective: Reading MA: Addison-Wesley Publishing Company.
Beer, M. & Nohira, N. (2000). Breaking the Code of Change. Boston, USA: HBR Press.
Bridge, S., O'Neill, K. & Cromie, S. (2003). Understanding Enterprise, Entrepreneurship and Small Business, Second Edition. Hampshire, London: Palgrave Macmillan.
Brown, J. & Proudlove, D. (2009). Business Entrepreneurs' Mindsets on Their Enterprises' Business Model in Daly, P. & Gijbels (eds), Real Learning Opportunities at Business School and Beyond, Advances in Business Education and Training 2, DOI Science + Business Media B.V.
Burns, P. & Dewhurst, J. (1996). Small Business and Entrepreneurship London: Macmillian Business.
Christensen, C. M. (1997). Making Strategy; Learning by Doing. Harvard Business Review. November-December, pp141-56.
Cooperrider, D.L., & Whitney, D. (2005). Appreciative Inquiry: A Positive Revolution in Change. San Francisco, CA: Berrett-Koehler Publishers.
Cooperrider, D.L., Whitney, D., & Stavros, J.M. (2008). Appreciative Inquiry Handbook. San Francisco, CA: Berrett-Koehler.
Deakins, D. & Freel M. (2003). Entrepreneurship & Small Firms 3rd Edition. Education Berkshire, England: McGraw Hill.
Daly, P & Walsh, J.S. (2010). Drucker's theory of the business and organisations: challenging business assumptions. Management Decision, Vol 48, No. 4, pp 500 – 511
Deal, T.E. & Kennedy, A.A. (1982). Corporate Cultures: The Rites and Rituals of Corporate Life. Mass: Addison-Wesley Publications.
Delmar, F. & Shane, S. (2003). Does business planning facilitate the development of new ventures? Strategic Management Journal, Vol 24, pp 1165-1185.
Dewar, J. A. (2002). Assumption-Based Planning: A Tool for Reducing Avoidable Surprises. Cambridge, England: Rand/Cambridge University Press.
Drucker, P.F. (1994). Theory Of The Business. Harvard Business Review. September-October, pp 95-106, Boston, Mass, USA.
Egan, T.M., Yang, B. & Bartlett, K.R. (2004). The Effects of Organisational Learning Culture and Job Satisfaction on Motivation to Transfer Learning and Turnover Intention. Human Resource Development Quarterly, No. 15, pp 279–301.
Fernandez, S. & Rainey, H.G. (2006). Managing Successful Organisational Change in the Public Sector. Public Administration Review: Vol 66, No. 2, pp 168-176.
Gibbon, P.J. & O'Connor, T. (2005). Influence on Strategic Planning Process Among Irish SME's. Journal of Small Business Management, Vol 43, No 2, pp 170 – 186.
Gilad, B. (1994). Business Blindspots: Replacing Your Company's Entrenched and Outdated Myths….Beliefs and Assumptions with the Realities of Today's Markets. Chicago: Probus Publishing Co.
Gruber, M. (2007). Uncovering the Value of Planning in New Venture Creation - A Process and Contingency Perspective. Journal of Business Venturing, Vol 22, No. 6, pp 782–807.
Hamel, G. and Prahalad, C.K. (1994). Competing for the Future. Boston, USA: Harvard School Press.
Hammer, M. & Champy, J. (1993). Reengineering the Corporation: A Manifesto for Business Revolution. (1st ed.). New York: Harper Business
Ireland, R. D., Hitt, M. A., Camp, S. M. & Sexton, D. L. (2001). Integrating entrepreneurship actions and strategic management actions to create firm wealth. Academy of Management Executive. No. 15, pp 49–63.
Jensen, P.E. (2005). A Contextual Theory of Learning and the Learning Organisation. Knowledge & Process Management, Vol 12, No. 1, pp 53–64.
Johnson, G. and Scholes, K. (1993). Exploring Corporate Strategy. 3rd Ed. Essex, England: Prentice Hall.
Kaplan, R.S. & Norton, D.P. (2000). Having Trouble with your Strategy? Then Map it. Harvard Business Review. Sep- Oct, pp 167-176.
Kaplan, R.S. & Norton, D.P. (2001). The Strategy-Focused Organisation. Boston: Harvard School Publications.
Kaplan, R.S. & Norton, D.P. (2004). Strategy Maps – Converting Intangible Assets into Tangible Outcomes. Boston, MA: Harvard Business School Press.
Kegan, B. & Lahey, L. (2001). How the way we talk can change the way we work: Seven languages for transformation. San Francisco: Jossey-Bass.
Kuratko, D.F. & Hodgetts, R.M. (2004). Entrepreneurship: Theory, Process. Practice (Mason,OH; South-Western Publishers).
Magretta, J. (2002). What Management Is: How it Works and Why it's Everyone's Business. New York: The Free Press.
Magretta, J. (2002). Why Business Models Matter. Harvard Business Review, May, pp 86-99
Mason, R. O. & Mitroff, I. I. (1981). Challenging Strategic Planning Assumptions - Theory, Cases and Techniques. Toronto, Canada: John Wiley & Sons.
Mitroff, I. I. (1988). Break-Away Thinking – How to Challenge Your Business Assumptions (and Why You Should). Canada: John Wiley & Sons.
Mason, C. & Stark, M. (2004). What do investors look for in a business plan? A comparison of the investment criteria of bankers, venture capitalists and business angels. International Small Business Journal. 22(3): 227-248.
McGrath, R.G., & MacMillan, I.C. (1995). Discovery–Driven Planning. Harvard Business Review, July – August, pp 44 – 54.

McGrath, R.G., & MacMillan, I.C. (2009). Discovery Drives Growth – A breakthrough process to reduce risk and seize opportunity. Boston. Harvard Business Press.
McGregor, D. (1960). The Human Side of Enterprise. (Annotated Edition, 2006). Strategic Organisation, No. 3, pp 441-455. New York. McGraw Hill Publishing.
Morrison, A., Rimmington, M. & Williams, C. (1999). Entrepreneurship in the Hospitality, Tourism and Leisure Industries. Oxford: Butterworth-Heinemann.
Munive-Hernandez, E.J., Dewhurst, F.W., Pritchard, M.C. & Barber, K.D. (2004). Modelling the Strategic Management: An initial BPM Approach. Business Process Management, Vol 10 No. 6, pp 691-711.
Murray, P. & Donegan, K. (2003). Emperical linkages between firm competencies and organisational learning. The Learning Organisation, Vol 10, No. 3, pp 51-62.
O'Gorman, W. & Cooney, T.M. (2007). An Anthology of Enterprise Policy in Ireland. Irish Journal of Management, Vol 28 No. 2, pp 1-27.
Ohmae, K. (1982). The Mind of The Strategist. Middlesex, England: Penguin Books.
Olson, P.D. & Bokor, D.W. (1995). Strategy Process – Context Interaction: Effects on Growth Performance in Small Start-Up Firms. Journal of Small Business Management, Vol 33, No. 1, pp 34 – 43.
Osterwalder, A. & Pigneur, Y. (2004). An ontology for e-business models. In Value Creation from E-Business Models. W. Currie, Butterworth-Heinenann.
Osterwalder, A. & Pigneur, Y. (2009). Business Model Generation – A Handbook for Visionaries, Game Changers and Challengers. Self published.
Penrose, E. (1959). The Theory of The Growth of The Firm. (3rd ed.). Oxford: Oxford University Press.
Pettigrew, A. M. (1979). On Studying Organisational Cultures. Administrative Science Quarterly, Vol 24, No. 4, pp 570– 581.
Pitelis, C.N. (2002). The Growth of the Firm - The Legacy of Edith Penrose. Oxford. Oxford University Press.
Schein, E. H. (1990). Organisational Culture. American Psychologist. No. 45, pp 109-19.
Schein, E.H. (1996). Culture: The Missing Concept in Organisation Studies. Administrative Science Quarterly, Vol 41, No 2, pp 229-241.
Senge, P. M. (1990). The fifth discipline: The art and practice of the learning
organisation. New York: Doubleday.
Senge, P.M., Kleiner, A. & Roberts, C. (1994). The Fifth Discipline Fieldbook. London: Nicholas Brealey Publishing.
Senge, P.M., Kleiner, A., Roberts, C., Ross, R., Roth, G. & Smith B. (1999). The Dance of Change: The Challenges of Sustaining Momentum in Learning Organisations. London: Nicholas Brealey Publishing.
Sinkula, J.M. (1994). Market Information Processing and Organisational Learning. Journal of Marketing, January, No. 58, pp 35-45.
Stutely, R. (2002). The Definitive Business Plan. Great Britain: Pearson Education Limited.
Tennent, J. & Friend, G. (2005). Guide to Business Modelling. (2nd Ed.) London: Profile Books Ltd.
Tikkanen, H., Lamberg, J.A., Parvinen, P. & Kallunki, J. P. (2005).Managerial Cognition, Action and the Business Model of the Firm. Management Decision, Vol 43, No. 5/6, pp 789−810.
Tsoukas, H. & Chia, R. (2002). On Organisational Becoming: Rethinking Organisational Change. Organisational Science, Vol 13, No. 5, pp 567 – 582.
Tuchman, B. (1984). The March of Folly: From Troy to Vietnam. New York: Alfred A. Knopf, von Winterfeldt, D. & Edwards, W. Decision Analysis and Behavioural Research. Cambridge: Cambridge University Press.
Wack, P. (1985) 'The gentle art of reperceiving', in Ratcliffe, J. (Ed.): Harvard Business Review, September/October and November/December, 1999.
Well, M.P. (2000). Business Process Re-engineering implementation using internal technology. Business Process Management Journal, No 6, pp 164 – 184.
Whittington, R. (1993). What is Strategy and Does it Matter? London: Routledge.
Wickham, P.A. (2001)Strategic Entrepreneurship - A Decision-Making Approach to New Venture Creation and Management. London: Pitman Publishing.
Wilson, A.D. (2000). From Scenario Thinking to Strategic Action. Technological Forecasting and Social Change, Vol 65, No. 1, pp 23 – 29.
Woods, A. & Joyce, P. (2003). Owner-Managers and the Practice of Strategic Management. International Small Business Journal, Vol 21, No. 2, pp 181-195.
Yusuf, A. & Nyomor, R.O. (2002). Uncertainty Planning Sophistication and Performance in Small New Zealand Firms. Journal of Entrepreneursip, Vol , No. 3, pp 1–19.
Zahra, S.A., Korri, J.S. & JiFeng, Y. (2005). Cognition and International Entrepreneurship: Implications for Research on International Opportunity, Recognition and Exploitation. International Business Review, Vol 14, No. 2, pp 129-146.
Zott,C. & Amit, R. (2006). Exploring the Fit Between Strategy and Business Model: Implications for Firm Performance. INSEAD/Wharton working paper.

The Influence of a 'Learning-by-Doing' Program on Entrepreneurial Perceptions of Economics Students

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Abstract: Entrepreneurship, in this paper, is considered from both a narrow and a broad perspective. Hence it is simultaneously seen from the viewpoint of starting a new company and from that of working in an existing organization. The key problem that educators face is the stimulation of entrepreneurship through instruction. This instruction may consist of traditional courses or may take the form of learning by doing programs. In this paper the effect of such learning by doing programs on entrepreneurial self-efficacy and entrepreneurial intentions is investigated and the social-cognitive theory is used as a theoretical framework.The general research question is: Can 'learning by doing' programs stimulate (1) entrepreneurial self-efficacy and (2) entrepreneurial intentions and what is the relationship between this entrepreneurial self-efficacy and these intentions and (3)personal variables, (4) socio-economic variables and (5) educational background? The personal variables were the Big Five personality dimensions, future time perspective and self-management. Socio-economic variables were gender and family background. The participants were 158 economics students of a Belgian urban university college, who were working on a project in a company or who had completed an internship in an organization.A single group pretest-posttest design was used. A questionnaire was presented at the start of the program and a second questionnaire was administered at the end of the program. Results indicated that the two programs were successful in raising the entrepreneurial self-efficacy of the participants. There was a significant increase in entrepreneurial self-efficacy between the beginning and the end of the 'learning by doing' program. The influence of the socio-economic and educational variables on entrepreneurial efficacy impact was very limited. The entrepreneurial intentions of the participants were increased by the program, but not significantly. Students from an entrepreneurial family had higher entrepreneurial intentions, but no higher entrepreneurial efficacy. It was already clear from the literature that the relationship of self-efficacy to entrepreneurial intentions and to other personal and environmental variables is very complicated and needs further investigation.

Keywords: entrepreneurship, higher education, learning by doing

1. Introduction

Because entrepreneurship is so important for the economy, it is worthwhile to study the impact of entrepreneurship education. Entrepreneurship can be defined in different ways, but for this study we used the broad definition given by the Commission of the European communities (2003: 6):"Entrepreneurship is the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organization."

The key problem that educators are facing is how to stimulate entrepreneurship through education. This key problem is very prominent in the educational environment of this paper: the teaching and learning of economics students. Higher education institutions offer these students a lot of courses on, for instance, accountancy and marketing, but also organize learning by doing programs. These programs include short-term assignments as well as long-term internships, but are dealing, in general, with real-life situations. To encourage entrepreneurship, practically-oriented educational programs, providing students with real-world experiences, proved to be particularly useful.However, the specific impact and interaction of environmental and individual variables in such 'learning by doing' educational programs remains very complex and not sufficiently investigated.As a result, many crucial questions remain unsolved: for instance, to what extent do personality characteristics, gender, prior school results, or the fact that students' family members are self-employed affect attitude changes through educational programs?

The social-cognitive theoretical framework (Bandura, 1986, 1997) is used in this paper to analyze the impact of entrepreneurship education. Bandura makes an important distinction between knowing and showing what you know, because learners do not always demonstrate what they have learned. Learners have to be motivated to show what they have learned. Self-efficacy is the most important motivational construct and is defined (Bandura, 1997: 3) as "belief in one's capabilities to organize and execute the courses of action required to produce given attainments". Several studies (e.g. Chen, Greene, and Crick, 1998) have pointed at the importance of the entrepreneurial self-efficacy construct, defined by Chen and colleagues (1998: 295) as "… belief that he or she is capable of

successfully performing the various roles and tasks of entrepreneurship". But how can education raise self-efficacy? Bandura (1997) discerns four sources of self-efficacy. The first and most important source is enactive mastery experience. A successful performance raises self-efficacy not just through the performance but through the interpretation of several personal (e.g. effort) and situational (e.g. received aid) factors. A complete description of this process goes beyond the intended scope of this paper.

The second source of self-efficacy is vicarious experience or modeling. Observing a successful model can enhance self-efficacy. The third source of self-efficacy is verbal persuasion and can be linked to giving feedback after performance. The fourth source is the physiological and affective state.

Analyzing the presence of these self-efficacy sources in entrepreneurship education facilitates the making of a distinction between traditional courses and learning by doing programs. The latter seem to provide many more opportunities to enhance self-efficacy. Learning by doing programs provide much more authentic evidence that learners can succeed and generally provide more modeling opportunities. We can hypothesize that learning by doing programs enhance entrepreneurial self-efficacy.

Chen et al (1998) also found that entrepreneurial self-efficacy is positively related to the intention of setting up one's own business. The limited circumscription of entrepreneurship, namely starting a new business, is also included in the definition outlined in the first paragraph. On the basis of the positive relationship between self-efficacy and entrepreneurial intentions, it could be hypothesized that learning by doing programs could enhance these intentions. Studies however show mixed results. Some authors (e.g. Souitaris, Zerbinati and Al-Laham, 2007) report that entrepreneurship programs can enhance entrepreneurial intentions, but others (Oosterbeek, van Praag andIJsselstein, 2010) even found that the effect on the intention to become an entrepreneur was negative. It should be noted that measurement instruments and participants were different in both studies. So it could be interesting to investigate whether learning by doing programs can stimulate the intention to set up one's own business.

The social cognitive theoretical framework is about much more than self-efficacy. One very fundamental aspect of the framework is the consideration that learning outcomes are the result of the interplay between environment and personal factors (Bandura, 1997).From this point of view, personal and environmental variables have to be included in the study.

Starting with personal variables, it is clear that individuals may differ on many variables. Therefore this study opted to investigate several personal variables at the same time. This approachwill influence the choice of measurement instruments. It will necessitate the choice of short versions of the instruments.

The fact that the variable 'intention to set up a business' is situated in the future reflects the decision to include a variable about students' perceptions of their future. It shows that "…students' motivation is profoundly affected by their conceptualizations of their future" (Kauffman and Husman, 2004: 3) and this is called a future time perspective. Shell and Husman (2001: 499) found "…a joint relation of higher self-efficacy and higher future time perspective to higher achievement". They hypothesize that students who have stronger tendency to extend their behavior into the future could be better able to project their abilities in the future and have higher self-efficacy. This hypothesis could be tested in this paper.

The Big Five is a measurement instrument concerning individual differences that is widely used in different domains. The instrument measures five personality dimensions and is also used in the domain of entrepreneurship, as two meta-analytical reviews show (Zhao, & Seibert, 2006; Zhao, Seibert, & Lumpkin, 2010). Of the five personality dimensions, openness to experience, conscientiousness, emotional stability, extraversion and agreeableness, only the last dimension was unrelated to entrepreneurial intentions and entrepreneurial performance (Zhao et al, 2010).

The choice of the last personal variable to be included in the study is inspired by the student-centered nature of learning by doing programs. In order to take maximum advantage of these programs, students must be capable of self-directing their learning. Stewart (2007) reported that self-management was the best predictor for achieving learning outcomes from project-based learning.

Two categories of environmental variable can be discerned: educational and socio-economic variables. From an educational point of view it would be interesting to compare the scores on learning by doing programs with the scores achieved in more traditional courses. It can be expected that different competencies underlie learning by doing programs and teacher-centered courses.

Socio-economic variables like gender and family background have to be taken into account. Wilson, Kickul and Marlino (2007) reported a gender effect. Males had higher scores on self-efficacy and had higher entrepreneurial intentions. Having an entrepreneurial family seems to predict entrepreneurial intentions according to some (Ertuna andGurel, 2011) but does not lead to self-employment according to others (Zellweger, Sieger and Halter, 2011). Zellweger et al, (2011) hypothesize that students from an entrepreneurial family have seen the sacrifices imposed on their parents and are affected by their parents' absence.

2. Research questions

The general research question is: Can 'learning by doing' programs stimulate (1) entrepreneurial self-efficacy and (2) entrepreneurial intentions and what is the relationship between this entrepreneurial self-efficacy and these intentions and (3) personal variables, (4) socio-economic variables and (5) educational background?

The following additional questions are derived from the literature: Are conscientiousness, openness to experience, emotional stability and extraversion positively related to entrepreneurial intentions? Do students with high scores for self-management get higher scores for learning by doing programs? Are students raised in a family business environment more inclined to start a new business and do they have a higher entrepreneurial self-efficacy?

3. Research method

3.1 Participants

A hundred and seventy-six students of a Belgian university college completed the first questionnaire. Only hundred and fifty-seven students (mean age = 22.17 year, 89 male)completed the first and the second questionnaire. They came from two different groups. The first group consisted of thirty-one third year bachelor students of Business Administration (mean age =21.58,19 male) who worked on a project in a company during one semester (one day a week).The second group consisted of a hundred and twenty-seven third (= last) year Bachelor students in Business Science (mean age = 22.30,70 male) from three different departments: Operation Management, Office Management, and Applied Information Technology. They had an internship (15 weeks) in a company during the last semester of their study.

3.2 Measures

Entrepreneurial intentions: three items on a seven-point Likert scale (Kolvereid, 1996; Souitaris et al,2007)

Entrepreneurial self-efficacy measured by twenty-two items on a ten-point Likert scale (Chen, Greene and Crick 1998).

For future time perspective, the short version of the connectedness subscale, i.e. six items on a five-point Likert scale, was used (Husman and Shell, 2008).

Self-management was measured by 13 items on a five-point Likert scale (Stewart,2007)

Big Five Personality (short version) 15 items on a seven-point Likert scale (Van Emmerik,Jawahar and Stone, 2004).

The following socio-economic variables were also obtained: gender, age, occupation of parents, self-employment of family members.

Finally, data from the educational background of the participants were gathered: study stream followed in high school and students' success rate in higher education (in terms of credits acquired).

3.3 Method

A single group pretest-posttest design was used. The first questionnaire was presented at the start of the program and contained all the described subscales. The second questionnaire was administered at the end of the program and contained the same subscales with the exception of the Big Five questionnaire. All the questionnaires were filled out online.

4. Results

As mentioned, entrepreneurial self-efficacy was measured by a scale variable composed of 22 items. The internal consistency of this variable was indicated by the high value of Cronbach's Alpha (α=0.944). The relation between entrepreneurial self-efficacy and the personal variables, the socio-economic variables and the variables related to the educational background of the students was investigated by a multiple linear regression model. The regression models in this survey were fitted in a forward stepwise manner with the inclusion level for independent variables set at p=.05. Selected predictors, regression coefficients, significant levels and collinearity statistics are presented in Table 1.

Table 1: Multiple regression model of entrepreneurial self-efficacy

Variable	β	t	p	Tolerance
Openness to Experience	0.497	5.751	<.001	.940
Conscientiousness	0.279	3.804	<.001	.872
Agreeableness	-0.253	-2.534	.012	.854
Gender	0.406	2.307	.022	.912
Constant	3.850	6.064	<.001	

All the indicated variables were significant on a .05 level and 24.1% of the variation in entrepreneurial self-efficacy was explained by the regression model (R=0.491, F=13.446, p<.001). The tolerance levels were much higher than .64, so multi collinearity problems were avoided. Variables related to educational background and socio-economic variables like educational level of parents and family business environment were excluded and turned out to have only a limited influence on entrepreneurial self-efficacy. From the different dimensions of the Big Five model, Openness to Experience and Conscientiousness had a positive correlation with entrepreneurial self-efficacy. An opposite relation was detected for the variable Agreeableness. The two other dimensions of the Big Five had no significant correlation (Spearman's rho was .104 for extraversion and .003 for neuroticism). Finally, a gender effect on entrepreneurial self-efficacy in the regression model was detected. The average level of entrepreneurial self-efficacy for the male students was 6.409 (SD= 1.177, N=100) and for female students 6.009 (SD=1.321, N=76). The gender effect on entrepreneurial self-efficacy was confirmed by an Independent-Samples t-test (t=2.117, p =.036). The prerequisite of normality for the data was tested by Shapiro-Wilk (SW=0.98, p =.123 for the male students and SW=0.988, p =.711 for the female students).

The main focus of this survey was to investigate the possible positive effects of 'learning by doing' programs on entrepreneurial self-efficacy. For the students who completed both surveys (N=157) the pretest data were compared with the posttest data using the Paired-Samples t-Test. Also for this data the normality condition was fulfilled (SW=.992, p=.556). In the pretest phase the average score for entrepreneurial self-efficacy was 6.212 (SD= 1.305) and in the posttest phase 6.610 (SD=1.339). The Paired-Samples t-Test indicated that this growth was significant (t =3.667, p<.001). For the students of the bachelor in Business Science who followed a full-time internship, the average difference between both tests was (at .420) also significant (t =3.272, p =.001, N=127). For the second group of students of Business Administration who worked on a project during one day a week, the average difference was 0.304 and the significance level decreased (t =1.821, p =.079, N=30). Due to the small sample in the second subgroup, there was no statistical evidence to make a well-founded conclusion.
In the second part of the survey the entrepreneurial intentions of the students were investigated in two ways. In the first place a scale variable measured by three items expressed the self-employment perspectives of the students in a (future) job environment. The reliability of this variable was established by Cronbach's Alpha (α = .864). Secondly, the variable 'the intention to set up a business' was directly explored. Multiple regression models were again fitted in a forward stepwise manner. Results are presented in Table 2.

Table 2: Multiple regression model of entrepreneurial intentions

Variable	*β*	*t*	*p*	Tolerance
Family business environment	0.529	2.353	.020	1.000
Conscientiousness	-0.226	-2.513	.013	1.000
Constant	4.600	10.204	<.001	

However, the coefficient of determination of this bivariate regression model was rather small (*R*=0.256, *F*=5.883, *p* =.003), so further research is necessary. An Independent-Samples t-Test proved that the variable Conscientiousness was independent of the dummy-variable Family business environment (*t* =0.272, p =.786, *N*=176). Therefore no multicollinearity problems crept into the model. Students with a high score on Conscientiousness had fewer entrepreneurial ambitions. Secondly, these intentions were also determined by the experience the students had during their early youth with an entrepreneurial environment. If the variable 'the intention to set up a business' was explained by a regression model, only this last variable was left as predictor. Results are presented in Table 3.

Table 3: Multiple regression model of the variable 'the intention to set up a business'

Variable	*β*	*t*	*p*	Tolerance
Family business environment	0.643	2.584	.011	1.000
Constant	3.563	22.711	<.001	

Only 3.8% of the variation in the dependent variable was explained by this simple linear model (*R*=0.195, *F*=6.675, p =.011).

The last two models confronted the business with the problem of how to stimulate the entrepreneurial intentions of economics students. One of the research questions was related to a possible impact of learning by doing programs on entrepreneurial intentions. In the survey the pretest data were compared with the posttest data. The Shapiro-Wilk test indicated that the differences between both datasets were not normally distributed (*SW*=0.969, *p* =.001, *N*=157). Therefore the Wilcoxon Signed Rank Test was explored. In the pretest phase the average score on entrepreneurial intentions was 3.690 (*S*D= 1.482) and in the posttest phase 3.810 (*SD*=1.533). However this slight increase in the entrepreneurial intentions was not large enough to be significant (*Z*=1.113, *p* =.266, n =157). But for the variable 'the intention to set up a business' the average score for the pretest phase was 3.820 (*SD*=1.656) and for the posttest phase 4.180 (*SD*=1.786). The Wilcoxon Signed Rank Test proved that this growth was really significant (*Z*=2.715, p =.007, *N*=157). There are no arguments for rejecting the assumption that the entrepreneurial intentions were positively correlated with learning by doing programs.

Next, the relation of the variable entrepreneurial intentions with entrepreneurial self-efficacy was examined by extending the multiple regression model (see Table 2). Results are presented in Table 4.

Table 4: Multiple regression model of entrepreneurial intentions (with entrepreneurial self-efficacy)

Variable	*β*	*t*	*p*	Tolerance
Family business environment	0.520	2.339	.021	1.000
Conscientiousness	-0.267	-2.939	.004	0.958
Entrepreneurial self-efficacy	0.193	2.195	.030	0.957
Constant	3.596	5.631	<.001	

The explained variation of the variable entrepreneurial intentions was 9.2% (*R*=0.303, *F*=5.618, *P*=.001). This causal model argued that the positive effects of learning by doing programs on entrepreneurial self-efficacy resulted also in a favorable (restricted) impact of these programs on entrepreneurial intentions.

The variable self-management was measured by 13 items and internal consistency was guaranteed by a high value of Cronbach's Alpha (*α* = .867). The first remarkable observation was that self-management was related to the educational level of the mother. The average score on self-management for students with a low-educated mother (no undergraduate or graduate diploma) was 3.51 (*SD*=0.529, N=63) and for the complementary subgroup of students the average was 3.33 (*SD*=0.477, *N*=70). The Independent-Samples *t*-test indicated that the difference between both subgroups was significant (*t* =2.058, p =.042). The variable self-management was also positively correlated with the variable entrepreneurial self-efficacy (Spearman's *rho*=0.347, p<.01). Therefore the hypothesis that self-management increases during learning by doing programs was justified. Again the differences between the pretest data and the posttest data for the variable self-management were not normally distributed (*SW*=0.975, *p* =.006, *N*=157). The non-parametric

Wilcoxon Signed Ranks test proved that there was a significant increase in the variable self-management (Z=4.888, p <.001).

For the variable future time perspective, Cronbach's Alpha was 0.757 and the correlation with the variable entrepreneurial self-efficacy was smaller (Spearman's *rho*=0.156, p <.05). The differences between the pretest data and the posttest data for the variable future time perspective were in this case not normally distributed (SW=0.975, p =.005, N=157). In the pretest phase the average score on future time perspective was 4.831 (SD= 0.596) and in the posttest phase 3.873 (SD=0.703). For the first time in this survey there was an important negative effect of the learning by doing programs. The Wilcoxon Signed Ranks test indicated that this reduction in the variable future time perspective was highly significant (Z=-10.386, p <.001).

Finally, the evaluation scores on the learning by doing programs were investigated by a multiple regression model which included the descriptive data (personal variables, socio-economic variables, variables related with the study performance) and was extended by the inclusion of entrepreneurial self-efficacy, entrepreneurial intentions, self-management and future time perspective. After a forward stepwise method the following multiple regression model was selected:

Table 5: Multiple regression model of the evaluation scores of the learning by doing programs

Variable	β	t	p	Tolerance
Type 'learning by doing'	2.851	9.712	<.001	.992
Self-management	1.000	3.731	<.001	.964
Gender	-0.806	-2.931	.004	.968
Constant	8.569	8.753	<.001	

The explained variance of the evaluation scores was 44.6% (R=0.668, F=43.757, p <.001). Multicollinearity problems were avoided by the high values in the collinearity diagnostics. First of all the evaluation scores were related to the type of learning by doing program. The average score for the students of the bachelor in Business Science was 14.43 (SD=1.399, N =118) and for the students of the academic bachelor in Business Administration 11.37 (SD=2.593, N =30). These differences were explained by the evaluation systems which in the case of both study programs were different. Also a well-known gender effect was spotlighted. The average evaluation score 14.37 (SD 1.753, N =63) of female students was significantly higher than the average evaluation score 13.40 (SD 2.248, N =85) of male students.

5. Discussion

The first part of the general research question is: Can'learning by doing' programs increase entrepreneurial self-efficacy and entrepreneurial intentions? Results indicate that the programs increase the self-efficacy significantly but results also show a slight and not significant increase in the entrepreneurial intentions.

The increase in entrepreneurial self-efficacy after following an educational programis in accordance with existing literature (BarNir, Watson and Hutchins,2011).

The second part of the general research question is: what is the relationship between entrepreneurial self-efficacy and intentions on the one hand and personal variables, socio-economic variables and educational background on the other hand?

The fact that the educational data had no effect is in line with expectations because learning by doing programs require other competencies than traditional courses.

From the different dimensions of the Big Five model, Openness to Experience and Conscientiousness had a positive correlation with entrepreneurial self-efficacy and Agreeableness had a negative correlation with this self-efficacy. These results are in accordance with the results of Zhao et al (2006) that entrepreneurs score higher on Conscientiousness and Openness to Experience and lower on Agreeableness.

They also reported that entrepreneurs scored lower on Neuroticism, while our results showed no correlation between Neuroticism and entrepreneurial self-efficacy (Zhao et al, 2006).

There was a gender effect on self-efficacy. Wilson, Kickul, and Marlino (2007) also reported that females showed significantly less entrepreneurial self-efficacy than males.

The significant reduction in the variable future time perspective was an important negative effect of the learning by doing programs. Perhaps the time schedule of the learning by doing programs made this effect clear. Most of the students in this survey graduated after the learning by doing program and obtained during the internship real job perspectives. The demand on the labour market for these economic students was very promising. Therefore the short-term need for the students to plan their future career steps was less urgent at the end of the internship. Because the variable self-management appeared in the regression model of the evaluation scores and not the variables related to the student's performances in the past, this observation gave evidence that in the evaluation process of the learning by doing programs other skills and attitudes than those used in a traditional evaluation system are being examined. It was already clear from the literature that the relationship between self-efficacy and entrepreneurial intentions and other personal and environmental variables is very complicated and needs further investigation.

The current study certainly has some limitations, such as the impossibility of working with a control group. It would be interesting to check whether the entrepreneurial self-efficacy of participants following traditional courses is also enhanced. Further research could also investigate whether the increase in entrepreneurial self-efficacy is maintained for a long time. Although this study involves an important step, further research is needed to more deeply unravel the complicated, but intriguing process of stimulating entrepreneurship in educational settings.

References

Bandura, A (1986) Social foundations of thought and action. A social cognitive theory, Englewood Cliffs NJ:Prentice-Hall.

Bandura, A. (1997)Self- efficacy: the exercise of control, New York:Freeman.

BarNir, A., Watson, W. and Hutchins, H. (2011) "Mediation and moderated mediation in the relationship among role models, self-efficacy, entrepreneurial career intention, and gender",Journal of Applied Social Psychology, Vol41 No.2, pp 270-297.

Chen, C., Greene, P. and Crick, A. (1998) "Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?",Journal of Business Venturing, Vol13, pp 295-316.

Commission of the European communities. (2003) "Green Paper. Entrepreneurship in Europe", Brussels: Enterprise Publications.

Ertuna, Z. andGurel, E. (2011) "The moderating role of higher education on entrepreneurship", Education + Training, Vol53 No.5, pp387-402.

Husman, J. and Shell, D. (2008) "Beliefs and perceptions about the future: a measurement of future time perspective", Learning and Individual differences, Vol18, pp 166-175.

Kauffman, D. andHusman, J. (2004) "Effects of time perspective on student motivation: introduction to a special issue", Educational Psychology Review, Vol16, No.1, pp1-7.

Kolvereid, L. (1996) "Prediction of employment status choice intentions", Entrepreneurship theory and practice, pp 47-57.

Oosterbeek, H., Van Praag, M. and IJsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. European Economic Review, Vol54, pp442-454.

Shell, D. and Husman, J. (2001) "The multivariate dimensionality of personal control and future time perspective beliefs in achievement and self-regulation",Contemporary educational Psychology, Vol26, pp481-506.

Souitaris, V., Zerbinati, S. and Al-Laham, A. (2007) "Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources",Journal of Business Venturing,Vol22, pp566-591.

Stewart, R. (2007) "Investigating the link between self-directed learning readiness and project-based learning outcomes: the case of international Masters students in an engineering management course", European Journal of Engineering Education, Vol32 No.4, pp453-465.

VanEmmerik, IJ., Jawahar, I. and Stone, T. (2004)"The relationship between personality and discretionary helping behaviors", Psychological Reports, Vol95, pp355-365.

Wilson, F., Kickul, J. andMarlino, D. (2007) "Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: implications for entrepreneurship education",Entrepreneurship Theory and Practice, pp 387-406.

Zellweger, T., Sieger, P. and Halter, F. (2011)"Should I stay or should I go? Career choice intentions of students with family business background", Journal of Business Venturing, Vol 26, No.5, pp 521-536.

Zhao, H. and Seibert, S. (2006) "The Big Five personality dimensions and entrepreneurial status: a meta-analytical review", Journal of Applied Psychology, Vol91,No.2, pp259-271.

Zhao, H., Seibert, S. and Lumpkin, G. (2010) "The relationship of personality to entrepreneurial intentions and performance: a meta-analytical review", Journal of Management, Vol36,pp 381-404.

Nanotechnologies and Eco-Innovation: Creating a Regulatory Framework for Sustainable Markets

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Abstract: The eco-innovation as a field of research is often ascribed to Fussler and James 1996). OECD and Eurostat (1999) defined eco-activities as 'activities that produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems'. Within this framework, Rennings (2000) argues that eco-innovations are distinctive by three elements: "the double externality problem, the regulatory push/pull effect and the increasing importance of social and institutional innovation" (2000:319). In this contribution, we aim at illustrating the strategies that entrepreneurs can develop to face these challenges. The case that illustrates this is the nanotechnology one, which possesses all three characteristics. Building on the current literature in entrepreneurship (Shane (2003), Casson (2005), OECD (2009)), we argue that entrepreneurs are not only discoverers and inventors but that they are also evaluators and exploiters of opportunities. In this sense, they may also contribute to the transformation or elaboration of market structures in order to enable innovations to find their place. Doing so, they take the role of institutional entrepreneurs: they mobilize resources to modify the institutional context in which they operate in order to suit their interest (Auplat 2009, Delemarle 2007, DiMaggio 1988). Using Callon's concept of framing and overflowing (1998) to better understand market structure, we argue that some elements in nanotechnologies cannot be handled by the existing structure of the market. They are externalities that overflow. These externalities that are linked to sustainable development issues give opportunities to entrepreneurs to act strategically, to act as institutional entrepreneurs by organizing new frameworks or reorganizing old ones to favor the development of a sustainable market. We argue that two types of strategies are possible for them: (1) Developing new frameworks to face the overflowing. The cases of code of conducts or voluntary standards are examples of such strategies; (2) Mobilizing elements of existing but unconnected structures and rearrange them into a coherent normative structure which can be recognized by all stakeholders as that in which the market can develop. Indeed the overflowing might have already handled by another industry framework. Our paper is organized in the following manner: we first review specificities of radical innovations and introduce Callon's concept. We then point to the specificities of nanosciences and technologies and present existing frameworks. We then discuss them and present our argument.

Keywords: nanotechnology, nanosciences, market shaping, entrepreneur, sustainable market, regulation

1. Introduction

Nanotechnology is defined as "the design, characterization, production and application of structures, devices and systems by controlling shape and size of the nanostructued components" (ISO, 2007). It is actually an umbrella term that encompass science and technologies at the "size range [of] typically between 1nm and 100nm" (ISO, 2007). At the atomic level, matter is said to have specific properties which today scientists start to control to produce enhanced products and create new ones. The societal benefits expected like providing renewable energy, clean water, and improving the environment or human longevity and health led to a period of hype. The global market for nanotechnology products is expecting to reach 3 trillion USD in 2015 (OECD, 2009, Lux Research Inc., 2007). Today, some products are already on the market such self-cleaning glass or textiles, reinforced tires or bumpers, cements or paints with particular properties, cosmetics and healthcare products, food, beverages, electronic components etc. However, after the withdrawal of nanotechnology based products from the market, firms have been reluctant to put on the market new products using the properties of the matter at the nanoscale. We argue that markets are not yet framed for these new types of products and that markets need to be organized. One may argue that some products encapsulating nanomaterials are already on the market (the Wilson Woodrow Centre inventories in 2011 1317 products). However, we argue that these products do not question the boundaries of existing markets: On the contrary, other products could not prove on the long term the non-toxicity of the nanomaterials on the environment or on human health. They are in Abernathy and Clark's definition (1985), architectural products: they are disruptive both in terms of technologies used for the producers and in terms of acceptability and use for the consumers. Such examples show that

markets are not sustainable. These and the existing lack of structuration of markets may lead to a period of disillusion which can repel investors and hinder the future of the industry, leading to an unsustainable future.

We are here interested in the conditions for creating a sustainable market for radically new products such as nanotechnology ones, and our hypothesis is that the entrepreneur plays a fundamental role in it. Building on the current literature in entrepreneurship developed (Shane (2003), Casson (2005), OECD (2009)), we consider not only the entrepreneur as discoverer and inventor but also as an evaluator and exploiter of opportunities. We postulate that the entrepreneur contributes to the transformation or manufacture of market structures to enable innovations to find their place and it may well be part of designing a new regulatory framework for its products. Our concept of entrepreneurship is part of the theory of intrapreneurship (Basso 2004, Pinchot and Pellman 1999) by expanding the scope of the business strategy (Kim and Mauborgne 2005, Christensen and Raynor 2003). In situations of uncertainty, the work of marketing is made more difficult because the markets are not structured to allow emerging products to find a place. We are working on the assumption that the contractor can act to facilitate the marketing of its products and it takes the role of institutional entrepreneur to change the institutional context in which it operates (Auplat 2009, Delemarle 2007, DiMaggio 1988).

Using Callon's concept of framing and overflowing (1998) to better understand market structure, we argue that some elements in nanotechnologies cannot be handled by the existing structure of the market. They are externalities that overflow. These externalities that are linked to sustainable development issues give opportunities to entrepreneurs to act strategically, to act as institutional entrepreneurs by organizing new frameworks or reorganizing old ones to favor the development of a sustainable market. We argue that two types of strategies are possible for them: (1) Developing new frameworks to face the overflowing. The cases of code of conducts or voluntary standards are examples of such strategies; (2) Mobilizing elements of existing but unconnected structures and rearrange them into a coherent normative structure which can be recognized by all stakeholders as that in which the market can develop. Indeed the overflowing might have already handled by another industry framework. Our paper is organized in the following manner: we first review specificities of radical innovations and introduce Callon's concept. We then point to the specificities of nanosciences and technologies and present existing frameworks. We then discuss them and present our argument.

2. Organizing markets

Architectural or radical innovations as they are called by Abernathy and Clark (1985) refer to two central dimensions (Noori et al. 1999, Colarelli O'Connor et al., 2001): (1) they generate uncertainty as to the uses of innovation (market side) and (2) they question scientific and technological capabilities to produce them (production side of science and technology). There is first in this definition the need for consumers to "learn these new products" that are satisfying needs not yet recognized as such or not expressed, and secondly, the development of scenarios by firms as a tool to manage uncertainty. Sociologists of innovation emphasized the need for actors to share their vision of the industry to others and to align around a vision of the future market (Callon, 1992, Rip et al., 2001). Courtney et al. (1997) in strategy point to several strategies to face uncertainties. Among the three strategies, we find shaping the market, taking options or following. The first one consist to impose one's preferred scenario, one's preferred vision of the market to others and using terms uses in sociology of innovation, it consists in aligning actors and creating coalitions.

Recalling the story of Edison, we can illustrate how, to impose its innovation, this entrepreneur acted to create the physical infrastructure to have it works: he demonstrated the use of its innovation, he organized the physical infrastructure in specific quarters before extending it, he convinced city majors to have the technical infrastructure set up etc. Thus following this way of reasoning, we support the idea that markets can be organized and that actors can develop strategies to do so.

We mobilize Callon's concept of "framing and overflowing" (1998, 1999). This concept is derived from the sociological use of the economic concept of externalities (Callon 1998 and 1999). The concept of framing was originally developed by Erwing Goffman (1971). Frame defines what counts for the actors engaged in a collective action. Thus the action of framing consists in defining what is important and what should be the focus of actions. It results also in understanding the externalities (that are not taken into account because there are outside of the frame): for Callon, it is these externalities that lead to the overflowing: indeed the frame as it is does not allow any more issues to be solved. An

external arena needs to be set up to take into consideration these externalities. Once done, a new frame is created as the externalities have been taken for granted. If we take an example, pollution is a negative externality engender by the production process. But until recently, it was not taken into consideration.

The overflowings lead to the development of new arenas in which frames are adapted. We show that the overflowing are deeply linked to sustainable development and that the three interconnected principles summarized by the Grundtland's report (1987) are those leading to the overflowing, offering new opportunities for new frameworks to be developed: environmental efficiency, inter and intragenerational social justice and participation in decision making.

We argue that these overflowings offer the possibilities for entrepreneurs to act towards creating sustainable market: i.e. they offer the possibility to take into consideration the externalities and to internalize them in a new frame. The frame can be re-created by modifying one or several of these to internalize the externalities. We will test this hypothesis with the nanoscience and technologies (NST) case study. We will show that they have specificities that induce to re-think the existing frames..

3. Specificities of nanoscience and technologies

3.1 An emerging field

Before describing the specificities of nanoS&T, one need to acknowledge that it is still an emerging field, although actors try to move from exploration to exploitation (March, 1991). Delemarle et al. (2010) show an explosive growth, with a rate of growth of 14% per year, when the average growth of publications accounted for by the Web of Science is 3% or when Human Genetics (an emerging field in the 1990's) showed a rate of growth of around 8% (OST,2003). This explosive growth is however not fully mirrored in patents: they argue that after an initial anticipation of rapid market development, a plateau in the application appear in 2006. They explain this by saying that exploration still prevails.

3.2 1st specificity: A trans-sectorial technology

NST do not materialize in a single industry. Taking into consideration the patenting activity of the largest R&D industry players shows, Laredo et al. (2010) show that a majority of the world largest R&D players (as accounted for by the DTI scoreboard) are involved in nanotechnologies, covering all fields from electronics to food (see also Auplat (2011)).

3.3 2nd specificity: A global phenomenon

Second, the development of NST is a global phenomenon that breaks the frontiers of past S&T developments. New players, beyond the triadic countries, are active with Asia and most specifically China growing in importance over the years. Delemarle et al. (2009) show that 85% of all nano scientific publications are localized in only 200 clusters. Thus, NST not only involve actors in various industries, they involve actors all throughout the world. The most dynamic clusters (with the highest rate of growth over the period 1996-2008), are all but 2 located in Asia; Europe and Americas being far behind Asia.

3.4 3rd specificity: Scientific and social uncertainties

Third, NST face strong uncertainties in terms of impacts on health and environment on the long term (Royal Society, 2004; Aitken et al., 2009; Defra, 2009). Indeed, particules at the nanoscale do not always have the same characteristics (chemical, electronical, physical, structural) than bulk material. So, each material need to be analysed and characterised.

They also generate societal uncertainties about nano 'acceptability' (e.g. Siegrist et al, 2007; Afuah, 1995). National public debates and social movements all over Europe showed the fear that nanotechnologies engender. Most of the consumers do not know what they are, since nanotechnologies is only an umbrella term bringing together many different technologies, innovations and thus issues.

These various elements make markets for nanotechnology-based products difficult to organize and not sustainable on the long run. We argue that entrepreneurs need to find new ways to put their

product on the market and that one of them is by shaping the framework to take these specificities (using Callon's terms, to some overflowing) into consideration:

- As NST are a global phenomenon, actors cannot only play at the national level.
- As they are trans sectorial, issues cannot be dealt with only at one industry level
- As they generate social and health issues, public policy makers and other actors who are not experts in the field need to be included in the process.

4. Regulatory frameworks

In this paper, we first present the existing mandatory frameworks (Table 1) that could be used as the basis for a nanotechnology market. We show how some overflowing happens and how actors are trying to develop new frameworks.

Table 1: List of frameworks

Mandatory Frameworks	
REACH, EU, 2006	No specific to nanomaterials although a NanoReach is planned in 2012
Novel Food Regulation, EU, 1997	No specific to nanomaterials
Cosmetic products Regulation, EU, 2009	Adaptation of existing regulation made specific for nanomaterials
Toxic Substances Control Act Inventory Status Carbon Nanotubes, US, 2008	Adaptation of existing regulation made specific for nanomaterials
Federal Insecticide, Fungicide, and Rodenticide Act, US, 1996	Adaptation of existing regulation made specific for nanomaterials
DTSC chemical call-in: carbon nanotubes, US - California, 2009	Adaptation of existing regulation made specific for nanomaterials
The Manufactured Nanoscale Health & Safety Ordinance, US - Berkeley, 2006	Adaptation of existing regulation made specific for nanomaterials
OSH Framework Directive, EU, 1989	Adaptation of existing regulation made specific for nanomaterials
NIOSH Occupational Exposure to Titanium Dioxide, US, 2011	Adaptation of existing regulation made specific for nanomaterials
French Code de l'Environnement, France, 2010	Adaptation of existing regulation made specific for nanomaterials
Voluntary frameworks	
Voluntary Reporting Scheme for Manufactured Nanomaterials, UK, 2008	Creation
Nanoscale Materials Stewardship Program, US, 2008	Creation
UK Responsible NanoCode, UK, 2008	Creation
Nano Risk Framework, 2007	Creation
BASF Code of Conduct, 2007	Creation
EU Code of Conduct for Responsible Nanoscience & technology Research, 2008	Creation
Soil Association Organic Certification - Standard on Nanotechnology, UK, 2008	Creation
ISO TC 229, 2005	Creation

4.1 Mandatory frameworks

4.1.1 REACH, The Registration, Evaluation, Authorization And Restriction Of Chemical Substances - EC 1907/2006 – 2006

REACH is a comprehensive regulatory framework which was introduced by the European Commission in 2006 to replace some 40 existing legal acts and to create a single system for all chemical substances in Europe. Its main objective was to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances, and this included the plan to find substitutes for the most dangerous chemicals currently in use. Starting in June 2008 and before the deadline of June 2018, all firms that manufacture or import more than one tonne of a chemical substance per year are required to register it in a central database – the European Chemical Agency (ECHA). REACH is a general framework and it does not apply specifically to nanosubstances. REACH can in fact apply to substances produced or imported in volumes below 1 tonne per year if they are considered to be of very high concern. This means in

effect that risks from certain nanoscale substances could be addressed through REACH if they were identified as being “substances of very high concern” as defined in Article 57. Moreover, a general review of the scope of REACH (NanoREACH) including a review of the specific information requirements was planned for 2012.

4.1.2 Novel Food Regulation EC 258/97– 1997

This European regulation laid out rules for the authorisation of novel foods. “Novel foods” are foods and food ingredients that have not been used for human consumption to a significant degree within the European Community before 15 May 1997. Companies that want to place a novel food on the EU market need to submit their application in accordance with Commission Recommendation 97/618/EC that concerns the scientific information and the safety assessment report required.

4.1.3 Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products – 2009

This law includes a review of the safety of nanomaterials and will take effect in July 2013. All cosmetic products will be subject to a safety assessment and to a premarket notification and approval procedure. A new and important feature of the regulation is that in order to establish clear responsibilities, every product must be linked to a "responsible person" who is responsible for ensuring compliance with the regulation, and who must keep a product information file for a period of 10 years after the date when the last batch of the cosmetic product was placed on the market. The regulation also requires traceability of a cosmetic product throughout the whole supply chain, as well as clear labelling including the name and address of the responsible person, and the presence of all ingredients containing nanomaterials, with their names followed by (nano).

4.1.4 Toxic Substances Control Act Inventory Status of Carbon Nanotubes [EPA-HQ-OPPT-2004-0122; FRL-8386-6] – 2008.

The US Toxic Substances Control Act (TSCA) regulates all chemical substances. However, since the passing of the TSCA Inventory Status of Carbon Nanotubes in 2008, some nanomaterials have been considered as specific chemical substances and are therefore subject to special regulation. It requires manufacturers and importers of some new chemical Carbon Nanotubes to conduct specific toxicity tests and to notify the Environmental Protection Agency (EPA) 90 days prior to their manufacture or import for commercial purposes. These substances are considered new chemical substances because they are not listed on the TSCA Inventory of chemical substances in commerce. The EPA’s decision whether a substance is a “new” chemical is based on its molecular identity. If a chemical substance has a different molecular formula or the same molecular formula but with different arrangements of atoms or isotopes, then it is considered a new chemical substance.

4.1.5 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) –1996.

Under this US federal regulation, all pesticides distributed or sold in the United States must be registered by the EPA. Before EPA may register a pesticide under FIFRA, the applicant must show, among other things, that using the pesticide according to specifications "will not generally cause unreasonable adverse effects on the environment." The EPA ruled in 2006 that the Samsung silver ion generating washing machine, which released nano silver ions into wash water, was subject to registration requirements under FIFRA because it incorporated a substance intended to prevent, destroy or mitigate pests, and was therefore considered a pesticide. Under the registration requirement, manufacturers must provide evidence that the use of nanosilver will not cause harm to man or the environment.

4.1.6 DTSC chemical call-in: carbon nanotubes – 2009

This notice emanated from the California Department of Toxic Substances Control and had a local area of application: Manufacturers and importers of carbon nanotubes in the state of California had to register their products and provide toxicity data and other information by the end of January 2010. The law placed the responsibility to provide the required information on the manufacturers or importers of the chemicals.

4.1.7 The Manufactured Nanoscale Health and Safety Ordinance. Section 15.12.040 Berkeley City Council Ordinance - 2006

This municipal ordinance was passed in 2006 by the city council of Berkeley, California, and was the first case in the world of mandatory regulation specifically targeted at nanotechnologies. It amended existing health and safety rules to demand a full toxicological report from all facilities manufacturing nanoparticles. "All facilities that manufacture or use manufactured nanoparticles shall submit a separate written disclosure of the current toxicology of the materials reported, to the extent known, and how the facility will safely handle, monitor, contain, dispose, track inventory, prevent releases and mitigate such materials."

4.1.8 Council Directive 89/391/EEC – 1989

In the EU, the protection of workers is covered by Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work. The regulation was set up in 1996 to deal with European Occupational Health and Safety issues. This framework states clearly that employers must take adequate measures to protect the health and safety of their employees, including exposure to toxic particles, but does not contain any specific provision on nanotechnologies.

4.1.9 NIOSH CIB 63 On Occupational Exposure to Titanium Dioxide – 2011

NIOSH serves to develop and establish recommended occupational safety and health standards, and this involves describing exposures that are safe in relation to various periods of employment. These recommendations are then used by the federal agency to legislate. NIOSH produced a recommendation directly targeted at nano-sized chemicals. Its Current Intelligence Bulletin (CIB 63) on occupational exposure to nano TiO2 concluded that there was concern about the potential carcinogenicity of airborne ultrafine and engineered nanoscale TiO2 and that workers' exposure controls should be as low as possible. NIOSH recommendations are non-binding, and should therefore be listed under the voluntary initiatives. However, they can be seen as an initial step to mandatory regulation enacted by OSHA, which is why CIB 63 was considered a landmark in nanotechnology regulation.

4.1.10 French Code de l'environnement, livre V titre II, Chapitre III, (Articles L523-1 to L523-5) – 2010

According to this text, manufacturers, importers or distributers of nanoparticulates must inform relevant authorities, and provide information about the substances involved. The information relates to intended use of substance, quantities involved, identity of the professional users, and danger relative to exposure in terms of health or of environmental risks. The data provided can be made available to the public.

4.2 Voluntary frameworks

4.2.1 The Voluntary Reporting Scheme for Manufactured Nanomaterials (VRS)

VRS was set up in the UK in 2006 as a temporary experiment. It was run by the Department for Environment, Food and Rural Affairs. The scheme aimed to provide an indication of the kinds of nanomaterials currently in development and production to help inform policy-making decisions and to focus efforts and funding on areas which were relevant to the UK's current nano manufacturing and research base. The program asked for data that could be provided on manufactured nanomaterials from anyone involved in the manufacture or use of engineered nanomaterials, or anyone involved in nanoscience research or managing wastes consisting of engineered nanoscale materials. The program included regular updates to assess its implementation.

4.2.2 The Nanoscale Materials Stewardship Program (NMSP)

In 2008 the US EPA launched NMSP, a voluntary reporting scheme covering engineered nanoscale materials manufactured or imported for commercial purposes. The NMSP program invited interested parties to participate in a "basic" program by submitting existing data on the engineered nanoscale materials they manufactured, imported, processed, or used. The EPA also invited interested parties to participate in an "in-depth" program to test engineered nanoscale materials they manufactured,

imported, processed, or used. This scheme was expected to receive contribution from 180 companies.

4.2.3 The EU Code of Conduct for Responsible Nanoscience and Nanotechnology Research

The EU Code of Conduct for Responsible Nanoscience and Nanotechnology Research (European Commission, 2008). Based on the precautionary principle, this voluntary code covered seven general principles, including sustainability, precaution, inclusiveness, and accountability. Its main goal was to help research institutes, universities, and companies in the EU ensure the safe development and use of nanotechnologies in the face of knowledge gaps and uncertainties about the future impact of these technologies on human health and the environment.

4.2.4 The UK Responsible NanoCode

The UK Responsible NanoCode, released in 2008, was a joint production of several bodies including an asset management firm (Insight Investment) and a trade association (Nanotechnology Industries Association) as well as a research institution (The Royal Society) (Royal Society et al., 2008). The project had started in 2006 and aimed to explore the societal and economic impacts of the technical, social and commercial uncertainties related to nanotechnologies. The Responsible NanoCode had seven principles. It aimed to establish a consensus of what constituted good practice across the nanotechnology value chain so that businesses could align their processes with emerging good practice and form the foundation for the development of indicators of compliance.

4.2.5 The NanoRisk Framework

The Nano Risk Framework is a coproduction of industry the chemical company DuPont and the environmental group Environmental Defense. Their objective was “to help answer questions an organization should consider in developing applications using nanomaterials, including providing a way to address areas of incomplete or uncertain information using “reasonable assumptions and appropriate risk management practices””(Environmental Defense and DuPont, 2007). The framework included guidance on how to communicate information and decisions to stakeholders. One year after its launch, the NanoRisk Framework was available in French, Mandarin and Spanish and DuPont made the framework mandatory for all its nanotechnology work.

4.2.6 The BASF code of conduct

The first BASF introduced in 2007 a specific code of conduct for nanotechnologies. Based on principles of responsible management, the code had four commitments detailing the company’s approach.

4.2.7 The Soil Association Organic Certification - Standard on Nanotechnology

In 2008, Soil Association Certification Ltd became the first organization in the world to ban man-made nanomaterials from its certified organic products. Under the Soil Association standard, organic producers and processors must not use ingredients containing manufactured nanoparticles, where the mean particle size is 200nm or smaller, and the minimum particle size is 125nm or smaller. In 2011, the application of the Soil Association Logo concerned mainly cosmetics, food and clothing.

4.2.8 The ISO technical committee on nanotechnology

There is a multiplicity of standards today providing technical standards at the national and regional level. We will here for the sake of the argument only consider the activities of International Standardization Organization Technical Committee (ISO TC) 229 on nanotechnologies. Created in 2005, the ISO TC 229 is organised in four working groups: WG 1- Terminology and Nomenclature; WG 2- Measurement and Characterization; WG 3- Health, Safety, and Environment; WG 4 - Material Specifications.

The committee gather representatives from about 40 member countries from all over the world (including many members from Asia and delegates from Mexico, Brazil, and South Africa for instance). It is based on consensus so each project is subject to ballot. The TC also settled up two permanent task groups: one of sustainable development aiming at favouring the development of technological standards linked to sustainable technologies; one on societal dimensions of

nanotechnologies aiming at taking all aspects linked to the development of nanotechnologies into consideration including ethics and representations.

4.3 What does it tell us?

The specificities of NST limit the impact of mandatory regulation as it is: indeed globalisation on R&D activities as well as globalisation of markets lead to the impossibility for one country to regulate the emerging field. Although mandatory regulation is developing as we showed and is adapting to nano, pressures linked to sustainable development favoured the development of voluntary regulations : first; codes of Conduct first focus on showing that business is favouring a responsible and more transparent approach. the second receiving the much attention today is standardisation most notably within ISO. ISO is based on consensus and on expertise (even thought it has been criticized for its openness). These two elements give it legitimacy at the international level. On the contrary codes of conducts have been developed locally by a few actors who wanted to take into consideration social concerns, but they have not be taken up broadly. However, all of them result from the need to link culture, structure and technology. We argue that it is the overflowing that could not be dealt within the existing frames (existing sectorial and mandatory regulation) that led to the development of such voluntary frameworks. They are new frameworks that become important in the governance of NST. They come to complement existing frameworks that are trying to be adapted to face NST challenges. This gap offers the possibilities for strategic entrepreneurs to develop new frameworks and to try to have them become part of the regulatory frameworks (they are thus institutional entrepreneurs). We can consider here the work by Dupont and Environmental Defense which we recall earlier. The project developed when then taken up by the ISO TC 229 within WG 3 on health, safety and environmental issues. By developing such frameworks and having them adopted broadly, entrepreneurs can keep a lead over their competitors. Governance can thus also be promoted by entrepreneurs who want to act strategically under conditions of uncertainties.

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References

Abernathy and Clark. 1985. Innovation: Mapping the winds of creative destruction. *Research Policy* 14: 3-22

Auplat, C. 2009. 'Nanotechnology and institutional change: The co-industrial and institutional emergence of nanotechnology as a demonstrative case of a new form of institutional entrepreneurship.' *Innovation and Entrepreneurship Centre:* London: Imperial College Business School.

Auplat, C. 2009. Toward an integrated theory of entrepreneurial cognition: Exploring the interplay of entrepreneurship and institutional entrepreneurship. *International Journal of Entrepreneurship and Small Business* 9(3): 308-323.

Basso, O. 2004. *L'intrapreneuriat.* Economica.

Casson, M. C. 2005. 'The individual-opportunity nexus: a review of Scott Shane: a General Theory of Entrepreneurship.' *Small Business Economics,* 24, 423-30.

Casson, M.C. 1990. *Entrepreneurship*, Aldershot: Edward Elgar Publishing.

Delemarle, A. 2007. 'Les leviers de l'action de l'entrepreneur institutionnel: le cas des micro et nanotechnologies et du pole de Grenoble.' *Ecole Doctorale Entreprise Travail Emploi, Laboratoire Techniques, Territoires et Sociétés: 235. France: Ecole nationale des ponts et chaussées.*

DiMaggio, P. J. 1988. 'Interest and agency in institutional theory.' In L. G. Zucker (Ed.) *Institutional patterns and organizations: Culture and environment:* 3-22. Cambridge, Massachusetts: Ballinger.

Fussler, C. & James, P. 1996. *Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability.* London: Pitman Publishing.

Kim, W. C. & Mauborgne, R. 2005. *Blue ocean strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant* Harvard Business School Press.

Laredo P., E. Jolivet, E. Shove, C.E. Garcia, E. Moors, P. Penan, B. Poti', S. Raman, A. Rip and G.J. Schaeffer (2002): *Final Report of the SOCROBUST Project*, (supported by the EU TSER Programme) in www.ensmp.fr.

Larédo, P., Delemarle, A. et Kahane, B., 2010. Dynamics of Nano S&T: policy implications. *STI Policy Review*. Vol.1, No1, Spring 2010

Larédo, P., Rieu, C., Villard, L., Kahane, B., Delemarle, A., Genet, C., & Mangematin, V. 2009. Emergence des nanotechnologies: Vers un nouveau "modèle industriel"? In P. Laredo, J.-P. Leresche, & K. Weber (Eds.): 393: PPUR Presses Polytechniques et Universitaires Romandes.

Lux Research Inc. 2007. *The Nanotech Report, 5th edition*.

OECD & Eurostat 1999. 'The Environmental Goods and Services Industry - Manual for Data Collection and Analysis ' *OECD Publishing*, 68.

Pinchot, G. & Pellman, R. 1999. *Intrapreneuring in Action: a Handbook for Business Innovation.* San Francisco, CA: Berret-Koehler Publishers Inc.
Pitelis, C. (Ed.). 2002. *The Growth of the Firm: The Legacy of Edith Penrose*: Oxford University Press.
Rennings, K. 2000. 'Redefining Innovation - Eco-innovation research and the contribution from ecological economics.' *Ecological Economics,* 32:319-332.
Shane, S. 2003. *A General Theory of Entrepreneurship*. Cheltenham: Edward Elgar Publishing Limited.

The Management of Waste and Sustainable Development as Eco-Innovation and Source of Performance

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Abstract: This idea of eco-innovation is fairly recent. One of the first appearances of the concept of eco-innovation in the literature is in the book by Fussler and James (1996). In a subsequent article, James (1997) defines eco-innovation as ' new products and processes which provide customer and business value but significantly decrease environmental impacts '. Eco-innovation boosts economic growth whilst protecting the environment and can be a source of competitive advantage for an established firm? We consider how the device of Participative innovation (Telgborg, 2010; Durieux, 2000; Everaere, 1996) interacts with the development of eco-innovations. This form of innovation emanates from a desire at the head of the company not to book innovation to a few specialists, but to spread it among all company employees. Our question is as follows: How the management of waste and sustainable development can be a source of innovation and performance? We consider here the case of the SNCF Company and more particularly the device of Participative Innovation (PI) which can lead innovativeness towards eco-innovations. Its aim is to involve all stakeholders of the company in search of innovations, both in terms of products and services. Our interest in this research is how the SNCF company can successfully meet the challenges ahead concerning the management of waste and sustainable development as a source of innovation and performance in a context of opening of its market and competition. In this single case study, we access all different sources of data: documentation, archival records, interviews, direct observation, participant observation, and physical and cultural artefacts. More recently, the concern of sustainable development stakes have impulsed innovativeness towards the management of waste and sustainable development. We will prove through the development of several innovations - for instance noise reduction, green technology concerning high speed train compressor - in the case of the SNCF company how the management of waste and sustainable development is a source of innovation and performance.

Keywords: sustainable development, eco-innovation, waste management, performance, participative Innovation, SNCF (société nationale des chemins de fer français)

1. Introduction

Faced with international competition, economic, social and environmental crisis, innovation is a key to business development and eco-innovations. This context strives firms to integrate these new issues into their strategies. The European Commission defines sustainable development as " the voluntary integration, by enterprises, of social and environmental concerns in their business operations and their relationships with their stakeholders " (European green book, july 2001). The brand of clothing H & M for example launched in 2011 a collection of eco-friendly clothing made from organic cotton, Tencel ® and recycled polyester.

Hawken (1995 : 21) asks : can we create profitable businesses that grow without destroying, directly or indirectly, the world around them ? Integrating principles of sustainable development seems to be inevitable for companies today. But how to crystallize its diverse and sometimes conflicting issues is in question within companies?

In fact, to develop eco innovation can be leverage for savings and sustainable development. Eco-innovations can be considered as commercial application of knowledge to develop direct or indirect ecological improvements. Eco-innovation is a term used to describe products and processes that contribute to sustainable development. It is often used to describe a range of related ideas, from environmentally friendly technological advances to socially acceptable innovative paths towards sustainability. First, we will develop our theoretical framework with the questions of the management of waste and eco-innovation versus performance, some points on Participative innovation and innovation and the context of a bureaucratic structure such as the SNCF company before we formulate our research question. Then, we will focus on Participative Innovation (PI) in the context of SNCF[1] company as far as the management of waste and sustainable development in eco- innovation

[1] SNCF means « Société nationale des chemins de fer français ». It is the national railways company in France. It has a long history that began in 1938 with the merge of five private companies and two public networks. In1983, it became a public industrial and commercial enterprise (EPIC).

are concerned. We will develop the design of research. And last, we will present our analysis and results.

2. Theoretical framework of our research

2.1 The management of waste and eco-innovation versus performance

Sustainable development can be a catalyst for new ideas. Sustainable development is now a general consensus at least in discourses in the business world. Most firms just develop a « defensive » sustainable development (Porter and Kramer, 2006).

This idea of eco-innovation is fairly recent. One of the first appearances of the concept of eco-innovation in the literature is in the book by Fussler and James (1996). In a subsequent article, James (1997) defines eco-innovation as 'new products and processes which provide customer and business value but significantly decrease environmental impacts'. To develop eco-innovations can be a source of competitive advantage.

Eco-innovation is the commercial application of knowledge to develop direct or indirect ecological improvements. It is often used to describe a range of related ideas, from environmentally friendly advances to socially acceptable innovative paths towards sustainability.

We consider the articulation of the concepts sustainable development and eco-innovations and performance. In companies, performance has long been a one-dimensional concept, " measured by profit alone " (Saulquin and Schier, 2008). This vision of performance considers that the company must be managed to maximize the value created for shareholders.

Environmental challenges have increased in an environment plagued by the economic crisis, inequalities and pollution. The profit motive and the quest for legitimacy lead companies to give a growing interest in these issues.

Sustainable development is notably one of the concepts used by most organizations. It is defined as "development that meets the needs of the present without compromising the ability of future generations to meet theirs." (Brundtland report, 1997). These issues are reflected in the concept of Corporate Social Responsibility (CSR). The European Commission in july 2001 defines CSR as " the voluntary integration, by enterprises, of social and environmental concerns in their business operations and their relationships with their stakeholders ". Nevertheless, sustainable development remains a key challenge for companies. According to Wolff (2008 : 141), it questions " a form of ideal consensus to pass the concerns of two conflicting value systems : the logic of market expectations and moralists of civil society. "

More recently, the concern of sustainable development stakes have impulsed innovativeness towards the management of waste and sustainable development.

2.2 Some points on participative innovation and innovation

The Participative Innovation devices seem to hold the interest of many companies nowadays (Lopez, 2003; Lacourcelle, 2002). Participative Innovation covers very different realities. Let's define what we mean by Participative Innovation. Others before us have been interested in this subject. Durieux (2000) defines Participative Innovation as proposed innovation by actors of the company different from their missions. It concerns employee driven innovation. More comprehensive than the suggestion, this type of innovation involves active participation of the innovator throughout the development process. Everaere (1996) was also interested in Participative Innovation, which “emanates from a desire at the head of the company not to book innovation to a few specialists, but to spread it among all company employees. "

Teglborg (2010) points out that the dynamics of participative innovation is very sensitive to the " social climate " broadly : doubts about the sustainability of the organization, solidarity with the top management of all staff, can quickly break such a process dynamics. As specified by Innov’Acteur networks studied by Teglborg (2010) : " this device of Participative Innovation often takes the form of a structured management approach that aims to stimulate and promote the issue and the

implementation of ideas by all company employees to create added value and advance the organization. "

We complete this definition by Van de Ven's definition of innovation (1986) for whom "an innovation is first of a new idea. The idea of ' new ' can be a recombination of old ideas as long as the idea is perceived as new by the individuals involved. It is an innovation even if it may appear to others as an "imitation " of what may exist elsewhere. The innovation includes the development and implementation of new ideas by individuals who engage over time in transactions with others within an institutional order ".

By innovation, we do not necessarily mean radical innovation. We also consider incremental innovation or small, which introduces 'minor' changes to the existing product.

This idea of novelty can also be qualified because it depends on the perception of the people involved.

Methods to encourage the rise of ideas are varied. The theory of the "Idea Management " (De Bradandère, 2002) identifies four potential sources: customers, suppliers, employees and shareholders. Participative Innovation focuses on the "employees " source to develop the creative potential of individuals in an organization. Creativity is not due to chance.

We can wonder in the case of the SNCF company how the management of waste and sustainable development can be a source of innovation and performance in the context of Participative Innovation?

2.3 Research question and overview of the theoretical framework

To answer this question, we will use the strategic renewal framework which is often linked to evolutionary models of strategic change (Huff and al., 1992 ; Nelson and Winter, 1982). These models describe this process as a renewal of belief, action and iterative learning whose goal is to align organizational strategy with the changing elements of the environment (Huff and al., 1992 ; Johnson, 1988).

The conceptualization of Burgelman (1996) goes further. He explicitly adopts the framework variation - selection - retention resulting from evolutionary theory, by adapting the ecology population concepts (Aldrich, 1979; Hannan and Freeman, 1993) to the intraorganisationnel environment. An organization can escape the forces of environmental selection through a large enough variety of initiatives in the organization.

We will study in the case of SNCF how initiatives from employees may have developed through the participative innovation device and sometimes have a strategic significance concerning the management of waste and sustainable development as eco-innovation. The model of strategic renewal based on Floyd and Lane (2000) allows us to better understand the reasons for the evolution of strategic competence.

We will develop the sub-process of competence's definition in this model of strategic renewal according to Floyd and Lane (2000) in the following table 1.

Table 1: The sub-process of competence's definition in strategic renewal

	Description
Competence's definition	It is a sub-process that encourages experimentation with new skills and exploring new market opportunities. In Burgelman's term (1996), the definition of competence is the autonomous strategic behavior loop. A large variety of initiatives can be explored. After a gestation period, coalitions can be formed around a number of alternatives, some of them may be revoked as formal proposals (Narayanan and Fahey, 1982).

We do not focus in the two other sub-processes, such as modification of the competence and deployment of the competence because as far as our case study is concerned. We consider here the case of the SNCF company as a bureaucracy and more particularly the device of Participative

Innovation. Its aim is to involve all stakeholders of the company in search of innovations, both in terms of products and services. Our interest in this research is how the SNCF company can successfully meet the challenges ahead as well concerning the management of waste and sustainable development as a source of innovation and performance in a context of opening of its market and competition.

We will develop the case of PI in the context of this firm as far as it can help management of waste and sustainable development.

3. Participative innovation (pi) in the SNCF company

3.1 The strategic context and the participative innovation as a source of eco-innovation in the SNCF company

In 1995, the European Conference of Transport Ministers held an international seminar to discuss the situation of railways transport in Europe, whose results were compiled in the publication " The railways, for what ? ".

In discussing development opportunities for the railways in the near future, Plassard (1995) argues that the railways are in a crucial period where the services to develop and those to stop must be defined. The European directive of 29th July 1991 led to the accounting separation of infrastructure and operations and to the creation of RFF (Réseau Ferré de France) in 1997. In this report, he stresses out in the coming years the important issue of management of waste and sustainable development. We present in figure 1 the main issues in the strategic context of the SNCF company.

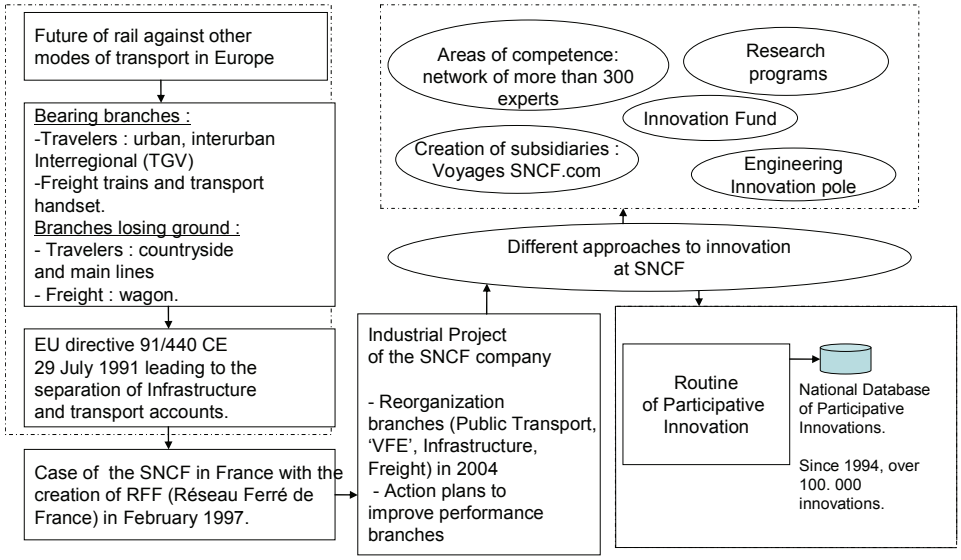


Figure 1: The strategic context and the participative innovation routine of the SNCF company

In 1996, the SNCF company to deal with these new regulations developed an Industrial Project seen as the strategic response. Different approaches to innovation have been launched by the SNCF company in recent years. The Participative Innovation device is not the only form of innovation launched by the SNCF company. We can note however that the research programs, the engineering of innovation are the responsibility of the Innovation and Research Department, including new missions in 2005 such as building and piloting a policy of innovation. The management of waste and sustainable development issues are part of the company's strategy.

Our research object deals with the comprehension of how Participative Innovation device can leads innovativeness towards eco-innovations and management of waste ?

3.2 The design of research

In this single case study, we have studied the evolution of the Participative Innovation for over twenty years. More recently, the concern of sustainable development stakes have impulsed innovativeness towards the management of waste and sustainable development.

The Participative Innovation in the SNCF company has a long history. Its roots go back to "suggestions" that have existed since the creation of the SNCF company in 1938.
In the Equipment departments, the creation of new tools and innovation on a daily basis were valued and included in repositories. We worked on retrospective accounts as well.

Our approach is interpretativist (Girod-Seville and Perret, 1999). We analyse a set of contextual elements to understand events over time. Indeed, we recognize to interpret the data to ensure consistency while it is clear that we strive to maintain the neutrality necessary for research. In this single case study, we use both the documentation, archival records, interviews, direct observation, participant observation, and physical and cultural artifacts. Our approach and our ties with the field allow us to access all these data sources as part of our case study of the SNCF.

After an initial investigation in 2004, we contractualised our presence in this company by a convention of study and research in 2005. We describe the different sources for this research (see table 2). As specified by Yin[2] (1990), a wide variety of archival sources may be useful.

Table 2: Sources of information on participative Innovation in the SNCF

Period	From 1994 to mid 2003	From mid 2003 to mid 2007
Data Archives (rules and procedures)	Yes	Yes
Computer databases of records Innovation	Yes	Yes until 2004
Retrospective accounts	Achievable	Made
Non-participant observation	No	Yes

In collecting and presenting data, we respected the criteria outlined by Yin (1990) to meet the requirement of scientificity.

The innovations issued from Participative Innovation we will develop in the next section are relevant as far as the management of waste and sustainable development issues are concerned. We had the opportunities to interview the different actors involved in the process of development of these eco-innovations.

4. Analysis and results

We will prove through the development of several innovations - for instance eco-innovation with light savings, noise reduction, green technology concerning high speed train (TGV) compressor - in the case of SNCF company how the management of waste and sustainable development is a source of innovation and performance. We first describe the content of three selected innovations that have a direct contribution concerning theses aspects. Then, we analyze how the role of some managers helped the innovator to develop in the context of this firm. These three cases of innovations that we will detail fall into a sub-process of creating strategic competence as far as management of waste or eco innovations are concerned.

4.1 The illustration with cases of innovation contributing to the management of waste or sustainable development

These three cases of innovations that we will detail below by their nature fall into a sub-process of creating strategic competence as far as management of waste or eco innovations are concerned. Following the EU directives, the SNCF as a large company has gradually incorporated this dimension of Sustainable Development (Plassard, 1995). Some innovations in fact contribute to develop the key success factors (Plassard, 1995) such as those defined in the strategic areas of Industrial Project of the SNCF. In this sense, the contribution of some innovations can be described as a comprehension

[2] According to Yin (1990), " an empirical research focuses on a contemporary phenomenon in a real context, the boundaries between phenomenon and context are not clearly identified and in which different sources of information are used ".

of how Participative Innovation device can leads innovativeness towards eco-innovations and management of waste? Through to this research, it was possible to identify several innovations in the context of SNCF through PI device concerning the management of waste or eco-innovations.
We first describe the content of three selected innovations that have a direct contribution concerning the management of waste or eco-innovations though PI device in the context of SNCF.

Case 1: Electricity savings in high speed trains.

When trains are stopped with no passengers inside, this innovation enables to have the lights down to spare electricity. This simple idea was produced because trains can stay without passengers for hours and because of the initial conception of these trains, all lights remain opened even if it is not necessary when empty.

Case 2: Reducing brake noise to meet prescribed standards of sustainable development.

The environmental compliance and minimization of noise are likely to give the rail a competitive advantage over road transport in a logic of sustainable development. The sounds of track brakes reach a level of noise that can be very high and hard to bear for agents as for people in the surrounding environment. In 2001, the idea of "slotting" the brakes emanated from a freight railways worker. This innovation can contribute to reduce noise pollution. It is inspired by adapting what is done in the automobile industry and in the motorbike universe. This innovation helps to reduce noise and improve working conditions. No alternatives had been identified before. It gives rise to the filing of a Soleau envelop in august 2002 and of a patent afterwhile. A Soleau envelope enables to protect a new idea before filing a patent.

Case 3: Dry compressors[3] to improve maintenance of TGV.

In the field of passenger transport, high speed trains constitute a strong strategic focus in the context of inter-regional transport. The level of investment for a high speed train is high and it is very important to have a fast and efficient maintenance and high speed train downtime as low as possible. At that time, beginning the idea, the regular supplier of compressors had delivery problems that could lead to shortages of parts and therefore of maintenance delays. This innovation is based on a new technology of dry piston compressors, which replaces the screw compressors. It allows to spare one day of maintenance operation in average because it is easier with this technology. In addition, this new technology allows positioning the dry compressors in tandem[4]. It makes them more manageable and reduces the frequency of breakdowns. Finally, this new technology fits into the logic of sustainable development of the SNCF. This innovation has led to a patent. This idea was proposed in a context where exactly this company was facing difficulties in maintaining TGV compressors and no solution had yet been identified by anyone. These three innovations contribute to strategic issues as described in table 3.

Table 3: Three examples of participative innovations contributing to the strategic issues of SNCF concerning eco-innovation and management of waste

Name and innovation's description	Contribution to **eco-innovation and management of waste as strategic issues of SNCF**
Electricity savings in high speed trains	- Cost control for high speed trains, - Management of waste, - sustainable development.
Dry-running compressors for high speed trains	- Quality of service (reliability) and cost control for the maintenance of TGV (strategic issue), - ' green engine ' : sustainable development. - Patent
Noise reduction of rail brakes	- Improvement of working conditions, - Reduction in noise pollution for the environment (sustainable development), - Patent.

[3] Compressors on the TGV produce the necessary air to the brakes and also control systems for opening and closing doors.
[4] The compressor unit is usually replaced by two small independent compressors and more manageable to maintain 75% power in case of failure of one of them, which avoids the immediate return of the TGV in workshop.

There are therefore Participative Innovations that contribute to the strategic issues of the SNCF and that solve key problems that had not yet solved by other approaches. Some ideas of innovations can become part of an exploratory research projects to further the validity of the idea and other potential development even if it is relatively exceptional. These cases of innovations can be analysed through the sub-process of creating strategic competence concerning management of waste and eco-innovations. Some managers can have a key role in the development of these innovations, which is exposed in the next section.

4.2 The roles of stakeholders groups in the sub-process of defining competence

In table 4, we analyse for two innovations described above the sub-process of defining strategic competence followed regarding the roles of different stakeholder groups. The example of case 1 is not developed because it was not possible to encounter the different actors in this process.

Table 4: The roles of stakeholder groups in the sub-process of defining competence for two cases of innovation

The roles of different stakeholder groups	Analysis of observed innovations
The decisions to acquire new assets or new skills are taken at the operational level by managers who are experimenting with new solutions to problems.	Case 2 : " At the time, starting from the idea, the regular supplier of compressors had delivery problems that could lead to shortages of parts and therefore of maintenance backlogs " Case 3 : As part of its mission agent's yard, an innovator had the idea of " slotting " the brakes ways to reduce noise.
Based on their knowledge of the strategic context of the organization, the middle-managers are able to assess the long-term implications of experiments, and they become advocates for the best opportunities to top management.	Case 2 : The rules have been prescribed at certain stages of development of innovation around by the team of innovators. In particular, they test their innovation on TGV trains in circulation even if no authority had been formally obtained. The development of this innovation took place over several years in a maintenance team.
Top managers have the most complete understanding of the strategic context, which allows them to assess the opportunities emerging from the organization and train new skills, in ratifying these initiatives that have the greatest potential for meeting the challenges future. When the available resources increase, the top management is able to redefine the formal strategy and pursue new opportunities and thus raise the level of basic knowledge.	Case 3 : The innovator was fortunate to be spotted by the Direction of Research and Innovation. Different supports were made available to the innovator in accordance with his superiors to develop this innovation. Case 2: This innovation has resulted in a patent application and should contribute to the development of an ecological driving called SNCF 'green driving'. Case 3. This innovation gives rise to the filing of a Soleau envelope in august 2002 and a patent in 2004. This innovation is part of the research program on noise reduction.

For each of these innovations emerging from actors without hierarchical position, middle management intervened to facilitate the development of innovation even if it thrived against prescribed practices. Before reaching the inversion of standards, innovation has to face the established order (Alter, 1995). It took in these cases several years before they can fully develop.

Haut du formulaire

To conclude, we show in this article that sustainable development and eco-innovations can serve the overall performance of the company.

We show through the examples chosen that these remarkable innovations linked with management of waste and eco-innovations and emerging from initiatives of actors without hierarchical position contribute to the development of strategic competencies for the SNCF company and its performance.

For each of these innovations the theoretical framework of strategic renewal (Floyd and Lane, 2000) allows us to show that middle management intervened to facilitate their development. These innovations went against prescribed practices.

This research highlights the interactions between middle managers and operators without hierarchical position and how this concern of sustainable development can be met.

The interest of the case of SNCF is multiple. We analyze in an interpretativist posture (Girod-Seville and Perret, 1999) the PI device in terms of sustainable development and eco-innovations management.

This type of approach for SNCF can more widely be interesting for companies facing the opening of their markets to competition. The development of their performance through a sustainable attitude, can be engaged through a system of participative innovation.

This research also has limitations. Thus, we do not consider here the specificities of each branch of the SNCF and the corresponding specific issues.

Finally, it might be fruitful to explore how participative innovation is particularly suited to develop the waste management and sustainable development from a wider perspective. In fact the employees are also citizens and as such they are sensitive to the future of the planet.

References

Aldrich, H.E. (1979), *Organizations and environments*, Englewood Cliffs, N.J.: Prentice-Hall.

Alter N. (1995) " Peut-on programmer l'innovation ? ", Revue Française de Gestion, mars-avril-mai, n°103, p.78-86.

Burgelman, R.A. (1996), A process model of strategic business exit : Implications for an evolutionary perspective on strategy, *Strategic Management Journal*, 17 (special issue), 193-214.

De Bradandère L. (2002) Le management des idées : de la créativité à l'innovation*,* Editions Dunod.

Durieux F. (2000) Management de l'innovation, FNEGE, Vuibert.

Everaere C. (1996) Des effets contrastés de l'encouragement à l'innovation pour l'innovation de service, 5è conférence de l'AIMS (Association Internationale de Management Stratégique), Lille, 21 p.

Floyd S.W. and Lane P.J. (2000) Strategizing throughout the Organization : Managing Role Conflict in Strategic Renewal, Academy of Management Review, 25 : 1, 154-177.

Fussler and James (1996) Driving eco-innovation : a breakthrough discipline for innovation and sustainability, Pitman PUB London and Washington DC, 364 p.

Girod-Séville M. and Perret V. (1999) " Fondements épistémologiques de la recherche ", in Thiétart R.A. and al.., *Méthodes de recherches en management*, Dunod, Paris, p.13-33.

Hannan, M.T. and Freeman J.R. (1993), Structural Inertia and organizational Change, *American Sociological Review*, 29, 149-164.

Huff, J.O., A.S. Huff et H. Thomas (1992), Strategic renewal and the interaction of cumulative stress and inertia, *Strategic Management Journal*, 13, 55-75.

Hawken, P. (1995), *L'écologie de marché*, éditions Le Souffle d'or.

James, P., 1997; 'The Sustainability Circle : a new tool for product development and design', *Journal of Sustainable Product Design,* 2, 52-57, http://www.cfsd.org.uk/journal

Johnson, G. (1988), Rethinking incrementalism, *Strategic Management Journal*, 9, 75-91.

Lacourcelle C. (2002), Il faut promouvoir l'Innovation Participative, *Entreprises et Carrières*, n°626 du 28 juin.

Lopez J.-G. (2003), L'Innovation Participative. Soutenir la créativité et l'initiative des salariés, *Entreprise et Carrières*, N°687, du 14 au 20 octobre.

Narayanan, V.K. and L. Fahey (1982), The micropolitics of strategy formulation, *Academy of Management Review*, 7, 25-34.

Nelson, R. and Winter S. (1982), *An evolutionary theory of economic change*, Cambridge, MA : Harvard University Press.

Normann R. (1971) " Organizational innovativeness : Product variation and reorientation ", *Administrative Science Quarterly*, 16, 2, 203-215.

Plassard F. (1995) A une nouvelle demande, un nouveau service, in CEMT, Conférence Européenne des Ministres des Transports, Des chemins de fer, pour quoi faire ?, Séminaire International, 19-20 janvier, 99-135.

Porter M.E. and Kramer M.R. (2006) Strategy and Society: the link between competitive advantage and corporate social responsibility, *Harvard Business Review*, December, 78-92.

Saulquin J.-Y. and Schier G. (2008) *Le développement durable et la notion de performance organisationnelle : une application à la GRH*, in Dion, M. and Wolff D. (dir.), *Le développement durable – Théories et applications au management*, éditions Dunod, 157-171.

Teglborg, A-C. (2010) Les dispositifs d'innovation participative. Vers une reconception réflexive à l'usage, *Thèse de doctorat* soutenue à l'Université Paris 1 - Panthéon-Sorbonne, IAE de Paris, le 6 décembre, 460 pages.

Van de Ven A. (1986) "Central problems in the Management of Innovation : implications for integration", Management Science, Vol. 32, 590-607.

Wolff, D. (2008) Du concept du développement durable à la notion de management durable, in Dion, M. and Wolff D.(dir.), *Le développement durable – Théories et applications au management*, éditions Dunod, 141-156.

Yin R.K. (1990) Case Study Research : Design and Methods, 6th printing, Newbury Park, CA, Sage. Zaltman G., Duncan R. and Holbek J. (1973) Innovation and Organizations, John Wiley, New York.

Motivations and Attitudes Towards Female Entrepreneurship: An Empirical Study in Western Romania

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Abstract: In Romania, only few studies had challenged the existence of issues related to gender disparities in entrepreneurship - the so-called gender gap in entrepreneurship. Although the gender gap in entrepreneurship varies considerably from country to country influenced by different culture and customs regarding female participation in economic activity, a gender gap definitively exists with respect to new venture creation and business ownership (Report on Women and Entrepreneurship - GEM 2011). For specialists it is required exceeding ascertaining phase so that, based on accumulated factual material to initiate research that critically examine specific vested attitudes towards the female entrepreneurship. In recent years, the private sector has got the idea (confirmed by the results) that women have native attributes that recommend them for performance management. European statistics show that in Romania the difference in wages between women and men (functions equal) in recent years is lower than in some countries with strong democratic tradition. These figures are targeted based interpretations. Are these data a sign of real progress or is the result of continental and local economic circumstances? Our study aims to provide insight into entrepreneurial motivation and the attitude of women entrepreneurs with the empirical support for women entrepreneurs in western Romania. Moreover, according to GEM Women's report 2010, analyses of society-wide attitudes about entrepreneurship show that, overall, women in factor-driven economies are most likely to perceive opportunities in their area and have confidence in their capabilities for entrepreneurship. They are more likely to know an entrepreneur and to intend to start a business, and they have a lower fear of failure compared to women in economies with higher levels of economic development. The research activity is consisting in the research based on the survey (a first wave in 2010 and second wave in 2012) of the most significant aspects concerning the profile of the business women. In addition, it reports rates among samples from 6 different counties and initial survey findings as a comparison. Paper relevance: The paper explores the issues and challenges during times of economic crisis with respect to women entrepreneurship in Western Romania and proposes encouraging women entrepreneurship from regional perspective.

Keywords: entrepreneurship, women entrepreneurship, self-employment, mentoring, entrepreneurial field

1. Introduction

According to several studies, women must make significantly more efforts then man in order to achieve a managerial position or to start their own business. Even though still poor and yet far from creating adequate theories, the literature consecrated to the women entrepreneurship hangs upon some conclusions: women entrepreneurs have similar motivations with those of entrepreneur men. These include: the wish of accomplishment, work satisfaction and independence (Schwartz 1976). All researches refer to a relatively uniform set of weaknesses which constitute an additional obstacle which women entrepreneurs have to face on an unfavorable business environment, having a smaller inclination to entrepreneurship and manage to settle a business in a slower rhythm than men (Hisrich, Brush 1983, 1984, 1985, 1986, 1987; Brush et al 2004; Casson et al 2006, Parker 2009), the lack of knowledge and technical abilities, that discourage starting a business in production or high technology field and difficult access to financial resources, that determine choosing that activities in the industry of services (Bates 1995) who engages a lower capital level (Bruni, Gherardi, Poggio 2008); being the most frequently invoked. As argued in earlier work by Dodescu (2010) quoting the GEM 2007 study, one can notice the stereotype of business women built around the idea that women are “less than men”. This can be translated as women are “less capable, less qualified, less trained, less brave, slower, less equipped with capital or less able to access capital etc.” in doing business (Dodescu 2010 :54). These interpretations vary to some extent depending on given cultural differences (GEM 2007, 2008; Parker 2009). Also, all researches refer that women entrepreneurs have to meet opportunities and barriers different from those encountered by men that affects their participation and performance in the entrepreneurial field and reflected in the so-called “gender performance gap” (Parker 2009:184) in entrepreneurship.

The persistence of such stereotypes derives from a severe lack of models and traditions in this direction (Avram 2008). The main aspects highlighted by research in this field are: professional

stereotypes (average salary inferior comparatively to men), unsuited to some positions, traditional social mentalities, maternity and the obligation to allocate more time to children, the stereotype of women as promoted through mass-media. The latest GEM global report reveals this "gender gap" as follows: entrepreneurship rates are lower among women than men across the world, independent of phase of economic development, with the exception of Panama, Venezuela, Jamaica, Guatemala, Brazil, Thailand, Switzerland and Singapore (GEM 2011: 15). Also, reports and surveys made by EU and OECD showed that, throughout the EU, men were twice as likely as women to be involved in entrepreneurial activity (Eurobarometer 2011:50), and women were more likely than men to answer that they were not interested in starting up a business (Eurobarometer 2011:65), motivations for starting-up a business are weaker, barriers and risks encountered during the first years of existence are stronger for women than men (Eurostat-OECD 2011).

In Romania, generally in Eastern Europe, despite the ideological pretenses of communists' regimes, these stereotypes were artificially stressed due to excesses of propaganda. During that period, "emancipation of women" remained a word lacking concrete meaning. In the recent years undisputable progress has been made in this regard, yet the effects of policies that "contaminated" the collective perceptions are still present. The entrepreneurial models crisis is confirmed by numerous studies and researches, all reveling the acute need for mentoring. The number of women acknowledging this need is rising. This situation is the consequence of a realistic assessment of the entrepreneurial obstacles (Dodescu, Bădulescu, Săveanu 2011), as well as assets (Săveanu, Borza 2010).

It became clearer that a woman intending to start a business does not have to overcome just the regular hardships of an entrepreneur. She must also consume more energy in surmounting the stereotypes that affects the trust of business partners and clients. As people had fewer occasions to make business with women there is a general lack of trust in their capacity to operate economical activities as efficiently as men. Angela On stated some of the reasons for the importance of mention in women entrepreneurship: (1) the young age of entrepreneurship in Romania, (2) the sub-representation of women in management and business sector. The fact that women that succeed in doing business or occupy managerial positions do not act as mentors closes a vicious circle which reduces even more the feminine representation in the field (On 2011).

A similar set of prejudices still rule at the level of public opinion in societies that were subdued to propagandistic excesses such as the case of Romania. Indifferent to the political regime or culture, women managers face gender barriers which force them to make more effort to achieve the same performance to that of men (Abrudan et al 2010: 47-53).

2. Aspects regarding the research methodology

Once recognized the existence of a "gender gap in entrepreneurship", it must stimulate research in a pragmatic direction. There is a need for efficient gender policies and equally transferable models of good practices. Given this need, in the Romanian academic field several relevant projects were conducted. The Faculty of Economic Sciences from University of Oradea implemented a European project considered by the European Commission a success model. The project entitled "Entrepreneurship and the Equality of Chances. An Inter-regional Model of Women School of Entrepreneurship" (AntrES) had a significant impact on models of women entrepreneurship by promoting Action Leaning as a teaching tool. Consequently the project provided support in three main directions: (1) information and training regarding business start-up and development; (2) promotion of positive attitudes and confidence for women intending to start a business and also for women entrepreneurs regarding their work, and (3) provide information and practical skills for young women trainers in the field of entrepreneurship. Within this project the research was conducted in the western part of Romania highlighting several aspects regarding the situation of women entrepreneurship. The collected data allowed researchers to assess the situation and formulate policy recommendations (Dodescu et al 2010).

The current paper is based on the data collected within this project which was financed by the European Social Fund with an amount of over 3.5 million Euros. The covering area of the project is the Western part of Romania, including Maramureş, Satu-Mare, Bihor, Arad, Timiş, Caraş Severin Counties. It was implemented by partner universities from each of these counties. The general objective was to promote the equality of chances in the field of entrepreneurship, by stimulating the implication of women, especially those coming from rural areas, to initiate and develop their own

business in the context of sustainable development of their communities. The project is addressed to a overall target group of 1800 consisting of women wishing to develop their own business (288 SME female managers from urban area) and also women intending set up their own business (1440 women from urban and rural area). A specific group was represented by young women which intended to become trainers in the entrepreneurship field (72 women, students in Economics). The project was implemented in a total number of 102 localities out of which 72 were rural areas.

Concretely the research was developed by the team of experts in the field by administering a set of focused questionnaires to all participants in the courses. Two sets of questionnaires were developed – one addressed to women that intend to start a business and one to women entrepreneurs. The current paper is based on the questionnaires applied at local centers – 24 towns from the six counties at the begging of 2009. A total number of 428 women that intend to start a business and 152 women entrepreneurs filled in these questionnaires. One set of questions were asked in two steps (for both groups): at the beginning and at the end of courses. This paper uses data collected in both waves – explications are made were presenting the data. The data was analyzed using SPSS statistical package.

The predominantly technical and statistical perspectives of the studies dominate the research in this field of study. The collective preference for ascertainment is often explained by methodological reasons. It was intended that based on rigorous research findings one can formulate policy models and practical solutions. Nevertheless we acknowledge that beyond the rigors of methodology, statistics does not assure an a priori fundamental understanding of principles. Despite the increasing usage of generalizing considerations, these did not always conduct to the expected results regarding policy and field related regulations. However, the statistical data obtained cannot solely lead to solutions, it is important to exploit the data towards its utility in practical strategies.

3. Results

In recent years, the private sector get the idea (confirmed by the results) that women have qualities that recommend them for a performance management (Gavrilă 2007). Increased empathic ability, readiness to mediate efficiently confers women manager, in certain circumstances, a real advantage over autocratic management style with emphasis specifically men. The questionnaires applied to subjects during AntrES project show a significantly increased self-confidence (optimism) hard worker and competence of women entrepreneurs.

As the frequency response shows in both test and retest questionnaires the significance assigned to psychological resources to launch successful businesses is visible increased. As shown in the table intellectual resources and professional competence are considered important but mental capacity to mobilize prevails when it comes to obvious first choice.

Table 1: Main qualities a woman needs to open a business – responses of women entrepreneurs involved in our research - wave 1

Class	Categories	Frequencies		
		First choice	Second choice	Third choice
I	Professional skills, knowledge and experience	18	21	23
II	Managerial skills, leadership qualities	11	14	9
III	Will and ambition	15	13	8
IV	Correctness, character, honor, honesty, integrity	2	6	6
V	Self-confidence, courage, optimism	38	14	10
VI	Creativity, imagination, initiative	8	6	4
VII	Intelligence, intellectual resources	16	11	7
VIII	Motivation, determination, determination, desire to succeed	11	10	5
IX	Hard worker, tenacity, perseverance	13	21	24
X	Financial potential, access to resources	3	5	5
XI	Responsibility, reliability, consistency	5	11	9
XII	Capacity of socialization, communication skills, flexibility, adaptability	4	6	9
	Non-responses			

As can be observed subjects show a relative constancy of options for Wave 2, (Table 2) questionnaires. In the second wave there can be seen a marked increase for work power, tenacity factors. In the class IX, second choice, the frequency increase from 21 to 36 points which can be interpreted as a greater awareness of the need for personal effort and continued commitment to investment. In our view is it obviously clear the effect of better awareness of the difficulties facing faced by woman entrepreneur when deciding to engage in business (Juravle 2002). Moreover, business success is still perceived in connection with a positive self-image (which is not interpreted as a psycho-emotional resource) and good motivation capacities under external pressure (VIII class, table 2) motivation, determination succeed also recorded good scores in both wave 1 and 2 questionnaires).

Table 2: Main qualities a woman needs to open a business – responses of women entrepreneurs involved in our research **-** wave 2

Class	Categories	Frequencies		
		First choice	Second choice	Third choice
I	Professional skills, knowledge and experience	18	17	16
II	Managerial skills, leadership qualities	12	9	14
III	Will and ambition	16	15	7
IV	Correctness, character, honor, honesty, integrity	6	8	8
V	Self-confidence, courage, optimism	36	22	13
VI	Creativity, imagination, initiative	9	6	8
VII	Intelligence, intellectual resources	17	12	12
VIII	Motivation, determination, determination, desire to succeed	12	3	11
IX	Hard worker, tenacity, perseverance	10	36	21
X	Financial potential, access to resources	4	6	9
XI	Responsibility, reliability, consistency	7	10	14
XII	Capacity of socialization, communication skills, flexibility, adaptability	5	2	2
	Non-responses	3	9	20

Table 3: Support elements to start a business - responses of women entrepreneurs involved in our research- wave 1

Class	Categories	Frequencies		
		First choice	Second choice	Third choice
I	Financial and material resources	68	27	11
II	Psycho individual qualities	0	0	6
III	Skills, knowledge and experience	38	23	16
IV	Professional consultancy	14	10	6
V	Emotional support (family, friends)	9	19	8
VI	Space, logistical support, specialized training	4	9	3
VII	Self-confidence, ambition	1	1	2
VIII	Human resources	0	4	6
IX	Relations, business partners	0	7	11
X	Luck, chance	0	0	2

As results shows (table 4) many women tend to appreciate as the main driving factor of business start-up prior existence of substantial financial resources. The fact that financial resources is considered by far the key that can provide support in trying to start a business can be put in connection with the concern for economic crisis. Acute perception the economic crisis is reflected in a significant increase (choice 1) of attention granted to financial and material resources, but also after attending the courses organized by AntrES subjects tend to value the project at a different level. They considered significant and valued emotional support that comes from the family and relatives. Overcome the difficulties posed by the crisis, is made according to subject's perceptions through an effort of willingness and this fact is reinforced by accumulations achieved during the course. (willingness and ambition shows a slight increase for choice 1 and 2, table 4).

This interpretive tendency is confirmed by similar research studies: "I appreciate that companies dependent on the profit need at this point exactly the typical female values: willingness of mind,

intuition, compassion and sympathy to the values of others. These are values that considered altogether, began to turn slowly all organizational structures. Changes in the scale of values "of corporate culture", in the technologies work, in the structure of available positions and the workforce, in the classic pattern of lifestyles, in the social attitudes and the distribution of roles in the family, the globalization, new requirements of legislative framework, the reorganization of companies emphasis on teamwork and the involvement of each employee – all these changes are factors that stimulate the appearance of new opportunities for women to withstand and compete successfully in an economic environment increasingly harder (Pastor 2011).

Table 4: Support elements to start a business - responses of woman entrepreneur involved in our research-wave 2

Class	Categories	Frequencies		
		First choice	Second choice	Third choice
I	Financial and material resources	101	35	11
II	Psycho individual qualities	3	6	11
III	Skills, knowledge and experience	7	9	9
IV	Professional consultancy	7	18	8
V	Emotional support (family, friends)	19	20	21
VI	Space, logistical support, specialized training	7	13	7
VII	Self-confidence, ambition	-	5	3
VIII	Human resources	4	15	8
IX	Relations, business partners	2	3	7
X	Luck, chance	1	4	1
	Non-responses	4	27	69

There are sufficient traditional prejudices which are evidently maintained related to gender differences. At the level of public opinion these require time and factual evidence on women's capacity to perform tasks that are associated in the collective mental reflex as being typically male skills. A civil action with concerted character does nothing to help overcome this inertia about mentality. „Based on these aspects frequently raised by many organisms constituted to promote women, have been shaped a series of possible measures necessary to adjust the balance of participation, taking in consideration changing of mentalities related to power and the holders of this in society. It was remarked the need for real networks, functional, business women to exchange information, mentoring, partnerships, promotion of models, etc.. (...). Finally, promoting women in the decision-making bodies can contribute to a better representation and support, which may be crucial for better gender balance in society" (On 2011).

Given the specific nature of managerial activity and character of the benchmarks, the access of women in top administrative management positions is limited not only by prejudice and mentalities, but also the requirement of total commitment that they require family obligations. Rarely a business woman chooses career objectives to the detriment of family (Văduva 2004). Research has shown that female managers increased significance attributed to family and moral support that you expect from relatives. It is clear that female entrepreneurs in Romania prefer to work with many precautions when deciding to engage in business. The choice in favor of businesses that provide certainty and progress in small steps is explained in the context of avoiding failure is essential. However in the wave 2, subject's responses become more open to businesses that provide products or services market, which is equal to the greater tolerance for risks.

The reorientation of preferences towards business brings on the market new services of products that reflect the increasing confidence of women in their creativity and innovation abilities. These are also associated with an increased self-confidence on behalf of these women. It is highly probable that the project succeeded in improving self-esteem and also an improvement of self-image of the participants. This was also possible as these courses, with their practical orientation, provided a basis for confirmation of personal skills of participants.

Romania registered significant progress in improving the public perception regarding the capacity of women to run a successful business. However, these developments do not imply the eradication of gender barriers but merely a premise for an efficient approach of governmental gender policies. Promoting women's access on a business sector characterized by unprecedented tensions can constitute a mechanism of improvement of quality of life by equal redistribution of social responsibility.

Through their psycho-emotional qualities women can contribute decisively to overcoming the difficulties faced by a society marked by competition and intolerance.

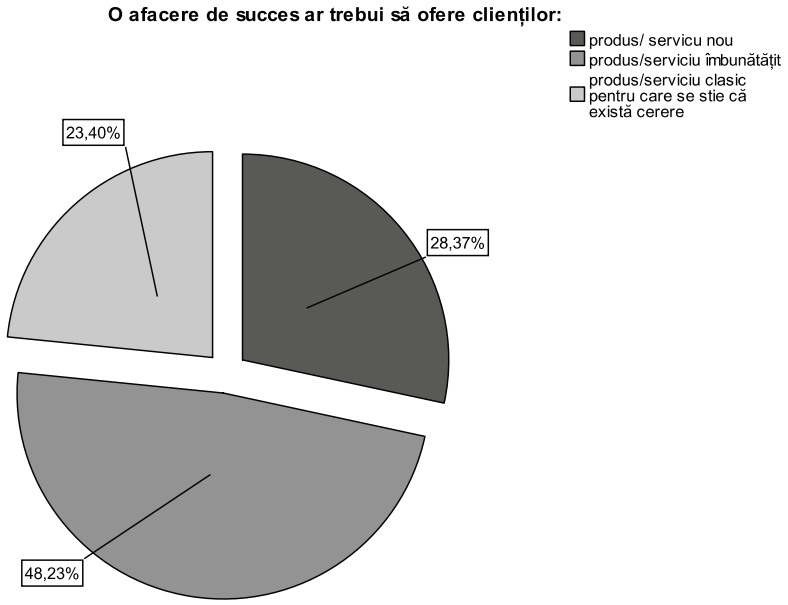


Figure 1: Wave 1: Type of product/service offered by a success business - responses in percentage

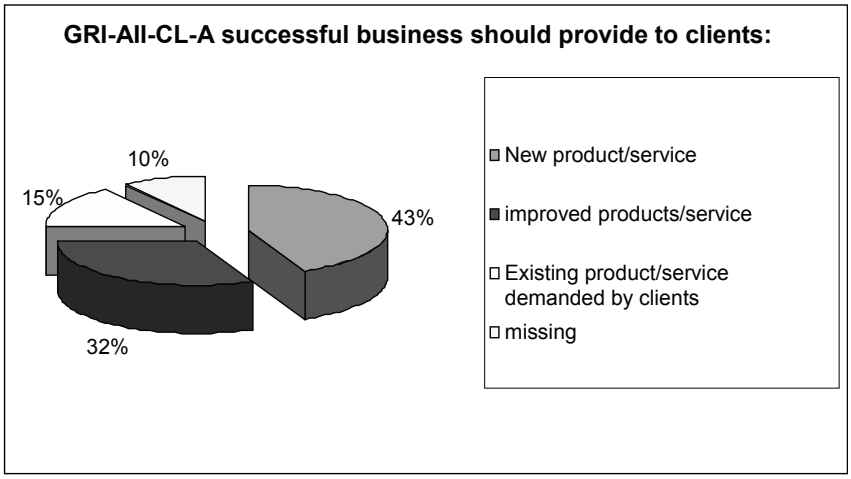


Figure 2: Wave 2: Type of product/service offered by a successful business- percentage of the responses

4. Conclusions and future developments

The current analysis aims at contributing to raising the interest for the study of determinants of women entrepreneurship in Romania, in order to ground public policies and strategies that support the potential of women entrepreneurship as engine of regional growth and development. The psycho-emotional qualities proved by woman entrepreneurs and not gender discrimination should constitute, in our view, the "hard core" of public policies aimed at promoting women entrepreneurship (Holtz-Eakin, Rosen 2011). This approach should also be in line with the latest policies that stimulate self-employment, emerging forms of entrepreneurship and underrepresented groups of entrepreneurs in European Union (European Employment Observatory Review 2010; Eurofound study 2012a, 2012b) as well as the so-called "gender sensitive policies*"* (Parker 2009:198). The starting point for these gender sensitive policies and strategies should be, in our opinion, the general measures for encouragement of women entrepreneurship: active measures for stimulating business start-up and development by women, especially for those businesses that involve self-employment; co-entrepreneurship and family business; creation of offices, agencies, national and regional networks for consultancy and support for women entrepreneurs; creation of data bases with business and

funding opportunities specifically for these groups; providing both formal and non-formal training for women entrepreneurs and for women who intend to start their own business etc.

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References

Abrudan, M-M, Deaconu, A., Lukacs, E. (coord.), Matei, M., Pop, F., Saveanu,T. (2010) *Echitate şi discriminare în managementul resurselor umane,* Bucureşti: Economica.

Avram, E. (coord.) (2008) *Psihologie managerial-organizațională*, Iaşi: Polirom.

Bruni, A., Gherardi, S., Poggio, B. (2008) *Gender and entrepreneurship, an ethnographical approach*, New York: Routlege.

Brush. C.G, Carter, N., Gatewood, E. et al. (2004) *Clearing the Hurdles: Women Buiding High Growth Businesses,* New York: Prentice Hall Financial Times.

Casson, M., Yeung, B., Basu, A. and Wadeson, N. (2006) The Oxford Handbook of Entrepreneurship, Oxford: Oxford University Press.

Dodescu, A., Bădulescu, A., Săveanu, T. (2011) "Beyond Entrepreneurial Education: The Access to Finance as an Obstacle to Female Entrepreneurship in Western Romania", in *Proceedings of the 6th European Conference on Innovation and Entrepreneurship*, Aberdeen: Robert Gordon University, Aberdeen, Scotland, UK.

Dodescu, A. (2010) "Attractiveness versus constraint in self-employment option in a certain field for manager women of their own business in the west of Romania", in The *Annals of the University of Oradea. Economic Sciences,* TOM XIX, no. 1/2010, Oradea: University of Oradea Publishing House, pp. 53 – 58.

Dodescu, A., Bădulescu A., Giurgiu, A., Pop Cohut I. (2011) "Antreprenoriatul feminin în vestul României. Rezultate de cercetare şi recomandări de politici", in *Economie teoretică şi aplicată*, Volume XVIII, No. 1(554), Oradea: University of Oradea Publishing House, pp. 23-46.

Dodescu, A., Bădulescu, A., Giurgiu, A., Pop Cohuț, I. (coord.) 2010 *Antreprenoriatul feminin în Vestul României: încadrări teoretice și provocări concrete,* București: Economica.

Eurobarometer survey on Entrepreneurship in the EU and beyond, [online], Available: http://ec.europa.eu/public_opinion/flash/fl_283_en.pdf [02 Apr 2012].

Eurofound study (2012a): '*Public measures to support self-employment and job creation in one-person and micro enterprise'*, [online], Available: http://www.eurofound.europa.eu/emcc/erm/studies/tn1108034s/index.htm [02.04.2012].

Eurofound study (2012b): "*Emerging forms of entrepreneurship*" [online], Available: http://www.eurofound.europa.eu/emcc/erm/studies/tn1009034s/index.htm [02.04.2012].

European Employment Observatory Review (2010) '*Self-employment in Europe*: *General report'*: [online], Available: http://www.eu-employment-observatory.net/resources/reviews/EEOReview-Self-Employment2010.pdf [02.04.2012].

Eurostat-OECD (2012) *Factors of business success* (FOBS) SBS, [online], Available: http://epp.eurostat.ec.europa.eu/portal/page/portal/european_business/special_sbs_topics/factors_business_success [02.04.2012].

Gavrilă, A. M. (2007) "Miza în afaceri între ying și yang", [online], Available: http://www.theinvestor.ro/hr/miza-in-afaceri-intre-yin-si-yang/[02.04.2012].

GEM - Global entrepreneurship monitor (2007), [online], Available: http://www.gemconsortium.org/docs/download/263 [20.03.2012].

GEM - Global entrepreneurship monitor (2008), [online], Available: http://www.gemconsortium.org/docs/download/264 [20.03.2012].

GEM - global report (2011), [online], Available: http://www.gemconsortium.org/docs/download/2201. [20.03.2012].

Holtz-Eakin, Douglas; Rosen and Harvey S., (2004) '*Public Policy and the Economics of Entrepreneurship'*, MIT Press.

Hisrich, R.D., Brush, C. (1984) "The woman entrepreneur: Management skills and business problems", in *Journal of Small Business Management*, V.22 (1): 30-37.

Hisrich, R.D., Brush, C. G. (1983) "The woman entrepreneur. Implications of family educational and occupational experience", in *Frontiers in entrepreneurship research*, 255-270. Wellesley, MA: Babson College.

Hisrich, R. D., Brush, C. G. (1985) "Women and minority entrepreneurs: A comparative analysis", in J. A. Hornaday, E. B. Shils, J. A. Timmons, & K. H. Vesper (Eds.), *Frontiers of entrepreneurial research* (pp. 566-587). Boston, MA: Babson College.

Hisrich, R. D., Brush, C.G. (1986) *The Woman Entrepreneur: Starting, Managing, and Financing a Successful New Business*, Lexington, MA: Lexington Books.

Hisrich, R. D., Brush, C. G. (1987) "Women entrepreneurs: A longitudinal study", in N. C.Churchill, J.A. Hornaday, B.A. Kirchhoff, O.J. Krasner, & K.H. Vesper (Eds.), *Frontiers of entrepreneurial research* (pp. 187-199). Boston, MA: Babson College.

Juravle, T. (2003*) "*Femeia manager: Influenţa diferenţelor de sex asupra stilurilor de conducere", in *Revista de psihologie organizaţională, Nr.2-3, Vol.II,* [online], Available: http://consultscolari.ro/indexphp?mid=169 [02.04.2012].

On, Angela (2011) "*Antreprenoriat feminin transilvan - caracterizare calitativă sintetică"*, in *Revista Antreprenoriat Transilvan*, nr. 6/2011, [online], Available: (http://antreprenoriat.upm.ro/antreprenoriat-transilvan/antreprenoriatul-feminin-transilvan-caracterizare-calitativa-sintetica~41.html [02.04.2012].

Parker, Simon C. (2009) *The Economics of Entrepreneurship.* Cambridge: Cambridge University Press.

Pastor, I.(2011) "Femeia Manager", in *Revista Antreprenoriat Transilvan*, nr. 6/2011, [online], Available: http://antreprenoriat.upm.ro/antreprenoriat-transilvan/femeia-manager~35.html [15.12.2011].

Săveanu T., Borza A., (2010) "*Psycho-Social Perceptions and Managerial Preferences of Women Entrepreneurs in Western Romania",* in The *Annals of the University of Oradea. Economic Sciences,* TOM XIX, no. 2/2010, Oradea: University of Oradea Publishing House, pp: 703 – 708.

Schwartz, E. (1976) "Entrepreneurship: A new female frontier", in *Journal of Contemporary Business* 5 (1), Winter, p: 47-76.

Văduva S. (2004) *Antreprenoriatul. Practici applicative şi în alte ţări în tranziţie*, Bucureşti: Economica.

Fostering SMEs and Innovation: Challenges for Romanian Regional Growth and Development Policy

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Abstract: In order to demonstrate the importance of supporting SMEs and innovative process for the regional development and for the growth and recovery process, as well, after a short literature review, the paper investigates the interdependence between growth and regional development policy - SMEs sector and innovative process in EU over the past 20 years, paying particular attention to the Regional Innovation Strategies (RIS/RIS+) positive experiences in EU regions, to different regional approaches towards the governance of innovation in the current programming period – 2007-2013. Even the regional institutional frameworks and governance systems are extremely varied across the Europe, and the "systemic vision of innovation" characterizes only few regions, especially those economically successful and capital regions, the paper highlights the crucial role of regions in innovation policy, the importance of creating space for regions and firms with less absorptive capacity and the need for appropriate policy mix for stimulating both innovation and entrepreneurship. Different regional experiences presented in the first part of paper and analysis of the Romania's situation as a modest innovator according with the Innovation Union Scoreboard 2011, lead us to the conclusion that fostering SMEs and Innovation is an emerging challenge for Romanian regional growth and development policy during the times of economic crisis. The paper concludes that a "more regionalized" Romanian innovation policy design framework is necessary, and the actual model of EU Innovation policy is not only applicable but also an urgent need in Romania. The paper presents research results afferent to the post-doctoral research project: "Growth and regional development economic policies. Challenges for Romania in the context of economic-financial crisis and European model integration", carried out in the project "Economic scientific research, reliance of human welfare and development in the European context", financed from the European Social Fund and by the Romanian Government through Sectorial Operational Programme Human Resources Development 2007-2013 (SOP HRD), contract number SOP HRD/89/1.5/S/62988.

Keywords: SMEs sector, innovation, regional growth and development policy, economic crisis, European integration

1. Growth and regional development policy – SMEs sector and innovative process: Literature review

In the context of economic financial crisis, the issues of *growth* and *development* occur more frequently in a *mix approach*. More restrictive than the *concept of development*, which represents all the sustainable changes accompanying the growth, the *concept of growth* is defined as sustained increase of an indicator of size, usually Gross Domestic Product (GDP), over a given period. *Regional policy*, by definition, includes all activities that significantly affect the growth and development of a region. According with OECD definition - *regional policy* is largely intended to promote growth (OECD 2005). But all over the world, growth is not the only objective of regional policy, we can notice here just for illustration: cohesion, equity, sustainability etc. Traditionally, there are two objectives of regional policy: economic efficiency and social equity. *Okun equity versus efficiency thesis* elaborated in the mid-1970s is re-evaluated nowadays. The new argument associated particularly with the New Economic Geography based on Kruman's pioneering work (Krugman 1998, Baldwin *et al*. 2003) and integrated in the World Bank's "*World Development Report on spatial disparities and development policy"*, and in the OECD and European Commission related reports as well, is that regional imbalance, regional concentration, spatial agglomeration may actually benefit national growth (World Bank 2009), so a policy 'trade-off' may exist between the pursuit of national growth and the reduction of regional economic disparities (Martin 2008). In the EU approach, regional issues revolve around the persistence of *regional disparities*, perceived as obstacles to the integration process and as causes of the concentration of economic activity and labour migration. Thus *EU regional policy* focusing on addressing uneven growth and development disparities among regions has twin objectives: regional competitiveness and social cohesion. There is a large variety at regional level in terms of geography, demographics, infrastructure, resources, basic economic activity, production factors, specialization, productivity, comparative advantages, the capacity to innovate etc., thus impact of economic crisis at regional level is different. While the identification of solutions for "exiting the crisis" and growth opportunities is an ongoing process*, innovation* is demonstrated as the main and increasing source of growth in OECD countries, *"regions* as key actors in shaping virtuous innovation trajectories" (OECD 2010a) and *entrepreneurship* as fundamental for the modern innovation process (OEDC 2007, 2009a, 2009b, 2010b). Commonly articulated rationale for pro-

entrepreneurship policies is that more entrepreneurship is better than less because entrepreneurship creates jobs and is fundamental for the innovation process (Parker 2009: 405-406). The specificity of EU policy in this context is that tends to focus on *small and medium-sized enterprises* with emphasis on job creation, competitiveness and innovation (Urban 2010: 79), in other words, promoting entrepreneurship through supporting new, emergent and *innovative SMEs*. In this context, initiatives to fostering SMEs and innovation have become widespread in EU, based of a variety of policy frameworks and using a variety of instruments and incentive structures, the comparative lessons arising from national and regional experiences have also been influential (Head 2011).

During the last half century, in EU Member States, policies, strategies, practices, objectives and instruments in regional growth and development field were continuously enriched. In this respect, Camagni and Capello realized an eloquent analysis of evolution of regional policy targets and styles from historical perspective as follows: *"1950s infrastructure, as precondition for growth"; "1960s attraction of external activities, development poles, export industry"; "1970s endogenous development: SMEs, local competencies"; "1980s innovation, technological diffusion, innovative milieu"; "1990s knowledge base, intangible factors, local culture"; "2000s 'relational capital', collective learning, interconnection, territorial capital"* (Camagni and Capello 2010). Actual approach are characterized by more realism and dynamism, more attention for the openness of space and spatial heterogeneity (Capello and Nijkamp 2009), for the role of soft and knowledge components of territorial capital and reflect transition from material assets to immaterial ones, from tangible to intangible factors, to relational and network type factors. These new approach have its roots in OECD Territorial Outlook (OECD 2001), and in emphasing of "*territorial development policies - policies with a territorial approach to development*" by DG Regio of the Commission of the European Union (European Commission 2005: 1). According with the OECD, list of determinants of territorial capital may include *"the area's geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, (...) its business incubators and industrial districts or other business networks that reduce transaction costs, (...) 'untraded interdependencies' such as understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector (social capital). Lastly, according to Marshall, there is an intangible factor, 'something in the air', called the 'environment' and which is the outcome of a combination of institutions, rules, practices, producers, researchers and policy makers that make a certain creativity and innovation possible"* (OECD 2001:15). As Camagni and Capello argue, a change in policy styles is still needed, residing in the goal of "*preparing territories for innovation"* (Camagni and Capello 2010).

In order to demonstrate the importance of supporting SMEs and innovative process for the regional development and for the growth and recovery process, as well, we'll investigate the interdependence between *growth and regional development policy - SMEs sector* and *innovative process* in Romania comparative with the EU situation.

2. Growth and regional development policy – SMEs sector and innovative process: EU situation

Over the past 20 years, the European Commission has supported the building up of Regional Innovation Strategies (RIS) 1990-1993, Regional Information Society Initiatives (RISI) 1994-1999, followed by Regional Programmes of Innovative Actions 2000-2006. European Commission Communication called "*The regions and the new economy: guidelines for the European Regional Development Fund (ERDF) innovative actions for the period 2000-2006*" was one of the first strategic documents that reflect new regional policy approaches based on knowledge creation, dissemination and adoption through innovation as regional competitive factors in the context of knowledge-based networked economy. The new generation of Innovative Actions 2000-2006, Regional Innovation Strategies (RIS/RIS+), the Regional Innovation and Technology Transfer Initiatives (RITTS) projects, and the Innovating Regions in Europe (IRE) network (European Commission 2002) - have been first steps in this direction in which the European Commission, in a direct link with the regions, have attempted at providing a response to the need of "*preparing territories for innovation"* in terms of Camagni and Capello.

RIS/RIS+ experience gained in 30 European regions between 2000 and 2002, has clearly shown that innovation policies must be "more regionalized" and fundamentally aimed at increasing the capacity of businesses, particularly SMEs, to innovate as a principal source of regional competitiveness and

establishing an efficient regional innovation system for collective learning and spreading of knowledge (European Commission 2002:8). Their contribution to changes in relationship between growth and regional development policy - SMEs sector and innovative process is emphasized by results like: *general increasing awareness of entrepreneurs about innovation* (through radiobroadcast programmes in Canary Islands, press campaign in Aragon, for example), *general lintroducing innovation into the economic development strategies and actions plan* (Niederösterreich, Canarias and Algarve/ Huelva are planning the creation of regional agencies for innovation; Niederösterreich, Limburg, Strathclyde or Overijsel established deadlines in order to become one of the "most innovative regions" in Europe; Central Macedonia, Wales and the West Midlands are establishing regional innovation observatories; Shannon or West Midlands established the key objective to double the level of innovation, respectively to increase with 50% the proportion of innovating firms, Castilla y León had the complementary objectives to reach 1% of regional GDP etc.), majority of regions introduce in actions plan *supporting measures* for: creation of new technology based firms, start-ups or spin-offs from universities, incubator-type activities, and especially, clusters and business networks (Wallonia is a good example for pilot clusters with research centres, Tuscany for cultural heritage cluster, Halle-Leipzig-Dessau for establishing of a network of firms in the plastic sector in order to establish the Technological institute for polymers, Castilla y Leon for network of regional innovation support organization etc. (European Commission 2002).

Strategic guidelines for the current programming period – 2007-2013, strengthen the role of EU, through Cohesion Policy, in supporting regions to implement regional innovation strategies and action plans (Council of the European Union 2006). A study launched by European Commission that covering 14 regions throughout the European Union (Piedmont, Western Sweden, Pays de la Loire, Pomorskie, Lithuania, Prague, Steiemark, South Netherlands, Lowlands & Uplands Scotland, Saxony, Central Tansdanubia, Denmark, Slovenia, and East of England) provides an overview of different regional approaches towards the governance of innovation and the contribution of the European Regional Development Fund (ERDF) programmes (Riche 2010). The main findings of this study lead to the conclusion that "the role of the regions as stimulator and co-coordinator of regional innovation systems is crucial, while a good co-ordination between national and regional policies is necessary" (Riche 2010:5). Although analyzed regions have different understandings and governance of innovation, resulting from different degrees of decentralization or forms of regionalization, the study argues for a common innovation policy design framework through increasing the role of partnership and the involvement of research and private sector at regional level. Also, the study makes convincing arguments for the role of the Operational Programmes as contributors to national or regional innovation strategies, and for the role of partnership in projects designing, selection, implementation, and evaluation. In this context, the study notes as examples of good practice - regions such as Western Sweden (Sweden) or Steiermark (Austria) for a "*systemic vision of innovation",* Lowlands & Uplands Scotland (UK) for shifting its innovation policy to networking, Pomorskie region (Poland) for increasing the role of the regional authorities and partnership, Pays de la Loire (France) for endowing the Regional Council with management of innovation interventions, Denmark for Growth Forum as institutionalized partnership at regional level between business community, social partners, academic and education institutions and the municipalities, South Netherlands for the "Syntens Innovation Network for Entrepreneurs", Lithuania for the role of SMEs for innovation support, Piedmont Region for its regional 'think tank' for innovation and research, East of England for the key role of the East of England Development Agency in providing expert support and advice to develop projects through thematic facilitators, also for the Local Strategic Partnerships and the East of England Business Group involvement, Slovenia for the mechanism of selection for projects of strategic importance, Saxony for bilateral contacts with its peers in other East German Länder in designing and implementing innovation programmes etc. (Riche 2010).

Above conclusions about crucial role of regions in innovation policy, even the regional institutional frameworks and governance systems are extremely varied across the Europe, and the "*systemic vision of innovation"* characterizes *only* few regions, especially those economically successful, are found also in the Europe 2020 related reports and strategic documents. The most common innovation policy model in Europe is linear and focussed on R&D not on supporting the overall innovation system. "*The urban and regional dimension of Europe 2020. Seventh progress report on economic, social and territorial cohesion*" demonstrates that the innovation policy must to focus not only of R&D or science and technology, concentrated almost exclusively *in few regions across Europe, especially* capital regions, but "looking forward" for *appropriate policy mix for innovation* that *cover all dimensions of innovation* including those related with *organisational process, creativity, design etc.* and *all regions*

of Europe. In 2009, the Europe 2020 target - 3% of GDP to invest in R&D - is exceeded by the regions located in Germany, Austria, UK, Sweden and Finland, and the capital regions such as Hovedstaden (Copenhagen) and Île de France (Paris) (European Commission 2002). This picture *of "high concentration of technological capabilities in Europe"* must change progressively and creating space for regions and firms with less absorptive capacity.

But how to change this in less favoured regions? The most common response is to stimulating both innovation and entrepreneurship through actions such as investing, supporting and encouraging: business start-ups cluster based incubators, cluster-based technology hubs, entrepreneurs' and innovation networks etc. (Rosenfeld 2002). Although "innovativeness is context-dependent", being not perceived the same way in all economies (Kelley *et al.* 2011: 20) and both innovation and entrepreneurship are influenced heavily by educational process and cultural norms, they can be enhanced by deliberate supporting policies.

There are many voices claiming that, unlike the United States policy - oriented towards entrepreneurship with emphasis on competition and innovation, EU policy tends to focus on small and medium-sized enterprises with emphasis on job creation and competitiveness (Urban 2010: 79). SMEs perform more R&D in the United States than in the EU, SMEs in the EU are less innovative than their counterparts in the United States, and situation is more worrying for young SMEs. In this context, EU tends to address both "Europe's gap in innovation" and "SMEs' R&D expenditure gap". Fostering innovation and SMEs tend to be the dominant feature of EU policy.

The *Innovation Union Flagship Initiative* as an integrated innovation strategy under the Europe 2020 strategy, sets out how Europe will tackle the "innovation emergency" it is facing. The aim is to ensure that innovative ideas are translated into new goods and services that create growth and jobs (European Commission 2010a). The first year of the Europe 2020 Flagship Initiative Innovation Union (European Commission 2011a), and also the *Innovation Union Competitiveness Report 2011* (European Commission 2011b) show that Europe's research and innovation performance has declined in 2009 – 2010 in the context of economic and financial crisis that affected seriously different sectors of the European economy and competitiveness performance of the Member States (European Commission 2011c).

There is a general concern that recovery is at risk and Europe's "innovation gap" with US and Japan will deepen if Member States do not intensify their innovation efforts. Many European Commission Reports, such as "*State of the Innovation Union 2011*" (European Commission 2011a) emphasize "innovation imperative" has become even more important and urgent because stimulating innovation is the "best means to help put the European economy back on track" (European Commission 2011b) through strong budgetary commitment to education, research and innovation, on the one hand, and smart fiscal consolidation combined with incentive schemes for an "innovation-friendly" business environment, on the other hand. (European Commission 2011b, 2011d, 2010b).

3. Fostering SMEs and innovation as emerging challenges for romanian regional growth and development policy

Romania is still far from the perspective of the European Union in designing policies to fostering SMEs and innovation. According with the Innovation Union Scoreboard (IUS) 2011, Romania is a ***m*odest innovator** as well as Bulgaria, Latvia, Lithuania, with innovation performance well below that of the EU27 average. Just to compare, we notice that IUS 2011 places EU ***Member States*** into four country groups depending on their innovation performance face-to-face with EU27 average as follows: ***I*nnovation leaders**: Denmark, Finland, Germany, Sweden - above the EU27 average; ***I*nnovation followers**: Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK - close to the EU27 average; ***m*oderate innovators**: Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain - below of the EU27 average; ***m*odest innovator** - Bulgaria, Latvia, Lithuania, Romania - well below the EU27 average (**European Commission 2011e**). According with all 8 innovation dimensions captured by the IUS 2011 (*Human resources, Open, excellent and attractive research systems and Finance and support, Firm investments, Linkages & entrepreneurship, Intellectual assets, Innovators and Economic effects),* Romanian *relative strengths* are in *Human resources* (as driver of innovation performance external to the firm), *Firm investments* (regarding the innovation efforts at the level of the firm) and *Economic* effects **(outputs** that cover the effects of firms' innovation activities). On the contrary, Romanian relative weaknesses are in Open, excellent and attractive research systems (as driver of innovation

performance external to the firm), *Linkages & entrepreneurship*, and *Intellectual assets* (regarding the innovation efforts at the level of the firm) and *Innovators* **(outputs that** cover the effects of firms' innovation activities). IUS 2011 reflects that Romania, as all modest innovators, is characterized by an *unbalanced research and innovation systems*, on the one side, and by a *process of "***steady convergence"** highlighted above EU27 average growth rates, on the other side. Having an average growth of 5%, Romania is situated in the category of EU catching-up leaders, together with Bulgaria, Estonia, Romania, Portugal and Slovenia, and surpassed only by Bulgaria. Looking not only at average growth rate or at the innovation dimensions that represent *relative strengths and* relative weaknesses in national research and innovation systems, but also at all 25 different indicators considered by IUS2011, a very unbalanced scoreboard, as well as unbalanced growth rates, across all categories of indicators, are of concern (**European Commission 2011e**).

There is good news, too. According to National Institute of Statistics (INSSE), the *share of innovative enterprises in total enterprises* raised constantly and has nearly doubled between 2002-2008, from 17% in 2002 to 33% in 2008 (INSSE 2011). Also, innovation turnover rose from 22.7% in 2002 at 38, 8% in 2008. Not as satisfying is the slow growth of R&D expenditure as GDP percentage from 0,37% in 2000 to 0,47% in 2010, noting that it rose constantly during 2000-2008 but then to fall from 0, 58% to 0, and 47% because of economic-financial crisis. Also, GDP share of business sector R&D expenditure is of concern not only because is unimportant as relative value, but has dropped almost steadily from 0,26% in 2000 at 0,18% in 2010 (INSSE 2011).

Our analysis is preoccupied especially by 2 innovation dimensions captured by the IUS 2011: *Linkages & entrepreneurship* and *Innovators.* With relative values well below the EU27 average, just over half for SMEs innovating in-house as % of SMEs (55%), and well below half for Innovative SMEs collaborating with others as % of SMEs (20%), respectively for Public-private co-publications per million population (17%), and lower growth rates, even negative growth for Innovative SMEs collaborating with others as % of SMEs, Romanian "Linkages & entrepreneurship" as innovation dimension is an important signal for innovation policy in order to strengthening networks for innovative SMEs. Nor the "Innovators" dimension not outperforming the situation near half the EU27 average with 53% SMEs introducing product or process innovations as well as 66% SMEs introducing marketing and organisation innovation and, also, unimportant or negative growth rates (European Commission 2011e).

In this context, Romanian policy to fostering SMEs and innovation should attempt not only national responses to address "Linkages & entrepreneurship" and "Innovators" as innovation dimensions, but also regional responses because at regional level structures are more flexible and best practices quickly assimilated. At present, there are no specifically regional innovation policies in Romania, innovation policy has only "national focus" (Ranga 2010:3).The innovation policy making body - the National Authority for Scientific Research (NASR) has no regional coordination, although its mission includes the support of regional and local development, and the role of the Romanian development regions as stimulator and co-ordinator of regional innovation systems is weak.

Part of explanation is given by actual "formula" of *regionalization by cooperation between existing local communities* and consists of the inclusion of the existing sub-national administrations into the 8 established development regions, by voluntary cooperation of the existing 41 counties, without legal personality at regional level. In other words, Romanian development regions are *not* administrative-territorial units, and Romania's type of regionalization - *administrative decentralization* (by delegation) - does not imply administrative functions for regions, does not involve changing the administrative organization of the territory by the formation of regions as new territorial communities superior to the existing ones. Romanian regional structures do not hold fiscal and functional competencies, and therefore, no decision powers. This aspect makes the difference between the type of regionalization that is found in Romania comparing with more advanced forms of regionalization in other EU Member States, for example, France (*administrative regionalization*), Italy and Spain (p*olitical regionalization*), Germany, Belgium and Austria (r*egionalization by federal authorities)*. The actors involved in the regional development are Regional Development Agencies (RDAs) - created in each region as non-governmental organizations responsible for the elaboration of regional development plans and for implementing and promoting regional development projects, local and national governments. ONG's and other actors have a quite restrictive role and are hardly found in the decision making process at regional level. At local level, county councils are responsible with the elaboration of County Development Plans that will stand at the basis of the Regional Development Plans and National

Development Plans. At regional level, the RDAs are coordinators for Regional Development Plans, but without policy or strategy capacity, their role is only an administrative one, as a facilitator of interactions between regional actors and their actual capacity to mobilize regional stakeholders and to put in practice regional innovation strategies is poor.

Limited both in terms of resources and of competences, Romanian development regions were rather created as a functional response to the European Union regional policy requirements, in accordance to the structural funds absorption criteria, than for wide regional functions or purposes, including those related with fostering SMEs and innovation system. The "regional focus" in RDI policy implementation appeared as a response to European integration requires, process that will show results in the future, in "learning" of new modes to "make" public policies, characteristic to a multi-level governance and partnership culture, beside the complex process of policy transfer.

However, there are reasons for optimism after the experience gained through implementation Regional Innovation Strategies in 6 regions, monitoring projects funded by the 2007-2013 National RDI Plan, regional Research Exhibitions, the Innovation Roadshow, the INNOBAROMETER, and, especially, after the experience gained through implementation Operational Programmes that European Regional Development Fund contributes to innovation policy: Regional Operational Programme and Increasing Economic Competitiveness Operational Programme (Ranga 2010:3).

The projects implemented under 2007-2013 financial perspective are convincing arguments for the role of the Operational Programmes as contributors to national or regional innovation strategies. Nevertheless, while the EU is concerned to address "innovation imperative" as the "best means to help put the European economy back on track" through incentive schemes for an "innovation-friendly" business environment, Romania is unfortunately facing, at the present, the "short-sightedness" of SMEs to the government. Too preoccupied with public sector cutting costs for "exiting the crisis" reasons, Romanian government appears to have completely lost sight of the private sector, especially the SMEs, and its growth potential. The emergence of a new regional awareness articulated directly in the strategic planning frameworks for 2014-2020 must address multi-level governance deficits and also regional coordination limits, inter-regional and sub-regional disparities conflicts in development decisions in the field of fostering SMEs and innovation.

4. Conclusions

Different regional experiences presented in the first part of paper lead us to some lessons to learn and models to apply in Romania. First of all, *a "more regionalized" innovation policy design framework* is necessary, fundamentally aimed at increasing the capacity of SMEs to innovate as a principal source of regional competitiveness. Second, we note the importance of the *increasing the role of partnership and the involvement of research and private sector at regional level,* including in projects designing, selection, implementation, evaluation and establishing an efficient regional innovation system for collective learning and spreading of knowledge. The examples of good practice presented in the first part of paper, strengthen the importance of *strategic partnership*, at regional level, between business community, social partners, academic and education institutions and the public administration, and of the role of SMEs for innovation support. Third, the innovation policy model must to focus not only of R&D, concentrated almost exclusively in capital region in Romania too like all over the Europe, but on *supporting the overall innovation system*, and covering *all Romanian regions.*

As we shown, the most common response of less favoured regions across Europe to the need of "*preparing territories for innovation"* is to stimulating both innovation and entrepreneurship through actions such as investing, supporting and encouraging: business start-ups, cluster based incubators, cluster-based technology hubs, entrepreneurs' and innovation networks etc. Also, the most common response for the "exiting the crisis" imperative is strong budgetary commitment to education, research and innovation combined with smart fiscal consolidation and incentive schemes for an "innovation-friendly" business environment. The model of EU Innovation policy divided in three policy areas**:** innovation friendly environment, knowledge transfer and support to innovation poles and clusters, boosting applied research and product development and applying as instruments: infrastructures and facilities, aid schemes, education and training (Expert Evaluation Network 2010) is not only applicable but also an urgent need in Romania.

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References

Baldwin R., Forslid R., Martin P., Ottaviano G., Robert-Nicoud F. (2003) *Economic geography and public policy*. Princeton University Press, Princeton, NJ.

Camagni, R., Capellohttp://www.google.com/search?hl=ro&tbo=p&tbm=bks&q=inauthor:%22Peter+Nijkamp%22, R. (2010) Macroeconomic and territorial policies for regional competitiveness: an EU perspective. *Regional Science Policy & Practice*, Volume 2, Number 1, June 2010.

Capello, R., Nijkamp, P., eds. (2009) *Handbook of Regional Growth and Development Theories.* Edward Elgar Publishing.

Council of the European Union (2006). The Community Strategic Guidelines on Cohesion -*Council decision* - 2006/702/EC of 6.10.2006, [online], http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:291:0011:0032:EN:PDF.

European Commission (2002) Regional Innovation Strategies under the European Regional Development Fund Innovative Actions 2000-2002. *Scoping document and summary of political messages,* DG Regional Policy, [online], http://ec.europa.eu/regional_policy/archive/innovation/pdf/guide_ris_final.pdf.

European Commission (2005) Territorial State and Perspectives of the European Union towards a stronger European territorial cohesion in the light of the Lisbon and Gothenburg ambitions. *Scoping document and summary of political messages*, [online], http://www.eu-territorial-agenda.eu/PresidencyConclusions/Min%20DOC%201_finlux505.pdf.

European Commission (2010a) Europe 2020 Flagship Initiative Innovation Union. *Commission communication* - COM(2010) 546 final, [online], http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf.

European Commission (2010b) An integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Front Stage. *Commission Staff Working Paper* -SEC(2010) 1272, [online], http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/member_states_competitiveness_performance_and_policies_en.pdf.

European Commission (2011) The urban and regional dimension of Europe 2020.Seventh progress report on economic, social and territorial cohesion. *Report from the Commission*, [online], http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/interim7/interim7_en.pdf

European Commission (2011a) State of the Innovation Union 2011. *Commission communication* - COM(2011) 849 final, [online], http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0849:FIN:en:PDF.

European Commission (2011b) *Innovation Union Competitiveness Report 2011*, [online], EC –Innovation Union website, http://ec.europa.eu/research/innovation-union/index_en.cfm?section=competitiveness-report&year=2011.

European Commission (2011c) Industrial Policy: Reinforcing Competitiveness, *Commission Staff Working Paper* - SEC(2011) 1187 final, [online], http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:1187:FIN:EN:PDF.

European Commission (2011e) *Innovation Union Scoreboard 2011*, [online], EC – Entreprise and Industry website, [online], http://www.proinno-europe.eu/inno-metrics/page/innovation-union-scoreboard-2011.

European Union (2011d) *Innovation Union Competitiveness report 2011.Executive Summary* EC-Research&Innovation, [online], http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/executive_summary.pdf#view=fit&pagemode=none.

Expert Evaluation Network (2010) Policy Analysis on the Performance of Cohesion Policy 2007-2013.*Inception Report* 2010. [online], http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/expert_eval_ntw_inception_report.pdf.

Head, B. W. (2011). Governance for sustainable regions: can government meet the innovation policy challenge? *Regional Science Policy & Practice*, Volume 3 Number 3 August 2011.

Kelley, D. J., Singer, S., Herrington, M. (2011) *Global Entrepreneurship Monitor (GEM), 2011 Global Report,* [online], http://www.gemconsortium.org/docs/download/2201.

Krugman P (1998) What's new about the new economic geography? *Oxford Review of Economic Policy* 14: 7–17.

Martin, R. (2008) National growth versus spatial equality? A cautionary note on the new 'trade-off' thinking in regional policy discourse, *Regional Science Policy & Practice*, Volume 1 Number 1 November 2008.

OECD (2001) *OECD Territorial Outlook*. OECD, Paris.

OECD (2005) *Building competitive regions: Strategies and governance*. OECD, Paris.

OECD (2007) *Innovation and growth: Rationale for an innovation strategy*. OECD, Paris.
OECD (2009a) *Regions matter: Economic recovery, innovation and sustainable growth*. OECD, Paris.
OECD (2009b) *How Regions Grow: Trends and Analysis*. OECD, Paris.
OECD (2010a) *Regional Innovation*, [online], OECD, Directorate for Public Governance and Territorial Development website, http://www.oecd.org/document/56/0,3343,en_2649_34413_42962360_1_1_1_1,00.html.
OECD (2010b) *Studies on SMEs and Entrepreneurship. SMEs*, *Entrepreneurship and Innovation.* OECD, Paris.
Parker, S. C. (2009) *The Economics of Entrepreneurship.* Cambridge, Cambridge University Press.
Ranga, M. (2010) Expert Evaluation Network. Policy Analysis on the Performance of Cohesion Policy 2007-2013. *Policy Paper on Innovation. Romania.* [online], http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/eval2007/expert_innovation/romania.pdf).
Riche, M. (2010) Regional Innovation Governance. *Regional Focus*. A series of short papers on regional research and indicators produced by the Directorate-General for Regional Policy. European Union Regional Policy, n° 02/2010.
Romanian National Institute of Statistics (2011), [online], http://www.insse.ro/cms/files/Web_IDD_BD_ro/index.htm.
Rosenfeld, S. A. (2002) Creating Smart Systems. *A guide to cluster strategies in less favoured regions.* European Union-Regional Innovation Strategies, [online], http://ec.europa.eu/regional_policy/archive/innovation/pdf/guide_rosenfeld_final.pdf.
Urban, B. (2010) *Frontiers in Entrepreneurship*, Springer Publishing.
World Bank (2009) *World development report 2009: Spatial disparities and development policies*, [online], http://siteresources.worldbank.org/INTWDR2009/Resources/Outline.pdf.

Entrepreneurial Capital: The Experience of Black African Migrant Women in Britain

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Abstract: Entrepreneurial resources both financial and non-financial are essential for the success of any nascent entrepreneur. In many studies, greater emphasis has been placed on financial resources like the amount of cash one has or whether the prospective entrepreneur will be able to obtain financial assistance. In the context of migrant ethnic minority groups considering starting their own businesses, other forms of non financial resources (human capital, social and cultural capital) are equally important and can to a large extend, determine the trajectory of their entrepreneurial ambitions. Within the ethnic minority groups, access to these sources varies and generally men have greater access to these resources than women due to a number of factors such as background, tradition and culture. Most studies have focused on certain ethnic groups such as Asian and Chinese women and little is known about the effect of these factors on black African women migrants operating their businesses in the Diaspora. This limitation has resulted in little being known about their experiences of starting and sustaining those businesses. This paper addresses this gap in academic fields of entrepreneurship through an investigation of the experiences of the 1st generation migrant black African women entrepreneurs in the acquisition of entrepreneurial resources in Britain. The discussion that follows is based on theoretical and empirical evidence obtained during a recent study of 35 black African migrant women carried out in the West Midlands, United Kingdom. Preliminary findings suggests that the women have difficultly on accessing certain resources such as financial resources and the absence of close family and friends in the UK limit their ability to network and benefit from their social networks. Despite their lack of financial and social capital, they have reasonable amounts of human capital in the form of education, training, work experience and experience from previous ownership of businesses. The implications of this are that without the necessary institutional and Government support in the areas they are deficient in, they may find it difficult to start businesses that develop beyond subsistence level.

Keywords: black African migrant women, entrepreneurial capital, ethnic minority, migrant entrepreneurship

1. Introduction

The subject of capital is considered important in any entrepreneurship studies and the role it plays in influencing the trajectory of any business venture. In small business entrepreneurship this capital is often referred to as entrepreneurial capital and it is made up of three elements (four for migrants) namely; human capital which consists of the attributes, background and characteristics of the entrepreneur; social capital - which is the ability of the entrepreneur to form or be involved in social and business networks through which the entrepreneur can obtain information, advice and support; financial capital - sometimes referred to as economic capital which is the amount of cash and assets at the disposal of the entrepreneur; and for ethnic migrants, cultural capital which are the traditions and shared values shared by some ethnic groups. Early studies have shown that migrants and particularly migrant women and other ethnic minority groups often start businesses with fewer entrepreneurial resources. They lack of human capital due to for instance negative labour market and managerial experiences (Carter et al. (1997): Fielden, et al. 2003), fewer financial resources resulting in undercapitalization of their businesses (Marlow and Patton (2005); Shaw et al, (2005), and they have limited social networks (Shaw et al, (2005) : Fuller-Love et al., (2006) : Aldrich (1989).

This paper explores the entrepreneurial resources at the disposal of black African migrant women entrepreneurs and the impact they have on their ability to start and sustain their own businesses. The paper specifically focuses on 1st generation Black African migrant female entrepreneurs who have settled in the United Kingdom in the past decade and considers their experiences and challenges in relation to these resources.

2. Literature review

Firkin (2003) introduced the concept of entrepreneurial capital as a way of explaining the importance of both financial and non-capital capital to the entrepreneur. The amount and type of entrepreneurial capital available to an individual can have a significant impact on the individual's experience of business ownership and the growth of the business. Firkin's view was influenced by the work of Bourdieu (1986) who argued that the amounts and types of capital in an individual's possession and the values attached to such capital determine his/her position in as far as business ownership is

concerned. Bourdieu suggested that individuals possess four types of capital namely economic, social, cultural and symbolic capital which Firkin (2003) collectively referred to as 'entrepreneurial capital'. Bourdieu is suggesting that different values are attached to each type of capital and this further suggests that gender affects the way in which the different types of capital is valued. Carter and Shaw (2006) posited that the different types of capital are valued differently depending on whether they are in the hands of a male or female entrepreneur. According to Carter and Shaw, it does not matter whether men and women possess the same amounts and types of capital. The value attached to the capital is lower in the hands of female entrepreneurs and a higher value is attached to the same capital in the hands of a male entrepreneur and this may explain the gendered nature of businesses owned by men and women. They however did not explain why different values are attached to entrepreneurial capital by men and women and the role played by society in deciding these values including the perceptions held by society about women entrepreneurship. They also did not explain whether the same values are attached by all men and women regardless of their backgrounds.

2.1 Human capital

According to Gonzalez-Alvarez and Solis-Rodriguez (2011), formal education is an important component of human capital as it enables entrepreneurs to accumulate knowledge and it equips them with the necessary skills they need to start their own businesses. They added that the accumulation of knowledge alone is not sufficient enough for business creation, but that the individual should have a sense of self-efficacy and the perception one has of their abilities and the amount of skills they think they have. Carter et al., (2002) equally posit that human capital is derived from education, training and work experience and from an entrepreneurial standpoint, work experience has three important dimensions namely industry, management and start-up (ibid).

Men do not only have more industrial experience, they also have more entrepreneurial experience (Fischer et, al., (1993), and Gatewood et al., (2002) suggests that women lack entrepreneurial self-efficacy compared to men and this made them have less confidence which affects their ability to succeed when they become entrepreneurs. Gonzalez-Alvarez and Solis-Rodriguez (2011) found in their study that more men (57%) were confident and they had the necessary skills to start their own business while only 45% of women had positive perceptions about their skills. Gonzalez-Alvarez and Solis-Rodriguez in their investigation of the influence of human and social capital and the existence of gender differences in the discovery of business opportunities showed that greater amounts of human capital increased the likelihood of discovering entrepreneurial opportunities. They concluded that the greater the level of education of an individual, the better their perception or self-efficacy and confidence in their knowledge and skills to start their own business and, the greater their likelihood to start their own businesses. Gonzalez-Alvarez and Solis-Rodriguez also found that men were able to discover more entrepreneurial opportunities than women and concluded that men had higher levels of education and they had greater perception of the skills and knowledge they had to carry out entrepreneurial activities and this supported their initial view of gender differences in the accumulation of human capital. In their conclusion, they also found that gender differences existed in the amount of human and social capital and in the discovery of business opportunities with men standing a better chance than women. However, other studies have concluded that women had the same if not higher qualifications to men.

2.2 Social capital

Social capital is one aspect of entrepreneurial capital that has been studied at length over a long period of time. This form of capital is considered a significant component of an entrepreneur's capital and it takes the form of social networks which are thought to play an important part in the development and success of small businesses. These social capital resources help individuals to get connected to people who may provide vital support to the business in the form of information, advice and practical help. These networks are considered particularly important to migrant and nascent entrepreneurs. Boden and Nucci (2000) argues that women start their businesses with less social capital because they have had fewer years of work experience and they lack managerial experience due to lack of exposure in the labour market. Shaw et al, (2005) found that female entrepreneurs were relatively younger and they did not have much work experience. They also found that there was a close relationship between the amount of human capital one has and the amount of social capital that they have and since men possess a greater amount of human capital (industry experience, age, qualifications, etc.), they are more likely to also have better social networks which explains the better

performance of their businesses. This according to Shaw et al, (2005) makes women seek to engage more in networking in order to compensate for the low value attached to their social capital. Brush et al, (2002) suggests that social capital has greater value than other forms of capital when it comes to raising finance Shaw et al, (2005) also found that women were more actively engaged in social networking which did not matter much in terms of lending them the support they need in their businesses and they did this in order to appear legitimate and gain recognition- something Bourdieu (1986) referred to as symbolic capital.

Gonzalez-Alvarez and Solis-Rodriguez (2011) found that having entrepreneurs in individuals' social networks enhances their social capital which is positively associated with discovering more entrepreneurial opportunities and other resources. Social capital is considered significant especially to migrant ethnic minority entrepreneurs and is thought to play an important part in the development and success of their businesses. Social capital as an entrepreneurial resource is particularly important to nascent entrepreneurs as it helps them to get connected to people who may provide vital support to the business in the form of information, advice and support. Boden and Nucci (2000) argued that women start their businesses with less social capital because they have had fewer years of work experience and they lack managerial experience due to lack of exposure in the labour market. Shaw et al, (2005) found that female entrepreneurs were relatively younger and they lacked work experience. They also found that there was a close relationship between the amount of human capital one had and the amount of social capital that they have and since men possess a greater amount of human capital (industry experience, age, qualifications, etc.); they are more likely to also have better social networks. Brush et al, (2002) suggests that social capital has greater value than other forms of capital when it comes to raising finance. They (Ibid) also found that women were more actively engaged in social networking which did not matter much in terms of lending them the support they needed in their businesses and they did this in order to appear legitimate and gain recognition-something Bourdieu (1986) referred to as symbolic capital. Some studies have found that networking has positive impact and helps in acquiring business information and advice (Shaw, 1997), and this is particularly beneficial to women as it offers them the opportunity to develop business contacts, accessing mentors and other forms of informal support (Atkinson, 2001). Kolvereid (1996) argued that cohesion within entrepreneurial families and access to business role models encouraged individuals to develop entrepreneurial habits.

2.3 Finance (economic) capital

Firkin (2003) defined economic capital as assets that can be easily converted into cash. Research has suggested that the negative experiences of women in the labour market such as low pay compared to men and lack of upward mobility (or glass ceiling) meant that they have less financial capital at their disposal when they want to start their own businesses. This under-capitalization will negatively impact on the growth and performance of their businesses. Marlow and Patton (2005); Shaw et al, (2005) have concluded that the lack of access to finance by women was a major constraint to their ability to start and grow their own businesses. They concluded that female entrepreneurs start their business with low levels of capitalization. They found that female entrepreneurs start their businesses with only about one third of the start-up capital used by men and they use less borrowed or equity capital when they start their businesses. Watson (2002) found a close connection between the amount of start-up capital and the performance of the business. Carter and Shaw (2006) suggest that businesses owned by women have a tendency of operating in those sectors which do not require much finance and they are also generally smaller compared to those of their male counterparts. The differences in financial requirements have therefore been associated with structural differences between male and female owned businesses.

Coleman (2000) found that women did not use bank finance as much as men do and attributed this to the criteria used by the banks which had nothing to do with gender. He added that banks used structural discrimination where they considered larger businesses more favourably than small businesses, and since most women do not own large businesses, their application for bank finance is not looked at favourably. In other words, banks do not discriminate against women but against the structure (i.e. size, age and sector) of the businesses. Carter et al, (2007) also found no evidence of discrimination by banks as the criteria they used to decide on an application is the same for both male and female applicants though Carter and Shaw (2006) conceded that decisions about who to lend money are made by individuals who may have their own prejudices. Another reason given for the differences in the finance profile of female and male led businesses has been attributed to the high levels of risk aversion among women which has seen them less willing to assume debts when they

start their own businesses (Bird and Brush, 2002; Marlow and Carter, 2005; Marlow and Carter, 2006) and as a result they prefer to start businesses that are smaller and which require smaller amounts of finance which they can afford from their personal savings and help from family and friends. Apart from structural discrimination on the part of banks and risk aversion on the part of women entrepreneurs, Carter and Shaw (2006) suggest that gender based differences in their perception of access to finance has contributed significantly to the differences in the amount of finance used by men and women.

3. Research process

This qualitative piece of work was conducted using face to face semi structured interviews with 35 migrant black African female entrepreneurs based in the Birmingham area of the West Midlands, United Kingdom. Birmingham is the 2nd largest city in Britain with a large number of migrants. The interviews which were recorded on tape lasted on average one hour each and they were conducted over a period of four months between September and December 2011. An interview schedule was used to guide the researcher during the interviews and to ensure that all key areas were covered. The interview tapes were manually transcribed immediately following each interview. The interview transcripts were then analysed thematically resulting in preliminary findings which are presented the sections that follow. The participants were identified using the purposive snowball sampling strategy in order to ensure a fair representation of women of different backgrounds from different African countries. The interviews were conducted within the business premises of each participant. Preliminary results from the study are presented in the following sections. The women who took part in the study were drawn from 13 African countries and the business they operate cover different sectors of the economy. The businesses are small and fairly new with the majority having been started in the last three years. The participants had been in the country for about 10 years with only three participants having been in the country for longer than 10 years. While the study does not propose any hypothesis, it is rather exploratory and inductive in order to meet objectives of the study.

The objective of the paper is to identify the entrepreneurial resources these women start with when they go into business and the difficulties they face in acquiring the different resources and the effect this has on their entrepreneurial ambitions.

4. Findings and discussion

4.1 Human capital

Academic background; the women in the study displayed a strong academic background. Figure 1 show that 40 per cent of the women were educated to degree level with a further 17 per cent having post graduate qualifications like Master's degrees or equivalent. Those educated below degree level made up 39 per cent with only five per cent of them not having secondary school level education. Most of the women acquired their graduate and post graduate qualifications in the UK.

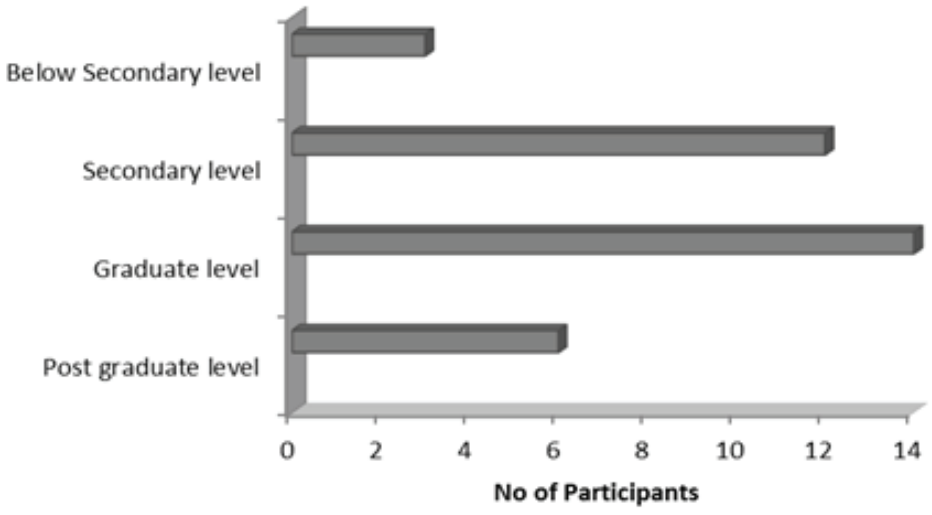


Figure 1: Level of education of participants

What seemed apparent with those women who were educated to degree level is that their degrees were in areas that were not relevant to their business. For some of these women, they obtained the degrees in order to qualify for post study work visas. They used their education as a means to settle permanently in the country and after they had achieved that goal, they then started doing things they had wanted to do i.e. starting their own businesses in areas that were sometimes not related to their qualifications. This was particularly evident in those women who obtained degrees in teaching, nursing and in social work. They knew these were areas with high demand and easy to obtain work permits. After they obtained their permanent residence, they left those professions for reasons like not enjoying the job or simply because 'that is not what I had always wanted to do'.

Previous experience; as discussed earlier in the literature review, human capital is not confined to the amount of qualifications and training one has acquired, but other factors such as the amount of experience one has usually obtained through formal work experience or experience in running their own businesses or exposure to the businesses run by family members. For example if an individual was brought up and exposed to the business run by their parents they are likely to has acquired some business skills. In the study, this form of human capital was found to be an important factor for some of the women as Carter et al., (2002) posited that human capital is derived from education, training and work experience and from an entrepreneurial standpoint, work experience has three important dimensions namely industry, management and start-up. As figure 2 clearly shows, 86 per cent of the women had previous experience when they started their businesses, 46 per cent from previous employment and 40 per cent from experience in running their own businesses or family businesses. Only 14 per cent of the women in the sample did not have any form of experience when they started their businesses.

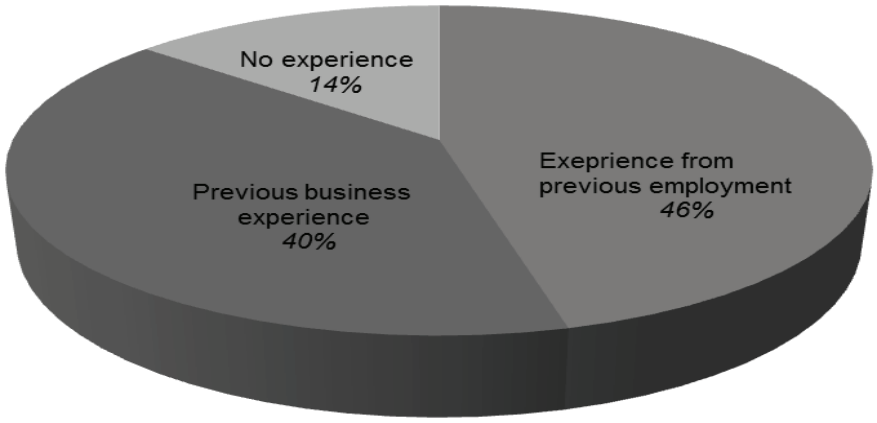


Figure 2: Experiences bought into the business

Apart from previous experience, another element of human capital is the personal attributes such as perception of risk, attitude towards owning a business, self -esteem or confidence, self-efficacy and according to Gatewood et al, (1995), having the right cognitive orientation increases the individual's ability to start their own business. In the study, the majority of the women showed a high degree of confidence and very positive about being able to own businesses though their perception of risk varied with the majority showing signs of risk aversion in making certain key decisions.

Post educational training; the nature of education and training and the type of skills acquired also count towards accumulation of human capital. As revealed in the literature review section, greater amounts of human capital is believed to increase the likelihood of discovering entrepreneurial opportunities and the greater the level of education of an individual, the better their perception or self-efficacy and confidence in their knowledge and skills to start their own business and, the greater their likelihood to start their own businesses. Evidence from the study (figure 3) shows that the overwhelming majority (80 per cent) of the women had undertaken some form of training much of which is related to the businesses they run. The remaining 20 per cent did not receive any form of training before they started their businesses. For those who had received training prior to starting their businesses, the training was done in the in the UK. The women took advantage of the numerous training opportunities available in their host country much of which is offered free or at subsidized rates.

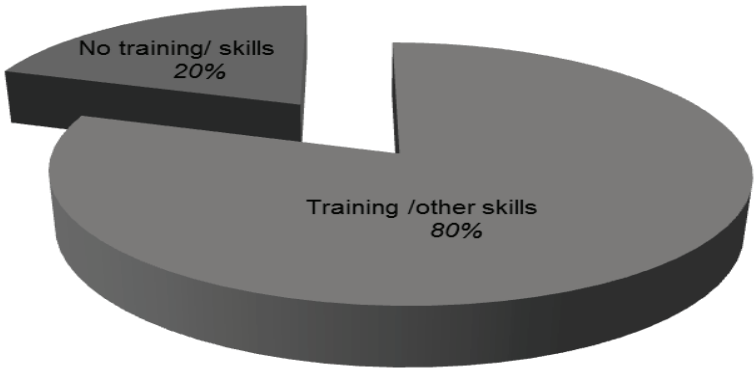


Figure 3: Post education training and skills

A combination of level of education, previous experience and post education training made their human capital stronger compared to their other forms of entrepreneurial capital.

4.2 Social capital

Informal social networking; as revealed in figure 4, even though all the women in the study claimed to be involved in some form of social networking, only nine (26%) of them effectively used those networks to obtain or share information, advice and other forms of business support while another seven (20%) had used official sources such as Business Link and the other eight (23%) used other sources such as other business people they came in contact with. The remaining 11 (31%) did not use any sources of advice. Part of the reason why these women used less of their family and friends was because of their migration history which is recent, they had not yet established strong cohesive networks and most of their family were not around. The other reason why there are a high number of those claiming not to use any sources was that because for some of these women, they still had immigration issues and so for them to avoid detection by the authorities preferred not to directly seek advice. Lack of trust and confidence and negative perceptions they had about their fellow Africans made them avoid making use of people within their social networks to benefit in their businesses.

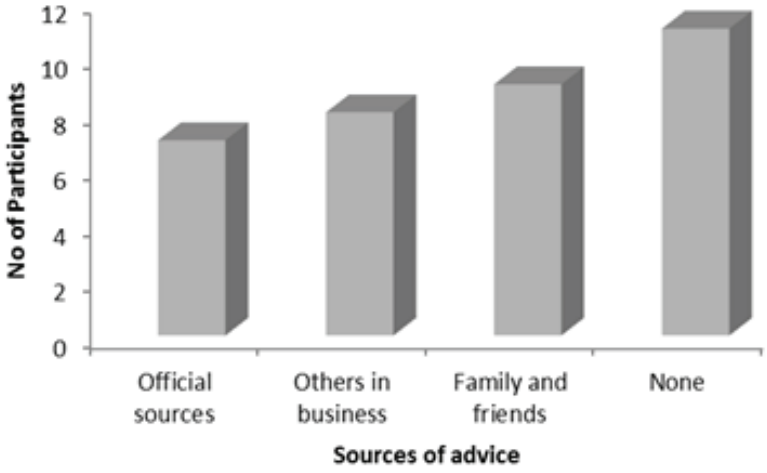


Figure 4: Sources of business advice

Formal social networking: When it came to more formal forms of networking which includes membership or participation in business or trade related organizations and associations, as figure 5 shows, nearly one half (49%) of the interviewees said they were members of such organizations but as figure 4 revealed, less than half of them actually used them for information and advice. So even though the women are formally networked in a significant manner, they did not seem to effectively use those formal networks to benefit their businesses.

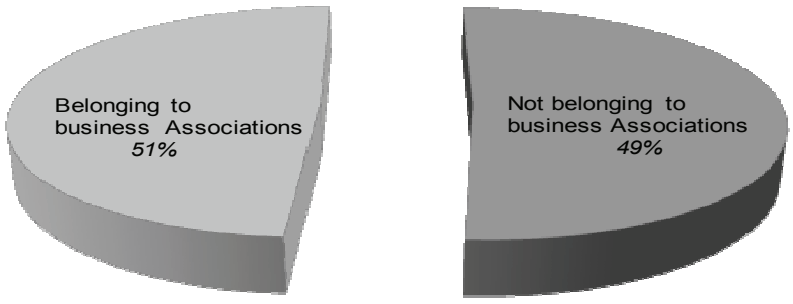


Figure 5: Membership of formal networks

The women said that they were not active members except for three who said they are actively involved in their formal networks. The reason given for their inactivity was because they saw no benefit from the networks or because they are too busy to attend functions such as networking events. Some felt uncomfortable attending formal networking events because they always found themselves in the minority.

4.3 Financial capital

Extant literature has over the years revealed that fewer ethnic minority groups especially women use formal sources of finance and the women in this study were no exception. As figure 6 reveals, only a small proportion used bank finance and for those who did, they used various means such as using their credit cards, overdraft facilities and in some cases re-mortgaging their homes.

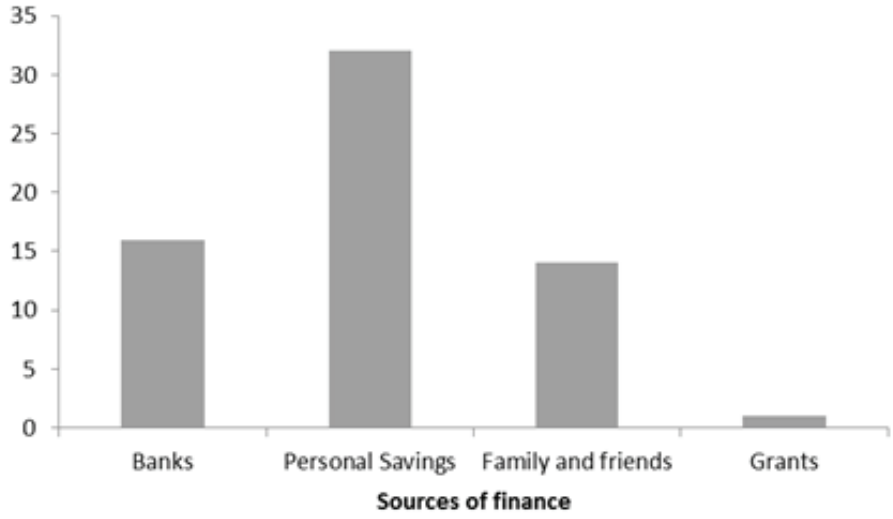


Figure 6: Sources of business financial

The overwhelming majority of the women (31) used their personal savings to start their businesses. Of these 31 women, eleven (31%) used their personal savings only and did not combine with other sources of finance. The rest used a combination of sources such as family and friends in addition to their own personal savings. Four women did not use their own personal savings two had to rely on family with one of them re-mortgaging her property to finance her business and the other obtained the European Union grant. Of the thirteen who got assistance from family and friends, only two got help from friends with the rest getting help from immediate family like husband, parents or brothers with the majority of these cases being husbands making the contributions. This appeared to contradict findings by Harding (2004) that the main source of finance for most ethnic groups were friends and family. The fourteen women who said their businesses were partly financed through bank loans said they used various means of obtained those loans. None of these women obtained a loan directly from their bank for the purposes of their businesses. Those who tried to borrow directly (40% of all women

interviewed), were turned down as found by Frazer, (2009) who concluded that the rate of loan denial was highest among black Africans compared to other ethnic groups, and they felt most discouraged from applying for a loan. These women had to use various other covert means like using their credit cards, using their existing overdraft facilities, re-mortgaging their properties and for some they lied about the purpose of the loan by for example claiming to be going on family holiday or renovating their homes when they actually needed to finance their businesses. The reasons for refusal of loans by banks were that the business plan was not viable, low credit score, not earning enough to service the loans or poor credit history. Ram and Deakins (1985) found that Africans and Caribbean relied on personal savings more than other ethnic groups partly because to their weak social networks and negative stereotyping by financial institutions. Twenty-one (60%) of the women who were interviewed said they never bothered to approach their banks for assistance and the reasons they gave were varied just as the Department for Trade and Industry (DTI, 2003) revealed that black African and Caribbean entrepreneurs were more discouraged from applying for finance than the other ethnic minority groups. Some were to do with being risk averse and some to do with immigration status while one said, it was due to her Islamic faith which did not allow paying of interest on loans, some said they did not believe in borrowing money from a bank. These women had different stories to tell about their experience of raising money to start their businesses with one woman saying she used debt factoring as a means of raising additional money to expand her business.

5. Implications

Regardless of gender, colour or ethnicity, it is important to have the correct balance of the different types of entrepreneurial resources. This balance becomes even more critical for new migrants as they often come into the country with limited financial and social network resources. It is therefore important for policy at local and national level to provide mechanisms that enable new migrants to have access to alternative sources of finance given that they may not qualify for ordinary bank loans as they may not have built sufficient credit history in the country. Without the financial resources to complement their human resources, it will be difficult for the new migrant women to turn their human capital into business opportunities. Besides financial resources, cohesive networks are also vital to ethnic minority entrepreneurs and without this cohesion, their businesses are likely to experience growth challenges as the social networks provide new entrepreneurs with access to other entrepreneurial resources and opportunities. Encouraging social and ethnic cohesion among the new migrant entrepreneurs by supporting organizations that provides platform for business networking among ethnic minority groups may be necessary as some of the existing business associations may not be suitable for the new migrants. It is important therefore for policy to engage with new migrants who have settled in the country and devise ways in which they can be supported and maybe incorporates them into existing structures in order for them to have a voice.

6. Limitations and observations

The lack of disaggregated data on ethnic minority groups as observed by Dawe and Fielden (2005) has meant that information of where to find the participants to the study as the organizations that hold data of female entrepreneurs rarely show such information as ethnicity or country of origin. This left the snow ball sampling strategy as the only viable option which has its own weakness of limiting the diversity of the participants though the use of complimentary purposive sampling helped to mitigate this limitation. Also due to the immigration status of some of the women, they were unwilling to be interviewed and especially when the recording was going to be on tape. To accommodate such women recording was not made on tape and instead, field notes had to be used at the transcription stage which could have impacted on what was exactly said during the interviews and no opportunities to play back any parts that appeared unclear. In use of interpreters at the interviews to accommodate those women who had difficulty in speaking English also meant that some of the information was received second hand which might have introduced some biases as a result of the interpretation process.

7. Conclusions and recommendations

As the world moves towards globalization and migration increases especially from developing to developed countries, new migrants who are entrepreneurial are often faced with challenges owing to changes in the socio economic and cultural environment and coupled with inadequate resources for business start-up. Further research may be necessary to determine whether the experiences of black African migrant women differs from that of their male counterparts to see to what extent gender, culture and tradition affects the way different entrepreneurial resources are accumulated. A

comparative study with other 1st generation ethnic minority groups who has been in the country for longer may also be necessary to determine whether some of the challenges cultural or ethnic specific.

References

Aldrich, H. (1989) Networking Among Women Entrepreneurs. In Brush, C.G., Carter, N.M., Gatewood, E.J., Greene, P.G., and Hart, M.M.(Eds.), *Women and Entrepreneurship; Contemporary Classics* pp. 103-32.

Atkinson. C. (2001) *With a Little Help from My Friends: Networking and Mentoring Among Entrepreneurs for Personal* Business and *Professional* Development. *WEI Working Paper* 18. Pontypridd, University of Glamorgan Business School.

Bird, B. and Brush, C. (2002). 'A Gendered Perspective on Organization Creation', *Entrepreneurship, Theory and Practice*, Vol. 26, No. 3 pp. 41-65

Boden, R.J. and Nucci, A.R. (2000). 'On the Survival Prospects of Men's and Women's New Business Ventures', *Journal of Business Venturing*, 15 (4): 347-362.

Bourdieu, P. (1986). The forms of Capital. In Richardson, J. (ed.), *The Handbook of Theory and Research for the Sociology of Education*, Greenwood Press, 241-258. New York

Brush, C.G., Carter, N., Greene, P.G., & Gatewood, E. (2002). The role of social capital and gender in linking financial suppliers and entrepreneurial firms: A framework for future research. *Venture Capital*, 4, 305-323.

Carter, N., Williams, M. and Reynolds, P. (1997). 'Discontinuance Among New Firms in Retail: The Influence of Initial Resources, Strategy and Gender', *Journal of Business Venturing,* 12 (2): 125-145.

Carter, S, Tagg, D& Brierton J (2002) 'Women owned business in profile', A report from The Bank of Scotland

Carter, S. and Shaw, E. (2006): Women's Business Ownership: *recent research and policy developments Report to the Department for Trade and Industry's Small Business Service Analytical Unit*, November 2006.

Carter, S., Shaw, E., Lam, W. And Wilson, F. (2007), 'Gender, Entrepreneurship and Bank Lending: The Criteria and Process Used by Bank Loan Officers in Assessing Applications'*, Entrepreneurship Theory and Practice* 31 (3): pp. 427-44

Coleman, S. (2000). Access to Capital and Terms of Credit: A Comparison of Men and Women- Owned Small Businesses, *Journal of Small Business Management*, 38 (3): 37-52.

Dawe, A. I. & Fielden, S. L. (2005) The Experiences of Asian Women Entering Business Start-Up in the UK. In Fielden, S. L. & Davidson, M. J. (Eds.) *International Handbook of Women and Small Business Entrepreneurship.* Cheltenham, Edward Elgar, 120-132.

DTI (2003a) *Small Business Service: Business Plan 2003,* London, Department of Trade and Industry.

Fielden, S.L., Davidson, M.F., Dawe, A.F., and Makin, P.F. (2003), Factors inhibiting the economic growth of female women small businesses in North West England, *Journal of Small Business and Enterprise Development*, Vo. 10 No. 2, pp. 152-66.

Firkin, P. (2003). Entrepreneurial Capital. In de Bruin, A. and Dupuis, A. (Eds.). *Entrepreneurship: New Perspectives in a Global Age*. Aldershot: Ashgate, pp. 57-75.

Fischer, E.M., Reuber, A.R., and Dyke, L.S. (1993), A theoretical overview and Extension of Research on Sex, Gender, and Entrepreneurship; *Journal of Business Venturing* Vol.8 pp. 151-68.

Fraser, S. (2009), '*Is there ethnic discrimination in the UK market for small business credit?'* International Small Business Journal, Vol. 27, (5), pp. 583-607

Fuller-Love, N., Lim, I. and Akehurst, G. (2006) *Female and ethnic minority entrepreneurship, Entrepreneurship* Mgt. 2: pp 429-439

Gatewood, E. J., Shaver, K. G., Powers, J. B., & Gartner, W. B. (2002). Entrepreneurial expectancy, task effort, and performance. *Entrepreneurship Theory & Practice*, 27(2): 187206.

Gonzalez-Alvarez, N. and Solis-Rodriguez, V. (2011), 'Discovery of entrepreneurial opportunities: A gender perspective'. Emerald Group Publishing Limited.

Harding, R. (2004) *Global Entrepreneurship Monitor - United Kingdom 2004.* London, Foundation for Entrepreneurial Management, London Business School.

Kolvereid, L. (1996) Prediction of Employment Status Choice Intentions. *Entrepreneurship Theory and Practice,* 21 (1), 47-57.

Marlow, S., and Carter, S. (2005). '*Financing Female Owned Firm: The Role of Accountants as Advisory Intermediaries*', paper presented at the 28th Institute for Small Business Entrepreneurship National Conference, Blackpool, November.

Marlow, S., and Patton, D. (2005). 'All Credit to Men? Entrepreneurship, Finance and Gender', *Entrepreneurship, Theory and Practice*, Vol. 29, No. 6 pp. 717-35.

Marlow, S. and Carter, S. (2006). *'If You Don't Ask You Don't Get! Women, Self-employment and Finance*' paper presented at the Warwick Business school Small Firms Finance Conference, May.

Ram, M. and Deakins, D. (1995) 'African-Caribbean Entrepreneurship in Britain', University of Central England Business School, Birmingham.

Shaw, E. (1997) The Real Networks Of Small Firms. In Deakins, D., Jennings, P. & Mason, C. (Eds.) *Small Firms: Entrepreneurship in the 1990s.* London. Paul Chapman Publishing.

Shaw, E., Carter, S., Lam, W. and Wilson, F. (2005). '*Social Capital and Accessing Finance: the Relevance of Networks*', paper presented at the 28th Institute for Small Business Entrepreneurship National Conference, Blackpool, November.

Watson, J. (2002), 'Comparing the Performance of Male and Female Controlled Businesses: Relating Outputs to Inputs' *Entrepreneurship Theory and Practice* 26, 3 Spring, pp. 91-100.

Entrepreneurship Against Unemployment: The Lived Experiences of Immigrant Entrepreneurs in Four Countries

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Abstract: Entrepreneurship can be seen as a potential solution for financial growth and as effective means to counter unemployment, especially in times of economic downturn. In order to alleviate the burden of unemployment and reenergize the wider economy, entrepreneurial activity is encouraged by EU policy such as the Small Business Act for Europe. The globalized economy and the existing economic crisis may lead to greater mobility of human resources and a consequent expansion in opportunities for immigrant entrepreneurship in Europe. In this context, success stories of immigrant entrepreneurs are useful as they highlight the factors that facilitate or hinder immigrant entrepreneurship which in turn provide evidence for effective policy making and, if effectively disseminated, may also provide a significant input to potential business start-ups. The present study is part of the ELIE (Employability: Learning through International Entrepreneurship) Project, and presents the lived experiences of immigrant entrepreneurs from four EU countries. Specifically, a new model for breaking down socio-cultural barriers to entrepreneurship will be presented, based upon the lived experience of immigrant entrepreneurs in four EU countries. Structured interviews were used in an overall sample of randomly selected 198 immigrant entrepreneurs living in the UK, Finland, Greece, and Poland. The findings showed that there was significant commonality in the socio-cultural factors that promote or hinder immigrant entrepreneurship in each country coupled with significant variation in the structural factors (e.g., bureaucracy) encouraging or limiting entrepreneurship. The paper will show how the experiences of successful immigrant entrepreneurs have led to the development of an innovative approach to the promotion of immigrant entrepreneurship and discuss the benefits of the ELIE taxonomy of international entrepreneurship. Recommendations for policy making and for the development of tailor made courses for SME learners and graduate students will also be provided.

Keywords: immigrant entrepreneurship, interviews, case studies, success stories, employability

1. Introduction

As the European Union and USA struggle with rising and long-term unemployment, especially amongst young people there is a need for new solutions to be developed. Rising unemployment is linked to the global economic downturn, but also to technological developments that mean fewer traditional employment opportunities are available, and also to the global market facilitated by the increased availability of high-speed internet connections. A traditional route to improving employment rates; government expenditure of a Keynesian model, is also not likely to be widely adopted as a solution to structural unemployment as the global financial crisis is accompanied by sharp declines in public expenditure. Given the sustained and widespread nature of the economic downturn, particularly in Europe, it is increasingly important that new approaches are developed to improve and sustain new employment opportunities. Research has supported the 'Schumpeter effect' whereby entrepreneurship helps in reducing unemployment through self-employment and the creation of new jobs (Audretsch and Thurik, 2001; Thurik, Carre, Van Stel, and Audretsch, 2008).

The potential of entrepreneurship to provide economic development is also recognised by the World Bank as key to the development of 'dynamic private sector growth' and they note that the decline in new business creation has been sharpest within advanced industrialised economies who have experienced the financial crisis more deeply and quickly than some less advanced economies (World Bank, 2010). However, encouraging people into entrepreneurship is not necessarily a straightforward process and many business start ups may lead to failure unless facilitating factors or barriers to entrepreneurship are properly identified and measures or resources to facilitate take-up of entrepreneurship opportunities are put into place (Audet, 2004, 2009)

Within the EU a range of initiatives from the Small Business Act for Europe (2008), awards for enterprise promotion, funding for projects, networks, and regional development grants linked to enterprise are part of a toolkit of approaches that are designed to foster enterprise. One of the key

reasons for the Small Business Act for Europe was to help with addressing structural barriers to enterprise. Structural Barriers to entrepreneurship such as funding, bureaucracy and infrastructure often require significant capital or legislative input to resolve them and these types of barriers have been the focus of policy initiatives; both in the US and the EU. However, despite attention paid to the removal of structural barriers SME start-ups are found to be heavily concentrated in certain social groups and numbers of start-ups remain depressed (European Commission, 2012 http://tinyurl.com/73se9ob) Furthermore, enterprise start-ups that are marginal, that is those businesses that are not of sufficient quality or where there is inadequate demand, may fail to provide a living income and are often unsustainable as an enterprise in the longer term (Audet, 2009; Kirk and Bolevics, 2006).

The International Labour Office noted the impact of global economic downturn on migrant worker and on flows of migration in 2009. This includes in-country, regional and global patterns of migration. Within the USA internal mobility related to employment and employability is found to be greatest amongst migrant communities (Papademitriou and Terrazas, 2009) and flows of people from the large but declining industrial cities of Detroit and Chicago are well-documented (Walters, 2010) while net immigration flows into the USA have been found to be closely correlated to the level of employment opportunity as measured by economic growth. Within the EU free movement of labour is a key aim, but again, migration patterns are found to be linked to the economic factors of regions or sectors, for as Awad (2009) notes; 'The destination country and the sector of employment are the essential factors determining impact' with, for example, construction and hospitality sectors being severely affected by the economic crisis, while some countries or regions are more severely affected than others.

UN figures show that about 200 million people; 3% of the population of the world, live in a country different to that where they were born. Within the EU migration is not limited to movement within the now 27 member states. Migration from outside Europe for family reunion, as a result of conflict or for economic reasons is a feature of European life. However, there are barriers to non-EU migration to the EU, which are member-state-specific and affect the make-up of migrant populations within individual member states. Clemens (2011) argues plausibly that that one of the reasons why governments in richer countries should be encouraging migration is that place-specific influences increase productivity of individuals; a factor highlighted in the findings of the ELIE project.

Recent work by Clemens (2011) illustrates that removing barriers to labour mobility leads to economic gains in the destination country. Certainly the work of the ELIE project provides a qualitative account of motivations, methods and impacts of immigrant entrepreneurship and shows significant economic gains in destination countries for individual entrepreneurs and the wider communities within which immigrant businesses are working. However, and more significantly working with immigrant entrepreneurs has provided valuable information about the role of social and cultural barriers to entrepreneurship that can be applied to the development of new paradigms in enterprise education (Johansen, 2010; Kirk and Belovics, 2006), increase employability and self-employability skills and encourage Europe-wide mobility for graduates and for existing entrepreneurs.

Within business studies there has been much research on entrepreneurship, and on barriers to entrepreneurship, however this has largely focussed on structural barriers such as access to capital, infrastructure, bureaucracy involved in setting up and running a business (Kanniainen and Poutvaara, 2007; Waldinger et al, 2009). Less attention has been paid to social and cultural barriers to entrepreneurship, largely perhaps because these are more difficult topic areas to explore, although some excellent studies are providing a base from which comparisons can be made and problems can be identified (Liao and Sohmen , 2001;Rivera-Vazquez et al , 2009). Certainly in the current difficult economic climate access to capital for existing SMES and for start-ups can be extremely difficult, and this is often cited as the key to declines in or failures for increases in SME start-ups.

The ELIE project (Employability: Learning through International Entrepreneurship) interviewed 198 entrepreneurs across four countries and developed 40 representative case studies. Interestingly, given the focus on structural barriers to entrepreneurship focussed on as a result of the economic crisis a key feature of the ELIE case studies was the great majority of the entrepreneurs did not need capital to start up or needed only very small amounts of capital that they were able to access relatively easily from savings, disposable income or targeted start-up grants for migrants. In the few cases where substantial capital investment was required we found family or other networks were the

most common source of capital with banks and financial institutions only relevant to a few cases, all of whom had been living in their new country for significant numbers of years. This is an important feature of the ELIE case studies, as it highlights the significance of cultural and social factors both in encouraging and in hindering entrepreneurship. This paper will therefore focus on how the findings of the ELIE project offer key indicators for policymakers seeking to encourage new entrepreneurs from a wide range of social groups.

2. Background to ELIE project

The overall aim of the ELIE project is the development and piloting of a learning framework that facilitates employability and entrepreneurship in a cross-cultural environment. Taking account of previous research that has identified differences in outcome between self-employment and entrepreneurship (Hamilton, 2000; Parker, 2004) it was nevertheless seen as important to incorporate well-founded definitions of international entrepreneurship within the research parameters.

A working definition of international entrepreneurship within the context of the ELIE project is provided by Oviatt and Phillips McDougall (2005); 'the discovery, enactment, evaluation and exploitation of opportunities across national borders to create future goods and services' (Oviatt and McDougall, 2005:30). Following the work of Giamartino, McDougall and Bird (1993) the term international entrepreneur within the ELIE project has several facets, allowing it to reflect the varieties of entrepreneurial experience. We have worked mainly with people who are entrepreneurs in a country not of their birth. However, we have also included entrepreneurs whose work is international in its scope and a small sample of people whose initial business is based still in the country of their birth but this has expanded into a new country. So for the ELIE project international entrepreneurship relates to i) moving to a new country to live and becoming an entrepreneur in that country ii) remaining in your country of birth but expanding your business to include overseas bases iii) having an international reach for your business whether you were born overseas or in the country where the business is based.

3. Overview of methods

An action research approach was taken that recognised the participants as experts in their own experience and encouraged learning from entrepreneurs rather than simply learning about entrepreneurs. This assisted in developing an in depth understanding of the processes involved in immigrant entrepreneurship amongst the sample. It allowed areas of interest significant to understanding social and cultural barriers to entrepreneurship to be developed including the nature and role of support structures used to manage effectively across cultural divides, impetus for entrepreneurship and personal explanations for success or failure. A range of methods were used to help generate knowledge including knowledge cafes and interactive Ketso-based workshops.

Our approach generated a wealth of qualitative data and supporting biographical-type quantitative data. Qualitative data was first analysed by in-country research teams, taking a reflective and iterative approach with initial impressions from early interviews themselves feeding into the structure of later interviews. This process allowed later interviews to pick up on the indications of socio-cultural barriers to entrepreneurship noted in the first tranche of interviews and refine the interviewing process to develop deeper understandings of this important aspect of entrepreneurship. Interview notes were used alongside recordings to allow themes to be identified and material categorised appropriately. Following Berkowitz (1997) and Bogdan and Biklin (1998) we were concerned to address the key issues of the themes and patterns that emerged from our data that addressed our research questions, how participants past experiences, environments and attitudes towards entrepreneurship were linked to their entrepreneurial life-course and future plans. Coding categories were initially developed in-country, with no restriction on number or types applied at this stage in the analysis. These categories were refined at a partner meeting where all academics involved in the project developed the final categories for the qualitative data from our 198 interviews, allowing the development of our 40 case studies (10 per country) that reflected accurately the themes within our data. As a result of our discussions on coding and the nature of the themes within our data, which were surprisingly homogenous in terms of social and cultural issues, the academic team came to the conclusion that our findings could best be expressed through a new taxonomy of international entrepreneurship.

3.1 ELIE taxonomy of international entrepreneurship

There is a significant body of literature that has worked on identifying common features of entrepreneurship. In aiming to develop materials that support entrepreneurship and international entrepreneurship in particular a means of collating the extensive material provided by our participating entrepreneurs was essential. It was therefore logical to look at existing taxonomies of entrepreneurship and to attempt to apply these to our findings.

Taxonomies for entrepreneurship are a feature of work by Scheinberg and MacMillan (1988*)* Dubini (1988) Blais and Toulouse (1990) Birley and Westhead (1994) Manimala (1996) amongst others. However, there were some difficulties in applying existing taxonomies to the ELIE project. Taxonomies concerned with motivations for business start up tended to have a minimum of seven characteristics (see for example Scheinberg and MacMillan, 1988 and Birley and Westhead, 1994), many of which were not evidenced as discrete motivations in our qualitative findings amongst a relatively large sample of 198 interviews. Intentions for entrepreneurship are in integral part of models of entrepreneurial behaviour (Linan and Chen, 2009) and provide the background to taxonomies of entrepreneurship, as well as often being used as a useful indicator of likelihood of success for initiatives to encourage enterprise.

In general the development of entrepreneurial intentions is seen as a two-stage process wherein social norms and values encourage an individual onto a career path, followed by personal experience inclining an individual to believe they can be successful and apply their skills in alternative settings. The intention model of entrepreneurship supported by the work of Peterman and Kennedy, (2003) Zhao et al. 2005 and others focuses on the desire to become an entrepreneur and belief that they can succeed as an entrepreneur, also known as self-efficacy. This model of entrepreneurship is clearly important and is based upon many studies (e.g., Wilson, Kickul, and Marlino, 2007; Zhao et al., 2005), but for the ELIE project it was critical that our learning materials reflected the lived experience of our target groups and this required a model that acknowledged complex, diverse and multi-faceted motivations for enterprise, and reflected on the impact motivations might have on the way in which an enterprise was then structured and developed. In many respects though, several of the categories proposed by other academics (such as Scheinberg and MacMillan's *"Need for Independence," "Need for Personal Development," and "Welfare Considerations,"*) are subsumed within the work-life balance route that we have used as one of our categories.

There were similar problems with existing taxonomies of entrepreneurial type. One interesting example is the excellent work of Manimala (1996). He divided entrepreneurs into two groups; high and low innovation with a total of thirteen sub-types between groups; concluding that the over-arching similarity between all subtypes and groups was that all entrepreneurs were innovators; albeit with some innovating considerably more than others. The sub-types identified by Manimala are useful in thinking about all entrepreneurs and could have formed the basis for an analysis of the international entrepreneurs within the ELIE project but it was felt that the thrust of Manimala's taxonomy was too generic for some of the patterns of entrepreneurship that were found to be common across the four countries of ELIE and also that many of the ELIE entrepreneurs would fall into the 'non-pioneer niche-holder' category and that this would not do justice to their diversity and difference of experience. Furthermore, the existing taxonomies of entrepreneurship did not take account of how motivations impacted on the ways in which entrepreneurs then managed and developed their businesses or of how adaptation to the role of entrepreneur could impact on style of entrepreneurship, or how support or encouragement from formal or informal sources could help the new entrepreneur develop their attitudes and understandings of enterprise in the context of their business.

The findings of the ELIE project concur with the observation of Lafuente and Salas (1989) that*;* 'Personal characteristics of entrepreneurs, and especially their motivations and work experiences, are therefore relevant factors in the study of entrepreneurship' (Lafuente and Salas 1989: 18). The personal and life experiences of the ELIE entrepreneurs were a significant feature in how their intentions for entrepreneurship were initiated and developed, were translated into action and were established. The ways in which entrepreneurship tended to develop amongst the ELIE interviewees were not well served by the majority of categories of entrepreneurship developed in more general settings and with smaller qualitative samples or solely using quantitative data. The interviewing stage of the ELIE project uncovered clear trends in the entrepreneurial life-courses of participants that have enabled five routes into entrepreneurship and distinct categories of international entrepreneurship to be developed. Some of these categories are also clearly applicable across entrepreneurship more

generally, and offer generalised lessons for those seeking to support or develop entrepreneurship themselves or as a tool for economic growth within a town, city or country. Other categories noted in this research seem to be are particularly common amongst immigrant entrepreneurs. It is also the case that some individuals fit across routes and categories and these categories should be seen as a development of the excellent previous work on taxonomies of entrepreneurship rather than a replacement for previous work.

4. The ELIE taxonomy

The ELIE taxonomy identified five routes into entrepreneurship amongst our 198 interviewees, and eight types of entrepreneurs, based on the individual characteristics and personal stories of our participants during the interview process. The factors that distinguish between categories include what types of skills or knowledge provided the foundation for entrepreneurship and the model of enterprise adopted. More detail of the routes into enterprise and the types of entrepreneur is found in the ELIE Project website (www.elie-project.eu).

5. Breaking down the barriers to enterprise

One of the most striking factors was that within each participating country we were able to identify a group of entrepreneurs for whom the route into entrepreneurship we classified as 'Reluctant or Necessity-driven'. While previous research into migrant enterprise has noted the impact of differing cultural attitudes and values such as religious beliefs, close family ties or trust as encouraging or supporting entrepreneurship there has been less work on migrant entrepreneurs who do not have cultural characteristics supportive of enterprise and are pushed into entrepreneurship by circumstance. This might be because significant numbers of reluctant entrepreneurs fail and are therefore not researched. However, contrary to our expectations, the reluctant or necessity driven group in the ELIE project were not generally doing poorly. They had adopted various strategies, or had access to types of support that had allowed then to develop their enterprise into effective businesses. As the project progressed we were able to use the later interviews to explore in more detail the barriers that had been overcome and the strategies that had helped our reluctant entrepreneurs prosper. It became clear that these were not structural barriers, but were social and cultural barriers such as overcoming negative perceptions of entrepreneurship, developing supportive networks or finding or being provided with an effective mentor.

These findings were supported by our interactive workshops with students and entrepreneurs which led us to identify a number of invisible socio-cultural barriers to entrepreneurship that can prevent a new venture starting, can limit enterprise amongst disadvantaged social groups to marginal ventures that often fail to deliver a living wage or severely limit the expansion opportunities of an existing business venture. Barriers included shortfalls in soft skills such as emotional intelligence, lack of social and cultural capital plus issues such as access to networks, ability to identify and apply existing skills in an enterprising manner as well as skills in planning and negotiating. This finding correlates with the findings of previous studies (e.g., Rouse and Jayawarna, 2006; Jayawarna *et al.*, 2007; Meager *et al*., 2003, MacDonald and Coffield, 1991)

6. Breaking barriers to entrepreneurship

If enterprise is to act on employment then simply observing that some migrant entrepreneurs overcome barriers and make a success of their venture is not a significant finding. However, through triangulation of our interview data and workshop findings it was observed that there were strategies that had potential to act upon the problem of social and cultural barriers to entrepreneurship, with the ELIE skills and competencies ladder and learning toolkit providing a model upon which new solutions to this problem could be developed. Our learning materials were launched in May 2012 and can be accessed on www.elie-project.eu. However, these are only part of the solution. Our work on social and cultural barriers to enterprise took place amongst a group that had overcome the barriers and developed their enterprise into a successful business. This led the ELIE team to work with stakeholders to develop a new project which would enable the provision of robust solutions for removing socio-cultural barriers amongst social groups under-represented in SME start-ups. This is the essential element in encouraging enterprise as a solution to unemployment and under-employment. We aim to deliver this by establishing new knowledge of the nature of socio-cultural barriers to entrepreneurship, developing a community-based and online training tool-kit based upon this knowledge that will enable access to mentors and a range of learning activities identified during the course of the project. We will also focus on developing knowledge of co-operative, social and low-

investment enterprise as these forms may have most scope for assisting our target groups out of poverty (von Ravensburg, 2009; Smith and Ross, 2006) while also offering benefits to the wider communities within which our target groups live. The innovative nature of ELIEMENTAL lies in its participatory approach, robust proposal for a self-sustaining mentoring network, development of community access points as a tool for reaching marginalised social groups Conclusions

The work of the Global Entrepreneurship Monitor (GEM) regarding necessity driven entrepreneurship is interesting as they consistently find that while many poor people become necessity entrepreneurs this group do not drive economic growth in the way that opportunity entrepreneurs do, a finding supported by the UN Commission on Growth and Development. However, within the ELIE project we found that this need not be the case if social and cultural barriers to entrepreneurship can be overcome. Firstly, our reluctant/necessity driven group were not mainly in marginal self-employment (as the GEM research suggests should be the case) and also they appeared to develop into opportunity entrepreneurs as they overcome the social and cultural barriers to entrepreneurship that made them reluctant entrepreneurs in the first place; the mechanisms through which this was achieved being similar in the four countries of the study.

A particular issue for the ELIE sample was that our reluctant or necessity driven entrepreneurs (a large sub-group making up around 15% of the sample) seemed not to follow the pattern of behaviour noted in other settings where necessity as a motivation for enterprise has been studied. In fact we found this group offered significant information on how social and cultural barriers to entrepreneurship could be overcome; as they had themselves overcome social and cultural barriers to entrepreneurship in order to make a success of a new business in a new country.

References

Audet, J. (2004) “A longitudinal study of the entrepreneurial intentions of university students”, *Academy of Entrepreneurship Journal*, Vol 10, No. 1/2, pp 3-16.

Audet, J. (2009) “Factors leading to satisfaction in a mentoring scheme for novice entrepreneurs”, *International Journal of Evidence Based Coaching and Mentoring*, Vol 7, No. 1, pp 148-161.

Audretsch, D., and Thurik, R. (2001) “What is new about the new economy: sources of growth in the managed and entrepreneurial economies”, *Industrial and Corporate Change*, Vol 10,No 1, pp 267–315.

Awad, I. (2009) ‘*The global economic crisis and migrant workers: Impact and response*, International Migration Programme, Geneva: International Labour Office.

Berkowitz, S. (1997) Analyzing Qualitative Data. In J. Frechtling, L. Sharp, and Westat (Eds.), *User-Friendly Handbook for Mixed Method Evaluations*. Accessed on 3 Feb. 2011 from National Science Foundation, Directorate of Education and Human Resources Web site: http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/CHAP_4.HTM

Birley, S., and Westhead, P. (1994), ‘A taxonomy of business start-up reasons and their impact on firm growth and size’, *Journal of Business Venturing*, 9, 7-31.

Bogdan R.B. and Biklin, S.K. (1998) *Qualitative Research for Education: An Introduction to Theory and Methods*, Third Edition. Needham Heights, MA: Allyn and Bacon.

Clemens, M (2011) Economics and Emigration: Trillion-Dollar Bills on the Sidewalk? Centre for Global Development Working Paper 264 available on http://www.cgdev.org/files/1425376_file_Clemens_Economics_and_Emigration_FINAL.pdf

Dubini, P. (1988) ‘Motivational and Environmental Influences on Business Start-ups: Some Hints for Public Policies’ in *Frontiers of Entrepreneurship Research* vol. 8 pp. 31-45

George, B.P. (2007) ‘Alleppey Tourism Development Cooperative: The Case of Network Advantage’ *The Innovation Journal: The Public Sector Innovation Journal*, Vol 12, No. 2, article 9.

von Ravensburg, G.N (2009) ‘Enterprise future lies in cooperation – Entrepreneur Cooperatives in Africa’, *CoopAFRICA Working Paper No.2, (2009)* International Labour Organisation available on http://www.ilo.org/public/english/employment/ent/coop/africa/info/publ.htm

European Commission (2012) *Small and medium-sized enterprises (SMEs) Promoting Entrepreneurship* available on http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/index_en.htm accessed on 16th April 2012

Giamartino, G. A., Phillips Mcdougall, P. and Bird B. J.(1993) ‘International Entrepreneurship: The State of the Field’ *Entrepreneurship: Theory and Practice*, Vol. 18, 1993

Hamilton, B. H. (2000) “Does entrepreneurship pay? An empirical analysis of the returns to self-employment”, *Journal of Political Economy*, Vol. 108, pp 604-631.

Jayawarna, D, Rouse, J, Crompton, H (2007) The NES Follow-up Survey, 2006: an Evalutation of the Expereinces of New Entrepreneur Scholars and their Businesses, Centre for Enterprise, MMU Business School, January

Johansen, V. (2010) “Entrepreneurship education and entrepreneurial activity”, *International Journal Entrepreneurship and Small Business*, Vol. 9, No. 1, pp 74-85.

Kirk, J. and Belovics, R. (2006) "Counseling would-be entrepreneurs", *Journal of Employment Counseling*, Vol. 43, pp 20-61.

Lafuente, A. and Salas, V. (1989) 'Types of entrepreneurs and firms: The case of new Spanish firms' *Strategic Management Journal* Volume 10, Issue 1, pp 17–30

Liao D. and Sohmen P. (2001) 'The Development of Modern Entrepreneurship in China' Stanford Journal of East Asian Affairs, 1

Linan, F., and Chen, Y. (2009) "Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions", *Entrepreneurship Theory and Practice*, Vol. 33, pp. 593-617.

MacDonald, R. and Coffield, F. (1991) *Risky Business? Youth and the Enterprise Culture*. London: Falmer Press.

Manimala, M. J. (1996) 'Beyond Innovators and Imitators: A Taxonomy of Entrepreneurs' *Creativity and Innovation Management*, Vol. 5, No. 3, pp. 179-185, September 1996. Available at SSRN: http://ssrn.com/abstract=1825807

Meager, N., Bates, P. and Cowling, M. (2003) *Business Start-up Support for Young People Delivered by The Prince's Trust: A Comparative Study of Labour Market Outcomes*. Department for Work and Pensions Report 184. London: HMSO.

Oviatt, B. M. Phillips McDougall, P. (2005) 'Toward a Theory of International New Ventures' *Journal of International Business Studies* Vol. 36, No. 1 (Jan., 2005), pp. 29-41

Papademitriou, D.G and Terrazas, A. (2009) 'Immigrants and the Current Economic Crisis: research evidence, policy challenges and implications' Migration Policy Institute available on http://www.migrationpolicy.org/pubs/lmi_recessionJan09.pdf

Parker, S. C. (2004). The Economics of Self-Employment and Entrepreneurship. Cambridge University Press, Cambridge, UK.

Peterman, N.E. and Kennedy, J. (2003) 'Enterprise education: Influencing students' perceptions of entrepreneurship', *Entrepreneurship Theory and Practice*, Vol 28, No. 2, pp 129-144.

Poutvaara, P. and Kanniainen, V. (June 2007) "Imperfect transmission of tacit knowledge and other barriers to entrepreneurship" IZA Discussion Paper No. 2859; CESifo Working Paper No. 2053. Available at SSRN: http://ssrn.com/abstract=998465

Rivera-Vazquez, J. C., Ortiz-Fournier L. V., Flores, F. R., (2009) 'Overcoming cultural barriers for innovation and knowledge sharing', Journal of Knowledge Management, Vol. 13 Iss: 5, pp.257 - 270

Rouse, J. and Jayawarna, D. (2006) 'The financing of disadvantaged entrepreneurs: are enterprise programmes overcoming the finance gap?', International Journal of Entrepreneurial Behaviour and Research, 12, 6, 388-400.

Scheinberg, S. and MacMillan, I. C. (1988) 'An 11 country study of motivations to start a business'.in B. Kirchoff, W. Long, W. McMullan, K. H. Vesper, W. Wetzel (Eds.), *Frontiers of entrepreneurship research*. Wellesley, MA: Babson College.

Smith, S. and Ross, C. (2006) 'How the SYNDICO-OP approach has worked in East Africa -Organizing out of poverty' Geneva: International Labour Organisation

Thurik, A., Carre, M., Van Stel, A., and Audretsch, D. (2008) "Does self-employment reduce unemployment?", *Journal of Business Venturing*, Vol 23, pp 673-686.

Waldinger, Roger, Ward, Robin, Aldrich, Howard E. and Stanfield , John H., Ethnic Entrepreneurs: Immigrant Business in Industrial Societies (1990). University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship. Available at SSRN: http://ssrn.com/abstract=1496219

Walters Stephen J. K (*2010)* 'Unions and the Decline of U.S. Cities' *Cato Journal*, Vol. 30, No. 1 (Winter 2010)

Wilson, F., Kickul, J., and Marlino, D. (2007). 'Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education'. *Entrepreneurship Theory and Practice*, Vol 31, pp 387-406.

World Bank (2010) *Entrepreneurship Snapshots* available on http://elibrary.worldbank.org/content/book/9780821384763

Zhao, H., Seibert, S. E., and Hills, G. E. (2005) 'The mediating role of self-efficacy in the development of entrepreneurial intentions', *Journal of Applied Psychology*, Vol. 90, No. 6, pp 1265-1272.

Fostering Creativity and Innovation: Spheres of Interaction Influence Chance Encounters

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Abstract: Knowledge creation, but also the efficient exploitation of existing know-how has become of strategic importance and a source of competitive advantage for many companies. The level of specialization has increased in many branches, necessitating an emphasis on integrating the knowledge of many people with diverse backgrounds. Communication is key for both creative tasks and the coordination of processes. Despite the introduction of a variety of different IT-mediated communication systems in the last decades, the critical importance of face-to-face communication has remained untouched. Direct encounters enable people to gain trust in one another and to transfer more than just the spoken language. An encounter between people who were not planning to meet may be especially fruitful. Such coincidental meetings, so-called chance encounters, lead to the creation of weak ties, i.e. loose relationships. These facilitate access to new knowledge while keeping the diversity of opinions high. Encounters also catalyze the transformation of loose relationships into strong ties. Strong ties are especially important for efficient coordination. Workspace design may help to coordinate work, reveal conflicting opinions to a greater or lesser degree, help management steer knowledge creation and support company-wide projects. Chance encounters especially are vital for knowledge sharing, knowledge creation and the development of new and innovative ideas. Based on two case studies in the pharmaceutical industry and in academia, this paper presents a framework that illustrates the impact of workspace design on encounters and communication. A holistic view of the design of the working environment, including its influence on the interactions between the employees and the barriers to and enablers of the flow of information, is presented. The findings show that the architecture of a building and the design of a workplace are important factors in increasing the number of face-to-face chance encounters. Another important, yet subordinate, factor which influences the number of chance encounters is the physical proximity to other researchers and companies. However, IT is the sphere of interaction in which most of the chance encounters take place. The findings of this study can help innovation managers and architects to shape innovative activities consciously. The framework and the figures which are presented in this paper finally help us to understand where chance encounters take place.

Keywords: chance encounters, spheres of interaction, communication, innovation, workplace design, architecture

1. Introduction

> *Creativity comes from spontaneous meetings, from random discussions. You run into someone, you ask what they're doing, you say 'Wow', and soon you're cooking up all sorts of ideas.*
>
> *(Steve Jobs, cited in Isaacson, 2012, p.100)*

The emergence of knowledge societies has become manifested in corporate architecture: in the past decade, a series of multinational companies have changed their headquarters from production-oriented industrial sites into campuses tailored to the requirements of modern knowledge workers. Large corporations, such as Google or Apple, sought inspiration for their new corporate centers from the campuses of universities. It is the role of university campuses as incubators of innovation that makes them worth imitating. Campuses function as centers of knowledge and learning because they promote internal knowledge transfer and social interactions (Hoeger, 2007). It is the special architecture that fosters human encounters and, among these, the especially significant chance encounters.
This paper presents the results of two case studies which shed light on the phenomenon of chance encounters from a managerial perspective. Starting with a literature review on the importance of chance encounters for creativity and innovation, we will then show where the important encounters take place and how these interactions can be influenced.

2. Literature review

Until recently, the work environment in a typical company was seen as nothing more than a means to an end: many office buildings were built according to the work model which was developed in the 19th century. There was a very strict separation of work and leisure time, the work itself was heavily standardized and the workspaces of the employees were all exactly the same (Duffy, 1997). However, over the last few years there has been a drastic change in how we perceive work and workspaces:

new challenges in work have arisen, unprecedented possibilities have appeared due to new technology and the line between work and private life is beginning to blur. Due to these developments, the work environment appears in a new light and its design is increasingly seen as an instrument to actively support and encourage work (Newsham, 1997).

2.1 Creativity and innovation in day-to-day research work

When designing a new work environment, the productivity and the work performance of the employees is of utmost importance, but actually measuring the influence of the work environment on productivity is difficult. The reason is twofold: first, there is no single definition of“ productivity” of knowledge workers and second, it is difficult to identify which environmental factors influence the performance of employees (CABE, 2004). Vischer (2006) claims that there are three different types of productivity which can be influenced by workplace design: individual productivity, productivity of workgroups and organizational productivity. Individual productivity is affected by the design of one’s own workplace and one’s performance. Performance is then influenced by environmental factors such as lighting, temperature, humidity, ergonomics and acoustics. The productivity of work groups is dependent on the quality and quantity of the processes within the group. Organizational productivity can be increased by easy access to buildings, by the level of comfort within the buildings and by consolidating all of the employees under one roof, dividing them into workgroups and putting the workgroups within close proximity to one another.

The main goal of R&D-based companies and of universities is not productivity *per se*, but innovative power. Drucker (2002) describes innovation as being the “heart” of entrepreneurial activities and claims that knowledge is the most valuable resource of a company. According to Amabile (1998),knowledge is a prerequisite for creativity and for developing innovative ideas. Organizations can influence the creation of knowledge by enhancing the communication between their members and organizational structures (Allen and Henn, 2007), increasing the motivation of its members (Amabile, 1996), and defining the organizational norms and culture (Davenport and Prusak, 1998; von Krogh, 1998; Nonaka and Takeuchi, 1995).

2.2 Communication and its influence on collaboration

Communication between employees greatly facilitates knowledge transfer within a company (Davenport and Prusak, 1998). Speaking face-to-face is the richest type of communication because information is conveyed both in a verbal and nonverbal manner (gestures, movements, facial expressions, etc.). For this reason, face-to-face communication is crucial for people to gain trust in one another and is a prerequisite for efficient collaboration (Prusak, 2001). It is important to note that the medium through which a piece of information is being transmitted can adequately describe and reflect that information. In other words, the complexity of the information channel must match the complexity of the content: “the medium is the message” (McLuhan, 2001, p.7). “Simple” communication channels, such ase-mails, documents and telephone conversations, are adequate for conveying simple concepts, while more complex pieces of information should be communicated by video conferences, face-to-face discussions and expert presentations (Heyn and Boutellier, 2011). Allen and Henn(2007) have found that it is practically impossible to replace face-to-face discussion with another type of communication channel. Other channels are “bandwidth-limited” and are less suited for informal communication or for developing mutual trust. It has been shown that the average duration of a face-to-face conversation is similar to all other modes of communication and cannot be substituted.

Depending on your discussion partner, knowledge will be generated in different ways. Discussions with colleagues with whom you have a loose relationship can lead to new ideas (Perry-Smith, 2006).This is because, in this case, there is only a small overlap between the knowledge base of the two parties. However, an important prerequisite for a fruitful knowledge exchange is speaking the same language in order to be able to discuss complex or difficult technical issues. This, in turn, requires that the two people have a similar background. Loose relationships, or weak ties, can evolve into a large and diverse network that can be taken advantage of in order to solve-work related problems. On the other hand, people you know well and with whom you have a lot of contact know about your problems and difficulties and can thus help you to get to know other people who could offer a new perspective on your problem (Allen and Henn, 2007; Gladwell, 2001). Close relationships are important for knowledge transfer and coordination and thus increase work efficiency (Boutellier et al, 2008; Perry-Smith, 2006). Furthermore, tacit knowledge can only be passed on efficiently if all the relevant people work at the same place (Nonaka and Konno, 1998). At the same time, the transmis-

sion of complex knowledge is only possible between people who have a close relationship with one another because weak relationships and the complexity of transmitting knowledge are contrary to each other (Hansen, 1999). Social ties create trust among colleagues and are essential for knowledge transfer and efficient working practices
(Prusak, 2001).

In order to increase the productivity of R&D intensive companies and universities, a balance between loose and close relationships is very important. On the one hand, productivity relies on new perspectives and complementary knowledge; on the other hand, it depends on reliability and trust within one's immediate work surroundings.

2.3 Work environment and chance encounters

Gladwell (2000) describes the ideal work environment as a city which enables the transmitting of knowledge between its different areas. The layout of the work environment, including the layout of a building, has an influence on the communication patterns of the members of an organization (Allen and Henn, 2007) and on innovative activity (Haner and Bakke, 2008; Hatch, 1997). Buildings facilitate or limit physical movement and also foster or hinder communication (Seiler, 1984). The design of a building influences the interactions between the employees: it supports or hinders communication and thus the flow of information, helps to coordinate work, reveals conflicting opinions to a greater or lesser degree, helps management steer knowledge creation and supports company-wide projects (Haner and Bakke, 2008). Stryker (2004) underscores the importance of the location of a workplace and of building social oases within a building. Similarly, Allen and Henn (2007) stress the importance of social zones where chance encounters and discussions can take place.

Chance encounters, which we define as coincidental meetings between people who do not work directly with one another, deepen close relationships or lead to the creation of loose relationships which may, in time, turn into close relationships.

3. Research design

The literature on the special prerequisites, enablers, and facilitators of chance encounters is limited. Therefore, for this study the authors chose a grounded theory approach (Glaser and Strauss, 1967)as research methodology based on two explorative case studies. Case studies are well suited to conduct research on contemporary phenomena within real-life contexts while considering multiple variables (Yin, 2002).In particular, they allow us to answer the *how* and *why* questions.

For our case studies we chose the field of bio-molecular research. This field is well qualified for doing research on creativity and exchange: it is knowledge intensive and requires scientists and technology experts with diverse backgrounds to interact with one another, e.g. biologists, physicians, computer scientists, and chemists. In the first case, we focused on encounters and on the behavior of workers in offices and laboratories in a global pharmaceutical company (Pharma Inc.). We compared a 30- to 40-year-old cellular workspace for 1–2 people per room and a brand new open plan, multi-space environment. The new workspace is located in one of Pharma Inc.'s most modern research buildings (Building One)and merges laboratory and office space into one whole open plan office without any walls. The whole building consists of four floors, all with the same type of open-office environment. One of these floors is shared by 35 researchers from diverse disciplines. Following the suggestions ofEisenhardt (1989) and to test the universality of the gathered patterns ,we tested the model derived using a second case. This was also in the field of bio-molecular research, but investigated a workspace in academia. A research group in molecular systems biology and one in cellular biology working on ETH Zurich's Science City campus were analyzed.

We triangulated methods, including 400 hours of direct observation in labs and offices, semi-structured interviews with 30 different interview partners and online surveys. We attended team meetings and unit-wide assemblies in order to record the exchanges during the official parts of the meetings. We also observed the informal interactions before official meetings, during breaks and after the meetings. In addition, the ETH researchers were asked to complete log files during the course of their work. These 52 researchers noted all of their work-related communication with people outside of their own research group, i.e. outside their organizational unit. We collected the log files each evening for two weeks.

4. Findings

In the following sections, we present a classification of the different places within an environment and events where work-related encounters take place. Further quantitative data allows a prioritization of the classification of the different places from a managerial point of view.

4.1 Spheres of interaction shape encounters

The number and occasion of encounters during working hours are influenced by potential *communication partners* and by different *spheres of interaction* (see Figure 1).Potential communication partners are those whom an employee has a probability of meeting during working hours. This encounter occurs due to the function or role of the potential communication partner,e.g. an employee stays in contact with customers during the working day or the employee has to clarify regulatory affairs with authorities.

People are affected by and are dependent on the environment in which they are located. They are associated with different systems – spheres of interaction – which have their own rules and which influence each other. There is interplay both between the different spheres of interaction and each employee, and between spheres of interaction and potential conversation partners. A new building is an example of this interplay: the new architecture has an influence on the workflow which is linked to the organization of the work. Due to the building, the work itself changes. All of these changes can lead to an alteration in the characteristics of encounters and to new types of encounters between the employees, or even to newly formed contacts with clients. Thus the dependence of potential communication partners on different spheres of interaction – and vice-versa – is a dynamic process. The results of this process are (chance) encounters.

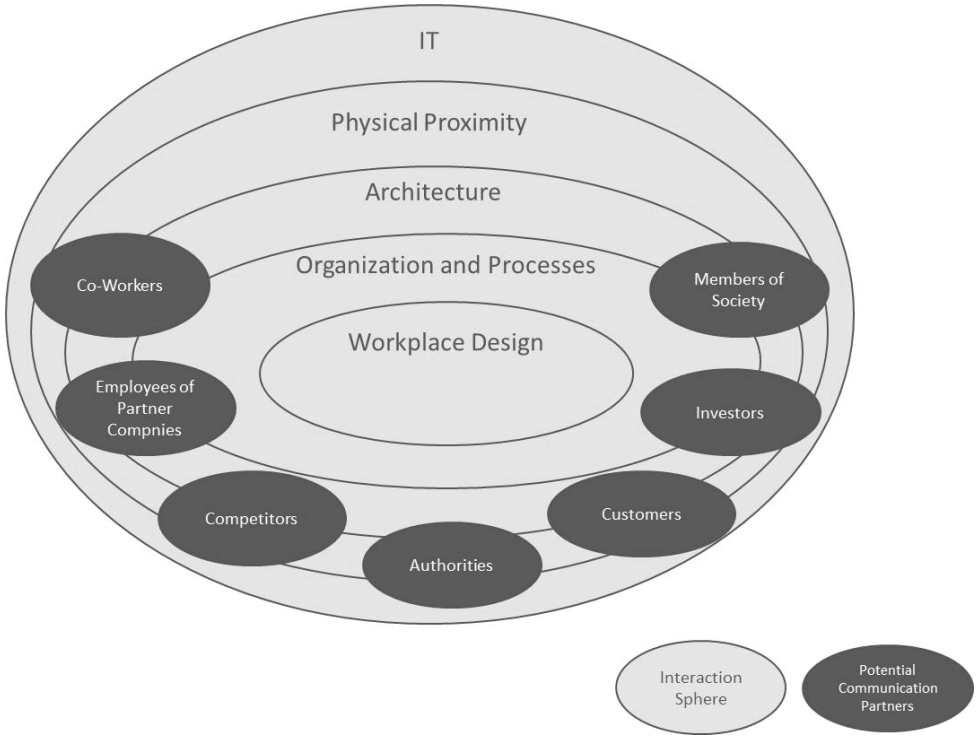


Figure 1: Impact on encounters: spheres of interaction and potential communication partners

As can been seen in Figure 1, important spheres of interaction are:

- *Workplace Design* The workspace design directly influences encounters with other people: visibility, lighting, acoustics and furnishing all influence the amount of face-to-face contact with colleagues. In the newly constructed Building One, the employees of several hierarchical levels share the same space. From the outside, one cannot tell who is in a managerial position and who is not.
- *Organization and processes* during work Workflow design also influences encounters because the people with whom one has a spontaneous meeting are dependent on how the available infra-

structure is used. Also, a company can encourage informal encounters in the employees' free time, e.g. by providing sports facilities or by organizing cultural events. Pharma Inc. does not provide the complete equipment needed to all research groups. They do this deliberately. Thus, if a specific machine needs to be used, the researcher has to go to a central area where various machines are pooled. The pooling can lead to chance encounters between researchers from different disciplines. Breakfast meetings for all those in Building One are another example of a measure that has led to various encounters: the various short presentations by the researchers in an informal atmosphere during meetings leads to animated and spontaneous work-related conversations after the meetings end.

- *Architecture* of the building in which the workplace is located Buildings can be designed in such a way as to encourage encounters with different people, and not only with one's direct colleagues. The way in which corridors, workrooms and leisure rooms are designed and placed in relation to one another influences the type and manner of encounters. The different floors within Building One can either be accessed by elevator or by stairs. The walls of the stairwell are made of glass and whoever uses the stairs must go through the working areas of other research groups.
- *Physical proximity* within and outside a cluster Campus- and cluster-like structures lead to a regional aggregation of different companies or research institutions. These regional aggregations can be described as areal networks which may increase the probability that researchers with similar interests meet and start talking. In all of the buildings on the Pharma Inc. campus the infrastructure which everyone uses is located on the ground floor. Also, restaurants, cafés and cafeterias are located on one long road that crosses the campus.
- New *Information Technology* (IT) New technologies lead to the creation of new spheres of movement. They enable encounters which, due to long distances, would otherwise not be possible. Several social areas in Building One are connected to similar areas in buildings on other sites by permanent videoconference channel – this means that these break rooms can transmit and receive video and sound. Thus, the distances between different stories, buildings and countries can be overcome.

When designing a new working environment, companies are increasingly focusing on communication and encounters. Pharma Inc. and other companies are trying to use campus-like structures in order to increase and utilize such correlations as described above, since the number of opportunities for a (chance) encounter should be higher than in a "conventional" work environment.

4.2 In which sphere of interaction do chance encounters take place?

After analyzing the communication across the boundaries of the research group at ETH Zurich, it was found that 44.4% of the chance encounters were conducted face-to-face (see Table 1), whereas all of the others took place by phone, videoconferences, communication platforms and social networks. Of the face-to-face chance encounters, 90.8% took place with people the researchers already knew. Only 9.2% of the face-to-face chance encounters were meetings between people who did not know each other.

Table 1: Spheres of interaction and their relative importance (causes of interactions)

	SPHERES OF INTERACTION					
	Workplace Design	***Organization and Processes***	***Architecture***	***Physical Proximity***	***IT***	***Total***
	44.4% of all chance encounters take place face-to-face				55.6%*	100%
Face-to-face chance encounters between people who **know each other** (90.8%)	38.8%	9.5%	49.2%	2.5%		100%
Face-to-face chance encounters between people who **do notknow each other** (9.2%)	65.2%	4.4%	17.4%	13.0%		100%

n=942

*55.6% of all chance encounters take place due to new information technology and are therefore not face-to-face (the people are not in the same place).

The study showed that concerning face-to-face encounters between people who know each other, architecture is an important factor because nearly half (49.2%) of all the encounters which led to a work-related conversation took place due to the design of the building. These encounters took place in a corridor, stairwell, or coffee corner, or at a coffee machine or beverage vending machine. Also, the workplace itself is a very significant area for chance encounters (38.8%). Visitors have often started conversations with their contacts' office or lab colleagues. This was usually either because they were introduced or because someone was looking for a specific person who was not inthe office (or could not be found) and therefore started talking to their colleague who did happen to be around. Overlapping work processes and organizational conditions were the reasons for 9.5% of the chance encounters, 2.5% were due to physical proximity (see Table 1).

With regard to face-to-face chance encounters with people who do not know each other, the workplace is even more important: almost two thirds (65.2%) of chance encounters with unknown people took place there. Even for this kind of encounter, architecture is an important factor (17.4%). Physical proximity has greater weight (13.0%), while the organization and processes are less important (4.4%) compared with encounters between people who know each other.

Face-to-face conversations remain similarly important over a large range of distances (see Figure 2).In the case of ETH, only when the home locations of two communication partners were separated by less than 100m were direct encounters significantly more important. At this level of distance, periodical (chance) encounters could partially replace other means of communication. For longer distances, the share of face-to-face communication stays constant, as does the number of chance encounters. Even if a significant share of communication takes place electronically, travelling to the locations of collaboration partners remains important, mainly due to the requirements for transferring tacit knowledge and for developing trust. The importance of visitors should therefore be taken into consideration when designing workplaces for communication and encounters.

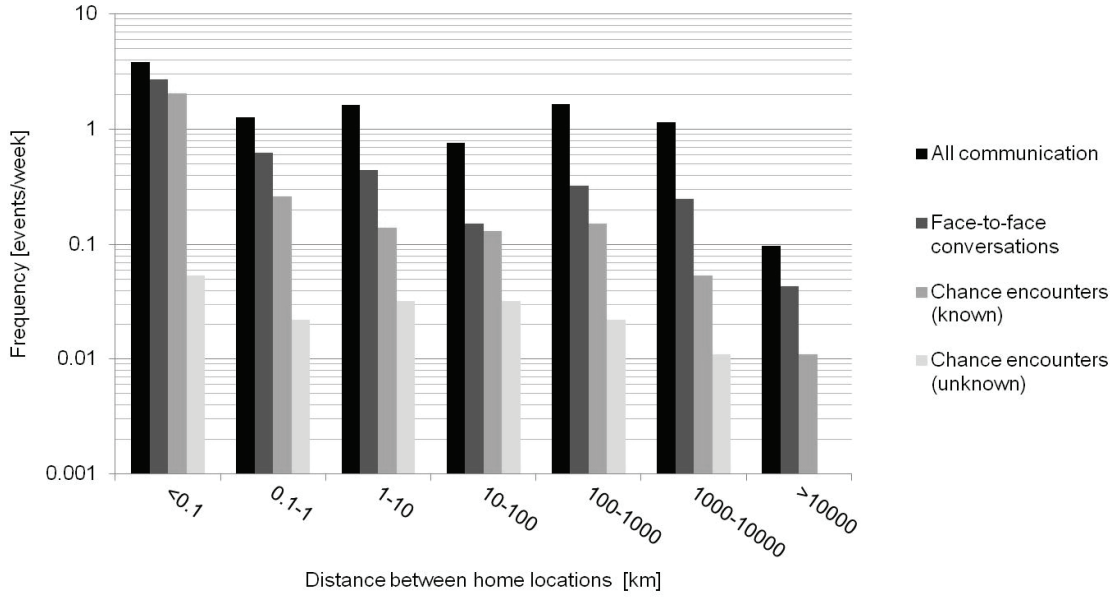


Figure 2: Communication channels and the proximity of communication partners (log scale)

5. Discussion

The study shows that the architecture of a building and the design of the workplace are very important factors in increasing chance encounters. This fact supports the decision to spend money on the design of these two spheres of interaction. However, there is a difficulty: when a company plans and designs a new building, it needs to make sure that the relationships between the employees form the basis of the planning and not the aesthetic aspirations of the architect. Having no walls does not lead to efficiency since the workers can be distracted by acoustic and visual stimuli.

Another important factor, albeit one which has a subordinate role in influencing the number of encounters, is the physical proximity to other researchers and companies. Physical proximity affects encounters between people who do not know each other. Between people who know each other, physical proximity seems to be less important. Here IT is the sphere of interaction in which most of the chance encounters take place. This sphere of interaction is subject to continuous change. What, though, is the quality of the chance encounters in this sphere? Preliminary results suggest that chance encounters in the IT sphere are good for transmitting simple knowledge and for sustaining relationships.

6. Conclusion: Encounters can be managed!

In conclusion, we can say that companies who actively want to support the generation of new ideas must give their employees opportunities to forge new relationships and to strengthen old ones, to achieve a balance between weak and strong relationships. By consciously designing and creating spheres of interaction, chance encounters can be instigated, and these are important for forging new contacts and deepening existing ones. Even minor changes to a specific sphere of interaction can influence other spheres of interaction as well as potential conversation partners: the design of a sphere of interaction always has an effect on encounters. However, for a work environment to be inspiring, there also needs to be places to which the employees can withdraw from everyone else in order to work in self-chosen solitude.

If companies want to increase the number of chance encounters and the number of new relationships, other opportunities besides the architecture and the design of workplace must be made available. As shown in our study, there is still potential for more chance encounters to be instigated in the sphere of Organization and Processes (Figure 1). One beneficial way of doing so would be by organizing events in which many diverse people from different teams, departments, or even people from outside of the company, can participate.

By consciously designing and creating the different spheres of interaction, Pharma Inc. is turning their vision into reality, namely that of creating a campus where the employees can meet, talk and exchange ideas. The office area was envisaged to increase the communication between researchers in the different research groups. The work flow process and the architecture of the building were constructed in such a way as to encourage and stimulate encounters with people outside of one's own research team. The structure of the campus makes it possible for the employees to meet people who are not directly relevant to their work. By integrating new types of technology in the workspace, better communication between colleagues and strangers can be achieved.

This paper contributes to the existing literature on spheres of interaction: the design of these spheres has an impact on communication patterns and (chance) encounters among employees. Furthermore, this paper quantifies the importance of the different spheres of interaction. In addition, it could be shown that chance encounters and face-to-face conversations seem to be of higher importance for employees who work less than 100m apart.

References

Allen, T. J. and Henn, G. W. (2007) *The Organization and Architecture of Innovation*, Elsevier, Burlington MA.

Amabile, T. M. (1996) *Creativity in Context: Update to the Social Psychology of Creativity*, Westview Press, Boulder CO.

Amabile, T. M. (1998) "How to kill creativity", *Harvard Business Review*, September–October, pp 77–87.

Boutellier, R. et al. (2008) "The quantitative impact of office layout on face-to-face communication, knowledge creation and creativity in a science based business", *R&D Management*, Vol 38, No. 4,pp 372–391.

CABE (2004) *Office Design and Business Performance: Technical Report*, D.E.G.W.,London.

Davenport, T. H. and Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know*,Harvard Business School Press, Boston MA.

Drucker, P. F. (2002) "The discipline of innovation", *Harvard Business Review*, Vol 80, No. 8, pp 95–102.

Duffy, F. (1997) *The New Office*, Conran Octopus, London.

Eisenhardt, K. M. (1989) "Building theories from case study research", *The Academy of Management Review*, Vol 14, No. 4, pp 532–550.

Gladwell, M. (2000) "Designs for Working: Why your bosses want to turn your new office into Greenwich Village", *The New Yorker*, December 11, pp 60–70.

Gladwell, M. (2001) *The Tipping Point, How Little Things Can Make a Big Difference*, Little, Brown and Company, New York.

Glaser, B. G. and Strauss, A. L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Wiedenfeld and Nicholson, London.

Haner, U.-E. and Bakke, J. W. (2008) “Proximity, mobility and aesthetics in strategies for innovation management”, *Int. J. Entrepreneurship and Innovation Management*, Vol 8, No. 2, pp 168–183.
Hansen, M. T. (1999) “The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits”, *Administrative Science Quarterly*, Vol 44, No.1, pp 82–111.
Hatch, M. J. (1997) O*rganization Theory – Modern, Symbolic, and Postmodern Perspectives*, Oxford University Press, Oxford UK.
Heyn, G. and Boutellier, R. (2011) “Die Kommunikationskanäle haben erheblichen Anteil am Projekterfolg“,*Innovation Management*, No. 1, pp 88–93.
Hoeger, K. (2007) “Campus and the City – A joint venture?” in Hoeger K., Christiaanse K. (eds.), *Campus and the City*, gta, Zürich.
Isaacson, W. (2012) “The real leadership lessons of Steve Jobs“, *Harvard Business Review*, Vol 90, No. 4, pp92–102.
McLuhan, M. (2001) *Understanding Media*, Routledge, London.
Newsham, G. (1997) “Cost-effective open plan environments (COPE): A new research initiative”,*Construction Innovation*, Vol3, No. 1,pp 32–34.
Nonaka, I. and Konno, N. (1998) “The concept of ‘‘ba’’: building a foundation for knowledge creation”, *California Management Review*, Vol 40, No. 3, pp 40–47.
Nonaka, I. and Takeuchi, H. (1995) *The Knowledge-Creating Company*, Oxford University Press, Oxford UK.
Perry-Smith J.E. (2006) “Social yet creative: the role of social relationships in facilitating individual creativity”, *The Academy of Management Journal*, Vol 49, No. 1, pp 85–101.
Prusak, L. (2001) “Face to Face, Screen to Screen. Collaboration in the New Workplace,” Workplace Issues: One in a Series, Steelcase.
Seiler J. (1984) “Architecture at work”, *Harvard Business Review*, Vol 62, No. 5, pp 111–120.
Stryker, J. B. (2004) *Designing the Workplace to Promote Communication: The Effect of Collaboration Opportunity on Face-to-Face Communication in R&D Project Teams*, PhD Thesis, Rutgers, Newark NJ.
Vischer, J.C (2006) “The concept of workplace performance and its value to managers”,*California Management Review*, Vol 49, No.2,pp 62–79.
von Krogh, G. (1998) “Care in knowledge creation”,*California Management Review*, Vol40, No. 3, pp133–153.
Yin, R. K. (2003) *Applications of case study research*, Sage Publications, Inc., Thousand Oaks, CA.

Entrepreneurial Attitudes and Perceptions in a Cross-Country Setting: Evidence From GEM Data

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Abstract: In the late 20th century, entrepreneurship re-emerged as a key outline item of economic policy makers across Europe, both for some nations as well as for European Union as a whole. Reasonable economic growth joined with constantly high levels of unemployment encouraged expectations of entrepreneurship's potential as a source of job creation and economic growth. In spite of this growing interest, an inclusive theoretical and empirical research is needed. This paper aims to identify groups of countries that share similar patterns regarding the characteristics of entrepreneurial attitudes and perceptions. For this objective, it was selected 54 countries from the 2009 GEM survey, and a k-means cluster analysis technique was used. The results show three clusters with different entrepreneurial attitudes among the countries - high, medium and low entrepreneurial attitudes and perceptions.

Keywords: GEM, entrepreneurial attitudes, entrepreneurial perceptions, cluster analysis, K-means

1. Introduction

The entrepreneurial activity, as well as all the factors that are behind its existence, and its influence on economic development have been studied in the literature (Birley 1985, Kirchoff & Phillips 1988; Storey, 1994). According to Schumpeter (1934), entrepreneurs are individuals who have a duty to drive the achievement of new combinations of resources and the entrepreneurial function is to identify and realize new possibilities in the economic area. Thus it is increasingly recognized the growing importance of entrepreneurship to professional careers (Hisrich et al., 2007). Choosing to be an entrepreneur is seen as an adaptive behavior training taking into account the various challenges, occupational hazards, but also the opportunities that come with the great economic change, technological and social societies face (Audretsch, 2007; Mahbubani, 2008). In the late 20th century, entrepreneurship re-emerged as a key outline item of economic policy makers across Europe, both for some nations as well as for European Union as a whole (Brock & Evans, 1989; Carree & Thurik, 2002). Reasonable economic growth joined with constantly high levels of unemployment encouraged expectations of entrepreneurship's potential as a source of job creation and economic growth (Acs, 1992; Audretsch & Thurik, 2000).

In spite of this growing interest, an inclusive theoretical and empirical research is needed (Wennekers et al., 2002). Several empirical contributions based on the Global Entrepreneurship Monitor (GEM) research project demonstrate that variations in economic growth rates can be clarified by differing rates of entrepreneurship (Reynolds et al., 1999; Zacharakis et al., 2000). Therefore, the creation of new firms may contribute to the economic performance of countries since entrepreneurial activities introduce innovation, competition and increase rivalry (Audretsch & Keilbach, 2004; Wong et al., 2005). For entrepreneurial activity to happen in a country or region, both opportunities for entrepreneurship and entrepreneurial abilities need to be present. The quantity and quality of perceived opportunities and capabilities may be strengthened by national conditions such as economic growth, population growth, culture, and national entrepreneurship policy. However, the impact of the entrepreneurial efforts on economic growth varies not only between countries at

analogous levels of development (Carree et al., 2002; 2007), but also between countries at different levels of development (Wennekers et al., 2005; Acs & Amorós, 2008).

For dynamic perspective various indicators can be used including entrepreneurial start-up activity. In the Global Entrepreneurship Monitor (GEM) study, a person is considered to be involved in a nascent firm "if had engaged in any activity to start the firm In the past 12 months, expected to own all or part of the new firm once it became operational, and the initiative had not paid salaries or wages to anyone for more than three months" (Reynolds et al., 2005:52). Currently, the GEM research takes as one theoretical starting point the assumption of various conditions that lead to the creation of entrepreneurial opportunities and the support of entrepreneurial individuals who are capable and motivated to exploit these opportunities (Valliere, 2010). The present study focuses on a crucial determinant of entrepreneurship in developing (and developed) countries from the 2009 GEM survey and it aims to identify groups of countries that share similar patterns regarding the characteristics of entrepreneurial attitudes and perceptions.

After this introduction, the paper is structured as follows: section two provides a review of the literature on entrepreneurship and entrepreneurial attitudes. In section three, we set out the methodology and describe the sample and methods applied. Section four the results are presented and finally the conclusions are draw in section five.

2. Literature review

Only from the 80s is emerged the interest in the role of entrepreneurship in economic development having this interest been influenced largely by the revolution of endogenous growth (Low & MacMillan, 1988). This revolution has led to a new wave of investigations that have placed the individual capacity to address the risk at the heart of economic analysis (Groot et al., 2004). However, the ability to face the risk was very early studied as a characteristic of the entrepreneurship (Knight, 1921; Lucas, 1978; Kihlstrom & Laffont, 1979; Kahneman & Tversky, 1979; Jovanovic, 1982; Parker, 1996; 1997). Entrepreneurship has recently been defined as the creation of new economic activity (Davidson et al., 2006). Although entrepreneurs may be analyzed at the individual level, operate at the organizational level (Shane & Delmar, 2004), economic, social and institutional (Veciana & Urbano, 2008). Kirzner (1973) argues that the entrepreneur is an agent driving the market equilibrium and its activity is essential to competitiveness, this being inherent in the process of entrepreneurship. Also to McClelland (1961) entrepreneurship is related to the desire for personal achievement, which turns out to be transposed into the business where you take risks of different nature and where it can achieve economic success due to their ability and not to their fate. The interest in entrepreneurship is an increasingly topical issue that is important both to Governments (NCOE, 2001), entrepreneurs, decision makers (Galbraith, 1985; Hansen, 1987; Felsenstein, 1996; Sternberg & Arndt, 2001) and for researchers themselves (Hisrich et al., 2007; Audretsch, 2007; Mabhbubani, 2008). We also noted that since the 90s, public bodies have proven aware of the importance of entrepreneurship to the growth of countries (Rosell & Viladomiu, 2001).

According to OECD (2005) report, 20% to 40% employment rate in most industrialized countries is directly related to the high rate of entrepreneurship. Entrepreneurship is first and foremost a catalyst for economic growth and national competitiveness (GEM, 2010) and emerges as a crucial contribution to economic development (Gatner, 1988; Sarasvathy, 2001; Baron, 2004; Sternberg, 2004; Krueger, 2007). Research into the role of entrepreneurship on economies has long been vulnerable by a dearth of consistent and comparable international data regarding entrepreneurs and their economic impact (Valliere, 2010). The Global Entrepreneurship Monitor (GEM) research comes to overcome this obstacle resulting in a large and growing database about entrepreneurial activity in many countries. The potential value of this kind of database has been demonstrated by an increasing number of studies that incorporate elements of GEM data (Bygrave et al., 2003; van Stel & Thurik, 2004; Wennekers et al., 2005; Wong et al., 2005; Koellinger, 2008; Koellinger & Minniti, 2009; Clercq et al., 2010). While the GEM project is now generally recognized as a useful tool for empirical researchers in entrepreneurship, the connection from these empirical findings to entrepreneurship theorizing has not been as far developed (Valliere, 2010). The worth of GEM in the future development of entrepreneurship theories remains somewhat unexplored.

3. Methodology

3.1 Data

The GEM project represents a fundamental underpinning to provide harmonized, internationally comparable data to evaluate entrepreneurship activity across different countries. Also, GEM is useful for studying the effects and the determinants of entrepreneurship. It is generally recognized in the GEM reports that institutional quality plays a key role as a determinant of entrepreneurship (Reynolds et al., 2005). GEM data contains various entrepreneurial indicators that have been constructed on the basis of a survey known as the 'adult population survey'. This survey helps GEM to estimate the percentage of the adult population (generally people between 18-64 years old) who are actively involved in starting a new venture. Therefore we use the database provided by the GEM (Table 1).

3.2 Measures

Attitudes vary usually concerning the desirability of entrepreneurship as a career. Knowledge of these attitudes can help policy makers support entrepreneurship. According this was purpose of this study identifying groups of countries that share similar patterns regarding the characteristics of entrepreneurial attitudes and perceptions measured by: i) entrepreneurship as desirable carrier choice; ii) medium attention for entrepreneurship; and iii) high status successful entrepreneurship.

i) Entrepreneurship as Desirable Career Choice

Economic conditions are also likely to influence the level of self-employment in a country. For example, according some authors (Evans & Leighton, 1990; Wildeman et al., 1998), the higher the unemployment in a country, the greater the incentive that individuals have to explore self-employment opportunities. Career choices and related phenomena have been demonstrated, both theoretically and empirically, to be cognitive in nature. Consequently, career-related decisions reflect a process in which beliefs, attitudes, and intentions evolve as we cognitively process the knowledge, beliefs, and experiences (Lent et al., 1994). Previous research suggests that entrepreneurial careers fit this pattern (Davidsson, 1991; Katz, 1992). The Entrepreneurship as Desirable Career Choice is measured by Percentage of 18-64 population who agree with the statement that in their country, most people consider starting a business as a desirable career choice (GEM, 2009).

ii) Medium Attention for Entrepreneurship

Entrepreneurship is seen as a way to renew stagnant economies (Wildeman et al., 1998), give life to former planned economies (Ivy, 1997), and make possible economic growth in many developing countries (Lado & Vozikis, 1996; Storey, 1994). For example, small firms may be more effective at creating jobs than larger, more established firms (Ivy, 1997; Kassicieh et al., 1996; Kirchhoff & Phillips, 1988). The medium attention for entrepreneurship is measured by Percentage of 18-64 population who agree with the statement that in their country, you will often see stories in the public media about successful new businesses (GEM, 2009).

iii) High Status Successful Entrepreneurship

Studies show that entrepreneurial dynamism is strongly correlated to the relationships which connect entrepreneurs with friends, family, business consultants but especially contacts established with other firms (Birley, 1985). Specifically, Baum and Oliver (1992) showed that entrepreneurs are attracted to an environment with a dense business population which gives rise to opportunities to learn and create a network of contacts, but which also incites a spirit of competition. Reynolds et al. (1994) evidences significant influence applied by economic growth on the setting up of new ventures in most countries. High Status Successful Entrepreneurship is measured by Percentage of 18-64 population who agree with the statement that in their country, successful entrepreneurs receive high status (GEM, 2009).

3.3 Methods

A practical component of this study followed all the steps suggested in the literature. In this sense, initially given the unknown of the optimum number of clusters was necessary to apply a hierarchical method, and the most common for this problem is the method of Ward. In this method of Ward, is minimized an objective function, defined as the sum of squares of deviations of the individual

observations compared with the average of the group are classified, with the aim is to create groups having maximum internal cohesion and maximum separate external (Green, 2003). Is a method that uses the variance to evaluate distances between clusters, these results in an efficient method when compared with other hierarchical methods. As a dissimilarity measure between subjects was selected the square of the Euclidean distance (Euclidean Distance Squared). Through the graphical visualization of Figure 1 allows us to anticipate the optimal number hypothetical clusters of countries as well as their composition. The distance between about 5 and 10 are easily distinguished three groups. The first cluster comprises 16 countries, 22 countries for cluster 2 and cluster 3 includes 16 countries. However, in order to identify number optimum of clusters we used the test r-squared (R-Sq). With the support of one-way ANOVA and the graph with relative distance between clusters and r-square test (Figure 1), we can retain three clusters.

Table 1: Entrepreneurial Attitudes and Perceptions for 54 GEM Countries in 2009 (Cont.).

Country	Entrepreneurship as Desirable Career Choice (%)	Medium Attention for Entrepreneurship (%)	High Status Successful Entrepreneurship (%)
Algeria	57	39	58
Argentina	68	80	76
Belgium	46	33	49
Bosnia & Herzegovina	73	51	57
Brazil	81	77	80
Chile	87	47	70
China	66	79	77
Colombia	90	81	74
Croatia	68	53	49
Denmark	47	25	75
Dominican Republic	92	61	88
Ecuador	78	55	73
Finland	45	68	88
France	65	50	70
Germany	54	50	75
Greece	66	32	68
Guatemala	77	66	67
Hong Kong	45	66	55
Hungary	42	32	72
Iceland	51	72	62
Iran	56	61	78
Israel	61	50	73
Italy	72	44	69
Jamaica	76	74	77
Japan	28	61	50
Jordan	81	70	84
Korea (South)	65	53	65
Latvia	59	51	66
Lebanon	85	65	79
Malaysia	59	80	71
Morocco	80	73	84
Netherlands	84	64	67
Norway	63	67	69
Palestine	88	52	78

Country	Entrepreneurship as Desirable Career Choice (%)	Medium Attention for Entrepreneurship (%)	High Status Successful Entrepreneurship (%)
Panama	74	50	67
Peru	88	85	75
Romania	58	47	67
Russia	60	42	63
Saudi Arabia	80	78	89
Serbia	69	56	56
Slovenia	56	57	78
Serbia	69	56	56
South Africa	64	64	64
Spain	63	37	55
Switzerland	66	57	84
Syria	89	55	89
Tonga Islands	91	80	52
Tunisia	87	70	94
Uganda	81	75	85
United Arab Emirates	70	69	75
United Kingdom	48	44	73
United States of America	66	67	75
Uruguay	65	62	72
Venezuela	76	49	69
Yemen	95	96	97

Source: Global Entrepreneurship Monitor (2009) database.

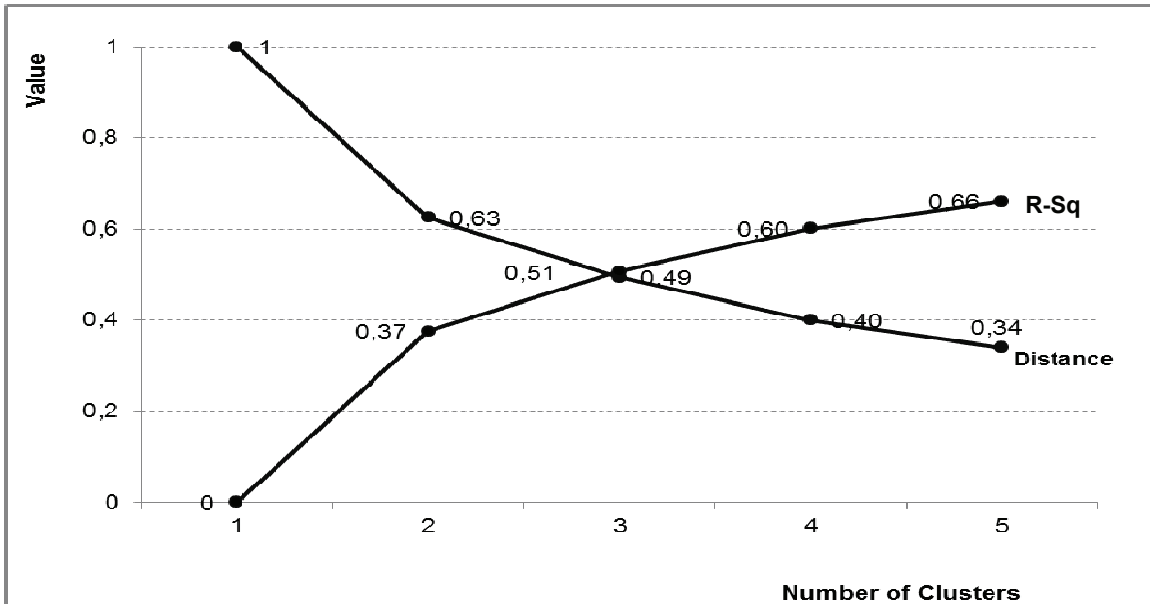


Figure 1: Optimal number of clusters.

3.4 Results

In order to analyze the variables that maximize and minimize the separation of clusters and the distribution of countries by clusters was done using the analysis of variance (Table 2). Thus, the variables that best discriminate the clusters are those with a high Cluster Mean Square and an Error

Mean Square lowest. The variable that allows further differentiate the clusters is High Status Successful Entrepreneurship (F=49,382), followed by Entrepreneurship as Desirable Career Choice (F=33,471). And last it appears Media Attention for Entrepreneurship (F=11,209).

Table 2: One-Way ANOVA and variables which separate clusters

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
High Status Successful Entrepreneurship	4101,214	2	83,050	51	49,382	,000
Entrepreneurship as Desirable Career Choice	3414,999	2	102,028	51	33,471	,000
Medium Attention for Entrepreneurship	1040,177	2	92,802	51	11,209	,000

The classification of each country was then subjected to a refining using the method of the K-Means with k=3 (Table 3).

The cluster analysis shows three clusters of countries regarding the characteristics of entrepreneurial attitudes and perceptions: Cluster 1 - High Entrepreneurial attitudes and perception; Cluster 2 - Medium Entrepreneurial attitudes and perceptions; and Cluster 3 - Low Entrepreneurial attitudes and perceptions. The countries in the GEM (2009) report are grouped into three stages of economic development as defined by the World Economic Forum's Global Competitiveness Report:

i) factor-driven economies are primarily extractive in nature (Algeria, Guatemala, Jamaica, Lebanon, Morocco, Saudi Arabia, Syria, Kingdom of Tonga, Uganda, Venezuela, West Bank and Gaza Strip, Yemen);

ii) efficiency-driven economies exhibit scale-intensity as a major driver of development (Argentina, Bosnia and Herzegovina, Brazil, Chile, China, Colombia, Croatia, Dominican Republic, Ecuador, Hungary, Iran, Jordan, Latvia, Malaysia, Panama, Peru, Romania, Russia, Serbia, South Africa, Tunisia, Uruguay);

iii) innovation-driven are characterized by their production of new and unique goods and services that are created via sophisticated, and often pioneering, methods (Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Israel, Italy, Japan, Republic of Korea, Netherlands, Norway, Slovenia, Spain, Switzerland, United Kingdom, United Arab Emirates, United States).

Table 3: Classification of countries into three clusters by K-means method with K=3.

Cluster 1 (N=21) High Entrepreneurial attitudes and perceptions	Cluster 2 (N=12) Medium Entrepreneurial attitudes and perceptions	Cluster (N=21) Low Entrepreneurial attitudes and perceptions
Argentina	Finland	Algeria
Brazil	Hong Kong	Belgium
China	Iceland	Bosnia & Herzegovina
Colombia	Iran	Chile
Dominican Republic	Japan	Croatia
Ecuador	Malaysia	Denmark
Guatemala	Norway	France
Jamaica	Slovenia	Germany
Jordan	South Africa	Greece
Lebanon	Switzerland	Hungary
Morocco	United States of America	Israel
Netherlands	Uruguay	Italy
Palestine		Korea (South)
Peru		Latvia
Saudi Arabia		Panama
Syria		Romania
Tonga Islands		Russia
Tunisia		Serbia

Cluster 1 (N=21) High Entrepreneurial attitudes and perceptions	Cluster 2 (N=12) Medium Entrepreneurial attitudes and perceptions	Cluster (N=21) Low Entrepreneurial attitudes and perceptions
Uganda		Spain
United Arab Emirates		United Kingdom
Yemen		Venezuela

Our cluster results evidence that a achieve mix according this classification. However, we see on cluster 1 is mostly constituted by factor-driven economies (9 countries) and efficiency-driven economies (9 countries). The cluster 2 we have an incidence from innovation-driven economies (8 countries). Finally, the cluster 3 we have a high number for both innovation-driven and efficiency-driven economies (respectively 10 and 9 countries).This classification in phases of economic development is based on the level of GDP per capita and the extent to which countries are factor driven in terms of the shares of exports of primary goods in total exports (GEM, 2009). When we compare the High Status Successful Entrepreneurship (HSSE) with the Total Early-Stage Entrepreneurial Activity (TEA), we obtain the following results (Figure 2).

The TEA rate is the proportion of people aged 18-64 who are involved in entrepreneurial activity as a nascent entrepreneur or as an owner-manager of a new business (GEM, 2009). According the GEM (2009) report the average pattern for the countries is of a decline in overall levels of early-stage entrepreneurial activity with increasing economic development, and relatively low levels of necessity entrepreneurship in innovation-driven countries. However, there are large variations in entrepreneurial activity among the countries, since each country has a unique set of economic and social conditions which can affect entrepreneurial activity. We can see countries with a high HSSE but with a very low TEA, this is the case of factor-driven countries (Porter et al., 2002; GEM, 2009). Among factor-driven countries, we have for example, Saudi Arabia, a rich state with a high reliance on income from oil extraction, has a very high proportion of HSSE but presents a low TEA rate.

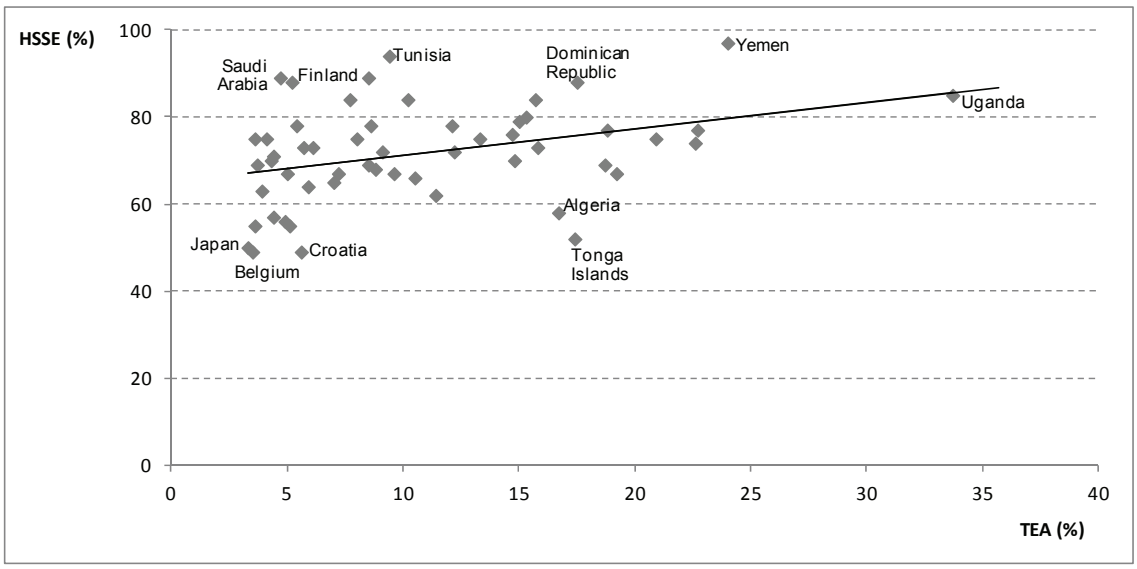


Figure 2: High status successful entrepreneurship (HSSE) versus total early-stage entrepreneurial activity (TEA), 2009.

4. Conclusions

Through the literature review we analyzed the importance of entrepreneurship for the development of regions and countries. Entrepreneurship may arise the need to create their own employment. In countries with high unemployment rates this may be an alternative to the difficulties in finding work. It can also be a way of personal and professional fulfillment through the creation of own business. GEM is a multinational project created to investigate the incidence and causes of entrepreneurship within and between countries. The key benefit of the GEM methods is that the sample is drawn from the whole working age population in each country and therefore detains both entrepreneurs and non-entrepreneurs. In this sense, the GEM provided the data we utilize in our study and it allows us to analyze the entrepreneurial attitudes and perceptions among countries included.

Our study highlights the groups of countries share similar patterns regarding the characteristics of entrepreneurial attitudes and perceptions evidencing three different clusters of countries – high, medium and low entrepreneurial attitudes and perceptions.We hope that our findings stimulate future research on the mechanisms underlying how entrepreneurial attitudes are developed within countries. It should be noted that not always the fact that countries have highly successful at achieving the people have a perception entrepreneurial the same level, as is the case in Finland, has a higher status successful entrepreneurship and a TEA relatively low, and in clusters analysis this country is included on medium perception of entrepreneurship cluster.

This paper is not without its limitations. It would be useful for scholars, policymakers, and entrepreneurs to understand the entrepreneurial attitudes and perceptions among countries. However the GEM data are limited and future work will focus on this relevant issue through panel data looking for different periods.

Finally, the cross-sectional nature of our study offers only a snapshot of the situation. In order to fully understand the entrepreneurial attitudes in a cross-country setting, longitudinal studies are required, and future research could fill this gap.

References

Acs, Z. J., and J. E. Amorós (2008). Entrepreneurship and Competitiveness Dynamics in Latin America. *Small Business Economics*, 31 (3): 305-22.

Acs, Z.J. (1992). Small business economics: a global perspective, *Challenge*, 35, 38-44.

Audretsch, D., and M. Keilbach (2004). Entrepreneurship and Regional Growth: An Evolutionary Interpretation. *Journal of Evolutionary Economics*, 14 (5): 605-16.

Audretsch, D. B. (2007). The entrepreneurial society. New York: Oxford University Press.

Audretsch, D.B., Thurik, R. (2000). Capitalism and democracy in the 21st century: from the managed to the entrepreneurial economy, *Journal of Evolutionary Economics*, 10(1), 17-34.

Baron, R. A. (2004). The cognitive perspective: A valuable tool for answering entrepreneurship's basic "why" questions. *Journal of Business Venturing* 19, 221-239.

Baum, J.A.C. and Oliver, C. (1992). Institutional embeddeness and the dynamics of organizational populations. *American Sociological Review*, 57(4), 540-559.

Birley, S. (1985). The role of networks in the entrepreneurial process. *Journal of Business Venturing* 1(1), 107-117.

Brock, W.A., Evans, D.S. (1989). Small business economics, *Small business Economics* 1, 7-20.

Bygrave, W. D., Hay, M., Ng, E., Reynolds, P. (2003). Executive forum: A study of informal investing in 29 nations composing the Global Entrepreneurship Monitor. Venture Capital: An International Journal of Entrepreneurial Finance, 5(2), 101–116. DOI:10.1080/1369106032000097021.

Carree, M., A. van Stel, R. Thurik, and S. Wennekers (2002). Economic Development and Business Ownership: An Analysis Using Data of 23 OECD Countries in the Period 1976–1996. *Small Business Economics*, 19 (3): 271-90.

Carree, M., A. van Stel, R. Thurik, and S. Wennekers (2007). The Relationship between Economic Development and Business Ownership Revisited. *Entrepreneurship and Regional Development*, 19 (3): 281-91.

Clercq, D., Danis, W., Dakhili, M. (2010). The moderating effect of institutional context on the relationship between associational activity and new business activity in emerging economies. *International Business Review*, 19 (2010) 85-101.

Davidsson, P. (1991). Continued entrepreneurship: Ability, need, and opportunity as determinants of small firm growth. *Journal of Business Venturing* 6(6):405-429.

Davidsson, P., Delmar, F., Wiklund, J., 2006. Entrepreneurship as growth; growth as entrepreneurship. In P. Davidsson, F. Delmar, & J.Wiklund (Eds.), *Entrepreneurship and the growth of firms* (pp. 21-38). Cheltenham: Edward Elgar Publisher.

Evans D.S., Leighton L.S. (1990). Small business formation by unemployed and employed workers. *Small Business Economics*, 2:319-30.

Felsenstein, D., 1996. High technology firms and metropolitan locational choice in Israel; a look at the determinants. Geografiska Annaler Series B, *Human Geography* 78 (1), 43-58.

Galbraith, C.S. (1985). High-technology location and development, the case of Orange County. *California Management Review* 28 (1), 98-109.

Gartner, W. B. (1988). Who is the entrepreneur? Is the wrong question. *American Journal of Business* 12 (14), 11-32.

GEM (2009). Global Entrepreneurship Monitor, Edited by N. Bosma and J. Levie http://www.gemconsortium.org/docs/download/265.

GEM (2010). Global Entrepreneurship Monitor. Edited by D. J. Kelley, N. Bosma, and J. E. Amorós , http://www.gemconsortium.org/download/1300624165779/GEM%20GLOBAL%20REPORT%202010rev.pdf

Greene, W. (2003). *Econometric Analysis*, fifth edition Upper River, New Jersey.

Groot, H.L.F., Nijkamp, P., Stough, R. R., 2004. *Entrepreneurship and Regional Economic Development – A spatial perspective*. Edward Elgar Publishing Limited, Massachuetts.

Hansen, E., 1987. Industrial location choice in Sao Paulo, Brazil: a nested logit model. *Regional Science and Urban Economics* 17, 89-108.
Hisrich, R., Langan-Fox, J., Grant, S. (2007). Entrepreneurship research and practice: A call to action for psychology. *American Psychologist*, 62, 575-589.
Ivy R.L. (1997). Entrepreneurial strategies and problems in post-communist Europe: a survey of SMEs in Slovakia. *Journal of Small Business Management*, 93-97.
Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica* 50 (3), 649-70.
Kahneman, B., Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica* 47(2), 263-91.
Kassicieh S.K, Radosevich R, Umbarger J. (1996). A comparative study of entrepreneurship incidence among inventors in national laboratories. *Entrepreneurship Theory and Practice*, 33-48.
Katz, J. (1992). Modeling entrepreneurial career progressions: Concepts and considerations. *Entrepreneurship Theory and Practice* 19(2):23-39.
Kihlstrom, R.E., Laffont, J. (1979). A general equilibrium entrepreneurial theory of firm formation based on risk aversion. *Journal of Political Economy* 87 (4), 719-48.
Kirchhoff B.A., Phillips B.D. (1988). The effect of firm formation and growth of job creation in the United States. *Journal of Business Venturing*, 261-272.
Kirzner, I. M. (1973). *Competition and entrepreneurship*. Chicago: University of Chicago Press.
Knight, F.H., (1921). *Risk, Uncertainty and Profit.* Boston, MA: Houghton Mifflin Company
Koellinger, P. and Minniti, M (2009). Unemployment benefits crowd out nascent entrepreneurial activity. *Economics Letters*, 103 96-98.
Koellinger, P. (2008). Why are some entrepreneurs more innovative than others? *Small Business Economics Journal*, 31, 21-37.
Krueger, N. F. (2007). What lies beneath? The experiential essence of entrepreneurial thinking. *Entrepreneurship: Theory & Practice* 31, 123-138.
Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. Journal of Vocational Behavior, 45, 79-122.
Low, M. B., MacMillan, I. C. (1988). Entrepreneurship: past research and future challenges. *Journal of Management* 14(2), 139–161.
Lucas R.E. (1978). On the size distribution of business firms. *Bell J Econ*, 9:508-23.
McClelland, D.C. (1961): *The achieving society*. Pinceton, N.J; Van Nostrand.
Mahbubani, K. (2008). The new Asian hemisphere. New York: PublicAffairs
NCOE. (2001). Embracing Innovation: entrepreneurship and American Economic Growth. In National Commission on Entrepreneurship. White Paper, 1-11.
OECD., 2005. Understanding Economic Growth. OECD, Paris.
Parker, S.C. (1997). The effects of risk on self employment under uncertainty. *Small Business Economics,* 9(6), 512-522.
Parker, S. C.(1996). A time series model of self-employment. *Small Business Economics,* 63, 459-475.
Porter, M.E., Sachs, J. J. and McArthur, J. (2002). Executive Summary: Competitiveness and Stages of Economic Development. In *The Global Competitiveness Report* 2001-2002, edited by M.E. Porter, J.J. Sachs, P.K. Cornelius, J.W. McArthur and K. Schwab, 16-25. New York, NY: Oxford University Press.
Reynolds, P. D., M. Hay, and S. M. Camp (1999). Global Entrepreneurship Monito'. Kansas City: Kauffman Center for Entrepreneurial Leadership.
Reynolds, P., N. Bosma, E. Autio, S. Hunt, N. De Bono, I. Servais, P. Lopez-Garcia, and N. Chin (2005). Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998-2003. *Small Business Economics*, 24 (3): 205-31.
Reynolds, P., Storey, D.J. and Westhead, P. (1994). Cross-national comparisons of the variation in new firm formation rates. *Regional Studies* 28(4), 443-456.
Rosell, J., Viladomiu, L. (2001). Empresariado y Políticas de Apoyo a las Empresas en una Zona Rural con Tradición Industrial. Paper presented at the 73rd EAAE Seminar. Zaragoza, Spain.
Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review* 26, 243-263.
Shane, S. A., & Delmar, F. (2004). Planning for the market: Business planning before marketing and the continuation of organizing efforts. *Journal of Business Venturing*, 19, 767-785.
Schumpeter, J. A., (1934). *The Theory of economic development*, Cambridge, MA: Harvard University Press.
Sternberg, R. J. (2004). Successful intelligence as a basis for entrepreneurship. *Journal of Business Venturing*, 19, 189−201.
Sternberg, R., Arndt, O. (2001). The firm or the region: what determines the innovation behaviour of European firms? Economic Geography 7, 364-382.
Storey D.J. (1994). *Understanding the small business sector*. London: Routledge.
Valliere, D. (2010). Reconceptualizing entrepreneurial framework Conditions, *International Entrepreneurship Management Journal*, 6:97–112. DOI 10.1007/s11365-008-0077-0.
van Stel, A., Thurik, R. (2004). The effect of entrepreneurship on national economic growth: An analysis using the GEM database. Discussion papers on entrepreneurship, growth and public policy. Jena DE, Max Planck Institute for Research into Economic Systems.
Veciana, J. M., Urbano, D., (2008). The institutional approach to entrepreneurship research. Introduction. *International Entrepreneurship and Management Journal* 4(4), 365-379.

Wennekers, S., A. van Stel, R. Thurik, and P. Reynolds (2005). Nascent Entrepreneurship and the Level of Economic Development. *Small Business Economics*, 24 (3): 293-309.

Wennekers, S., Uhlaner, L., Thurik, R. (2002). Entrepreneurship and its conditions: a Macro perspective, *International Journal of Entrepreneurship Education*, 1(1): 25-65.

Wildeman, R.E, Hofstede, G., Noorderhaven, N.G., Thurik, R., Verhoeven W.H.J., Wennekers, A.R.M. (1998). Cultural and economic determinants of entrepreneurship: an international study. Presented at the Annual Meetings of the Academy of International Business, Vienna, Austria.

Wong, P. K., Ho, Y. P., Autio, E. (2005). Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small Business Economics*, 24 (3): 335-350.

Zacharakis, A. L., Bygrave, W. D., Shepherd, D. A. (2000). Global Entrepreneurship Monitor: National Entrepreneurship Assessment: United States of America. Kansas City: Kauffman Center for Entrepreneurial Leadership.

Potentialities of Public eProcurement as a Tool to Leverage the Policy of Innovation

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Abstract: Nowadays, the challenge for public organizations is the creation of public value through the adoption of information and communication technology (ICT). This is the stance adopted by the European Commission for public administrations until 2020. It is understood that technology should emerge as an endogenous factor of organizational change and not as exogenous one, fundamental to leverage change processes in public organizations. It is also considered that technology, while artefact, which aims to solve real-world problems, should be previously based on a systemic organizational intervention in order to improve its performance. The public procurement is an instrument of implementation of public policy that, within a legal context, aims to create value, contrasting with the focus on economic efficiency of the new public management. The policies of public procurement aim, not only to the efficiency (value for money), but also to the promotion of economic, social and environmental goals. There are several reasons in literature to consider public procurement as a strategic activity of governments: (i) relevant economic impact; (ii) affects the competitiveness of the country; (iii) affects the welfare of citizens; (iv) all government entities need to acquire goods and services to pursue their goals. The public procurement is seen as an instrument of policy of innovation, not only for public organizations, but also for private initiative, namely the technology market. To that end, we must think about the alignment between public policies oriented to public value, public's business strategies and technology and information systems. In Portugal, recent governments have been paying much attention to public eProcurement, recognizing its importance for portuguese Public Administration renewal. These efforts were recognized by the European Commission as the best practice on eProcurement, with the entry into force of the Code of Public Contracts. However, it is considered that this merit is only due to the legal scope the mandatory adoption of electronic platforms, since it is considered that the efforts have been fallen short of what is required, compared to the potentialities found in literature. This scenario becomes more concerning at the level of local administration, particularly in Intermunicipal Communities, were the opportunities to redefine shared services whose results will contribute to the promotion of local area´s social and economic welfare development are wasted. In this context, through a literature review, this paper aims to answer to the following question: what are the potentialities of public eProcurement as a tool to leverage the policy of innovation, the policy of territorial sustainability and the technological development? As a result, we present the different approaches found in literature, presenting a wide overview of the phenomenon under study - public eProcurement -, which should not be regarded as only another more project of technology, but as an opportunity for change organizational and territorial development, namely for local and intermunicipal communities. Therefore, are presented recommendations focusing on the importance of governments and public entities transformation, tapping the ICT's potential, through the services' design based on a co-creation process, pursuing the transparency, collaboration and participation.

Keywords: public value, politicy of innovation, eGovernment, public eProcurement

1. Introduction

The public procurement is an instrument of implementation of public policy that, within a legal context, aims to create value. The policies of public procurement aim, not only to the efficiency (value for money), but also to the promotion of economic, social and environmental goals – the public value. In literature we found several reasons to consider public procurement as a strategic activity of governments: (i) relevant economic impact; (ii) affects the competitiveness of the country; (iii) affects the welfare of citizens; (iv) all government entities need to acquire goods and services to pursue their goals.

The public procurement is seen as an instrument of policy of innovation: (i) for public organizations, through redefine shared services whose results will contribute to the promotion of local area's social and economic welfare development; (ii) for private initiative, namely the technology market.

Through a literature review, this paper aims to answer to the following question: what are the potentialities of public eProcurement as a tool to leverage the policy of innovation, the policy of territorial sustainability and the technological development?

The bibliographical research took place through the combination of the following keywords: public value; public procurement and public eProcurement. The selection of articles was done through the existence of these words in the title and/or in the abstract. Through reading the abstracts, taking the criteria of objectivity and clarification with regard to the terms of the subject as a reference, were identified the articles to, subsequently, be analysed in full text. The bibliographical research took place through Scopus, Google Scholar, ISI Web of knowledge.

As a result, we present the different approaches found in literature, presenting a wide overview of the phenomenon *public eProcurement*, which should not be regarded as only another more project of technology, but as an opportunity for change organizational and territorial development, namely for local and intermunicipal communities. Therefore, are presented recommendations focusing on the importance of governments and public entities transformation, tapping the ICT's potential, through the services' design based on a co-creation process, pursuing the transparency, collaboration and participation.

Once the bibliographical research strategy implemented, in section 2 public value is defined, while a public governance paradigm, and its implications in the way of thinking the State, the Government activity and its public policy formulation and, consequently, in the way of structure the public administration and its contractual activity. In the light of the public value, the government action is interconnected and interdependent and, as such, it is demanded a more collaborative effort in the pursuit of public value, where the information and communication technologies assume an important role in the changing processes of the public bodies and services. These aspects are addressed in section 3. In section 4 is discussed the strategic importance of the public procurement as a public policy instrument. Were also focused the benefits related to the adoption of technological solutions in public procurement practices. It is highlighted, thus, the importance of approaching this phenomenon based on a multidisciplinary approach. Finally, it is launched to the debate aninsight of what one considers to be the public value dynamic and the technology as an endogenous factor at the level of the potential of territorial development through a local governance network, based on the shared services design.

2. Public value, a governance paradigm

The changing processes of the public bodies and services, in recent years, have been influenced by the model of the new public management. This model, described as post-bureaucratic or competitive, based on the market, has a clear and dominant focus over the outcomes, around development targets focused on the efficiency and economy, reflecting, thereby, the economic environment of the governmental activity and the citizens view as costumers (O`Flynn, 2007).

It was due to the new public management that the public contractual activity has gained importance, while an instrument of changing the fundamental nature of the public sector geared towards the competitiveness and openess to the market and private initiative, in the ownership and/or public services management (Hood, 1991; O`Flynn, 2007). Chalmer and Davis (2001) add that the contractualismin Public Administration arises as a means of enforcing of the public policy. "Services" are hired in the market to implement the policies, management of services is granted to the market, as well as the ownership of some entities is privatized, until then mainly public, through the liberalisation and privatization movement (Hood, 1991; Chalmer and Davis, 2001). The governmental manager expresses the policy, establishes its performance standards and chooses, in the competitive market, through the contractualisation, an agent who delivers the goods and services for the desired outcome of the established policy to be achieved (Kelly, 1998). This is, therefore, a quite different approach of the public policy implementation, when compared with the postulates of the bureaucratic model, where public service meant public ownership of the entity which provided it (Hood, 1991). In the new public management paradigm the contract arises, thus, as the most important mechanism of the organisation of economic activity (Deakin and Michie, 1997 referenced by O`Flynn, 2007), whose focus is in the economic efficiency (O`Flynn, 2007).

Nevertheless, the reforms in the light of the new public management produced some negative and unexpected results, reflecting the attacked implementation of the private sector model and the lack of attention paid to the interconnected and interdependent nature of the public sector (O`Flynn, 2007).More important than the failure of the governments' competitive model is to understand that the public management mechanisms do not only provide public services, also establishing deeper values of governance (O`Flynn, 2007). The issues related to this trend have led to the increasing interest in

the so-called approach to public value (Moore, 1994), the paradigm post-competitive. This paradigm signalizes a change of the main focus on the outcomes and efficiency, already inherent in the act of managing in itself, leaning towards the pursuit of the government wider goal, the pursuance of the preferences of citizens in the way of using their taxes (the State's shareholders) expressed through public policies (O`Flynn, 2005), where the contract works as an enforcement instrument of those policies.

The approach guides towards the public value, supports a paradigmatic change in the way of thinking the State and its purpose; in the way of thinking the Government and the formulation of public policies; in the way of structuring the public administration and, in these terms, new ways of operating, operation and management of public services and entities (Moore, 1995; O`Flynn, 2007). To manage public services and entities in a cost perspective is not to manage on the basis of value. Cost is not value (Hui and Hayllar, 2010). And value is also different from satisfaction in the service consumption, expressing an individual preference and not a collective one (Stoker, 2006). The value of public services should not be only related to the effectiveness and efficiency of the used resources, obtained from the contributions of the citizens and the market. Social and economic improvements should be an overriding goal (O´Flynn, 2007).

According to O`Flynn (2005), public value is described as a multidimentional construct: (i) a reflection expressed by the community, politically mediated by the preferences consumed by citizens; (ii) a reflection created not only by the outcomes, but also through processes that can engender trust and equity. It is, thus, considered as a way of thinking and understanding the governmental activity, of supporting in the formulation of public policies and, consequently, in the service provision, all this with several important implications to public managers, that do more than guide a market process, through contract formation (O`Flynn, 2007). They balance technical hiring concerns (policies enforcement) and policies formulation to ensure the public value (O`Flynn, 2007 citing Warner and Hefetz, 2004), reflecting, so, their wills in the way of using theis taxes. Stoker (2006) describes the public value as preferences collectively built through resolutions involving politicians, officials and main interested parties. Horner and Hazel (2005) define it as the correlated of the shareholder's return, in this case, the citizen/taxpayer. The citizens preferences are the base of the public value. They are the ones who define, in a democratic system, what represents value: the public collective preferences (Moore, 1995). Those preferences are demonstrated in several ways, since the vote, public consultation, petitions (O`Flynn, 2007) and participatory budgets, among others.

Public value is something brought by public administration to their citizens (O`Flynn, 2007). The (i) services, the (ii) outcomes and the (iii) legitimacy and trust are the three major branches of public value.

The identification of *public value* involves a pro-active model of management (Moore, 1995) based on a network of relationships between public services and entities, the market and the civil society, aiming to achieve a better, transparent and *accountable* governance (Moreira, 2002). In the direction adopted by OECD (1995),*governance* means the act of governing, in the broad sense. The role of the State (duties) and its relationship with the market and tha civil society will have implications at the level of the government role and, in these terms, dimension and structure of the public administration. It incorporates, so, the relationships between the government, citizens and economic operators, according to Figure 1.

The governance aims to shape and regulate the social order and this task is not only of the States and Governments responsibility (and its administrative mechanism), but also of the economic operators and citizens. The governance aims to build the *good citizen* (Coleman, 2008). This kind of relationships, between State/ Market/ Civil Society, as well as the public context where the public manager operates, are aspects that differentiate the public sector management from the private sector management, fact recognized as fundamental by the supporters of public value (O`Flynn, 2007).

According to the European Comission in the report "*Value for citizens: a vision of public governance em 2020*" the focus of the public sector activity is the creation of public value and the *empowerment*. In these terms, the citizens must be in the heart of the processes management and the technologies must be used to enhance the network management, providing to citizens what they expect from public services: transparency and *accountability.*

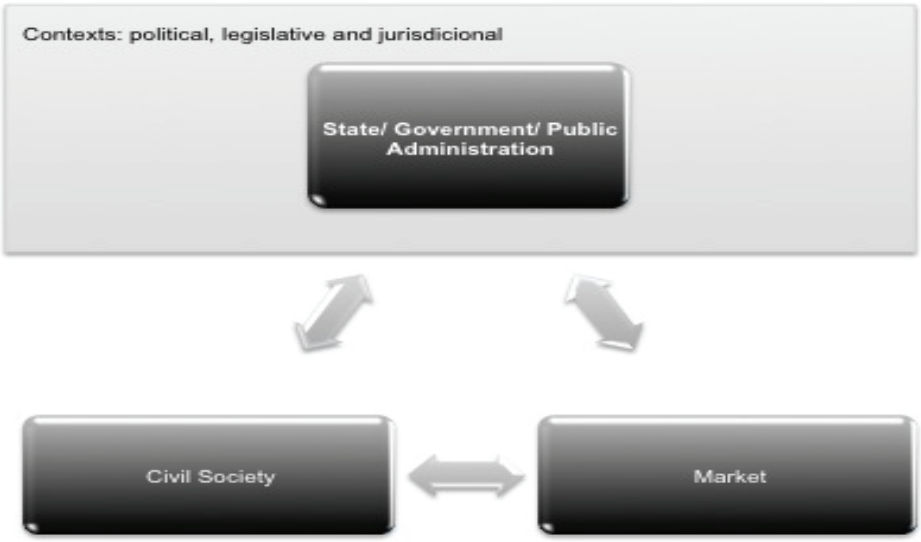


Figure 1: Governance dynamics

To understand this dynamic is, according to Soares (2009), fundamental to understand the ICT utilization area and, in these terms, framing the concept holistic and ecletic of the eGovernment.

3. To create public value through ICT

In the previous point it is approached the public value as the maximization of the value of the citizens, by asking to the public managers three nuclear questions: (i) what is the purpose of the public entity?; (ii) from whom that entity deliver accountability (*accountable*)?; and (iii) how one can know if the entity is being successful? (Coats and Passmore, *s.d.*).

In the paradigm of the public value, the government action is interconnected and interdependent and, as such, demands a more collaborative effort in the pursuit of public value, where the ICT assume a preponderant role in the public services and entities changing processes and, in these terms, in the assumption and dissemination ot this model of public management (Coats and Passmore, *s.d*). These authors present a dynamic of public value, espressed in Figure 2, highlighting the relationship between *authorization* (how is the public value legitimated?), *creation* (how is the public value produced?). Such factors are encapsulated in the notion of strategic triangle of Moore (1995), where is discussed the importance of aligning the authorization environment, operational and administrative abilities and the values, goals and missions to achieve the public value.

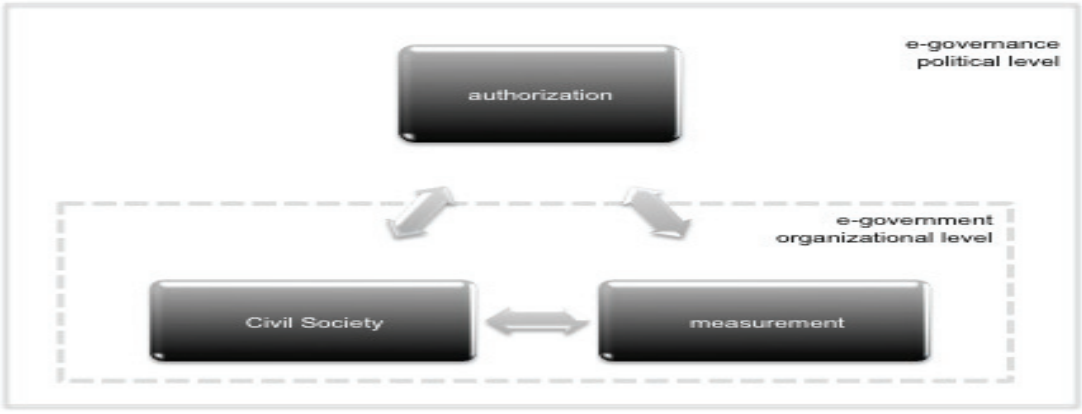


Figure 2: Dynamics of the public value's strategic triangle and the role of ICT

The *authorization* of the public value*,* expressedin public policies according to the public entities purposes and organizational competences, is legitimated by citizens through the vote, within the

framework of the democratic political process. For the *authorization* of those policies, public organizations can use the technology to improve the relationships with the citizens, in the context of the creation of public value: *e-governance* or *e-policy*, in the view of Soares (2009). Once *authorized*, the public value is *produced* when implementing public policies, translated into programs, measures, actions and projects, and provided through public entities services, having an underlying legal basis.

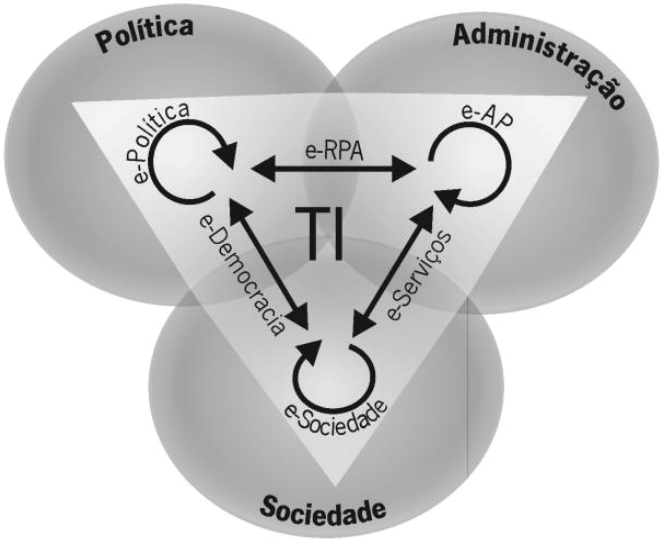
According to Hui and Hayllar (2010), it is important to articulate the strategies of eGovernment with the creation of public value, improving the provision of services, being irrelevant for a second plan the integrated management by networking of the *back-office* processes, since this is the key point in the services management (Johnston and Clark, 2001).

The *eGovernment* consists in the use of technologies and information systems in order to support and improve the implementation of public policies and governmental and services operations, involving the citizens, providing better services and in a timely way (Scholl, 2008).

OECD (2009) that defines eGovernment as the use of ICT in particular of the internet as a tool to achieve better government, presents it as a model of four components:

- Government to business (*government to business* – G2B), involving a bi-directional relationship between the State and companies
- Government to government (*government to government* – G2G), understanding intergovernmental and intergovernmental relationships;
- Government to citizens (*government to citizens* – G2C), focussing on the information and electronic provision of services to citizens;
- Government to employee (*government to employee* – G2E), that understands the necessary tools for restructuring and maintaining the Public Administration internal organisation.

Starting from the ICT utilization area in the context of governance dynamics, Soares (2009: 75) presents a framing for the concept of eGovernment*,* as expressed by Figure 3.



Source: Soares, 2009:75.

Figure 3: eGovernment concept framework

The definition of indicators to mesure the efficiency (optimization) and effectiveness (organizational *output*) seems to be consensual aspect, when accurately aligned in a management and monitoring system, of the services and the partners. The challenge is, therefore, in the measurement of the outcomes of the services provided to citizens and society, that is to say, in the impact on the public value, the collective wills define and legitimated by the democratic process.

The challenge in the public services and entities changing processes, in the light of the paradigm of the public value and the technology as an endogenous factor, is in the definition and measurement of public value. The technical developments in the internet and, in particular, of the web 2.0, could be

used as support tools for the definition and authorization of what is the public value (e-governance) associated to the creation and provision of services of a particular public entity (Hui and Hayllar, 2010; Coats and Passmore, *s.d.*), when the technology is regarded from the inside to the outside.

4. Public procurement, an innovation policy instrument

The EURODAD (2009) presents the public *procurement* as a public policy instrument, within a legal context, aiming to achieve social justice, that is to say, progress in the social equity and the reducing of discrimination. Public *procurement* policies are concerned not only about the efficiency (*value* for *money*) but also with the promotion of the social and environmental goals (the *outcomes*) of *procurement.*There exists a view of the public *procurement* as an effective instrument, when aligned with public policies, capable of promoting the public value, through the innovation policy (Fraunhofer, 2005). This perspective meets the view of *procurement* as an instrument for the creation of public value, as presented by the public value model, in contrast to the focus only on the economic efficiency of the *new public management* model (O`Flynn, 2007; Bof and Previtali, 2010). Hence the need to frame the public *procurement* in the development targets, so that the *procuremen t*outcome has impact on public value.

The strategic importance of public *procurement* is well present in the report produced for the European Comission, in 2005, by Fraunhofer – *Institute Systems and Innovation Research*,characterizing it as aninovation policy instrument, not only for the public market, but also private, namely the technological market, requiring solutions to face its challenges in a time of demand and change.

Bof and Previtali (2010) present several reasons to one consider the public *procurement* as a strategic government's activity, among them: (i) the relevant economic impact; (ii) hinders the country's competitiveness; (iii) hinders the citizen's well-fare; (iv) all the governmental units and public services need to acquire goods and services to proceed with their goals.

From the point of view of the management, the *procuremen t*is one of the strategic functions (and not support), once the relationship with the suppliers or customers are pointed as critical forces for competitiveness (Porter, 1980). And in the case of public *procurement* support all teh governmental functions (Bof and Previtali, 2010), as previously mentioned.

The public *procurement* refers to the acquisition of goods and services by the government or public sector entities (Uyarra, 2010).The concepts *procurement*, *purchasing* e *commissioning* arise in literature, mostly, in a interrelated and sometimes even confuse way. There are arguments which support the idea that the *procurement* and *purchasing* refer to similar activities. In other words, *procurement* is identified as the public sector's purchases activities and the *purchasing*as the private sector ones. Uyarra (2010) argues that the scope of the *procurement* is, however, wider than the *purchasing*. On the other hand, the *procurement* is much wider than the purchase departments activities and, in these terms, its impact probably is not only taking place on the organizational level.

Quoting Caldwell and Bakker (2009), Uyarra (2010) presents the *procurement* as including two cycles: the cycle of strategic acquisitions decisions (aggregation of purchase needs and strategies) and the cycle of acquisitions, as such. Nevertheless, in public sector, it does not mean that the purchase strategic decisions be taken by the purchase departments technicians.

In a legal context, the public *procurement* consists in one of the two underlyingschemes for the contractua activity of public bodies and entities. In other words, public contracts establish two significant matters: the formation of contracts and the enforcement of administrative contracts, according to the Code of Public Contracts.

By public procurement, one understand, so, once taken the decision to carry out the expenditure by the respective competent body, the process of the contract's formation, according to one of the five pre-contractual procedures under prevailing legislation: (i) direct adjustment (normal or simplified) , (ii) competitive tendering (normal or urgent), (iii) limited bid by previous qualification, (iv) competitive dialogue and (v) negotiation procedure.

Public procurement is a essential part of the ability of any organization to operate effectively, allowing to support the integration of the supply chains and the collaboration of all the stakeholders, with impact in terms o organizational development.

It is consensual the alignment of the purchase strategy with the organizational strategy guided towards the public value, given the impact of the organization's performance (Panayiotou *et al*, 2004), being several the references found in literature about the benefits related to the adoption of technologies in the public procurement practices. Ronchi *et al* (2010), referindo Wen and Wei (2007), talk about: (i) strategic benefits (related to comparative efficiency); (ii) transactional benefits (concerned about the efficiency and effectiveness of transactional activities); and (iii) informational benefits (as well as decision's and opportune communication's supporting ones). According to these authors these benefits are translated into financial gains (quantitatively measured) and organizational gains (measured qualitatively in terms of control, transparency, aggregation of needs, decentralization, supplier base's rationalization).Talero (2001), adds: (i) the increase of transparency in the public organisms relationships with the market (emphasis on G2B component); (ii) a lever of the eGovernment (to enhance the G2C; G2G; G2E components); and (iii) creation of interoperability mechanisms between the multiple systems. Kassim and Hassin (2010), refer, in turn, (i) the creation of value, (ii) the increase of the transparency, (iii) the improvement of the flow of information, (iv) the support to the decision-making, (v) the creation of open markets, in such a way that all the suppliers can compete, grasping the added governments' power to obtain goods and services' dynamic prices, improving the efficiency of the purchase cycle, like (vi) the benefits in the adoption of electronic public procurement systems. Bof and Previtali (2010), add (i) the propel of the innovation and collaboration, as well as, (ii) cultural changes, where the digital could become the Public Administration core business.

At the level of the European area, where there is a clear policy of ICT adoption in order to improve the development of the public bodies and entities guided towards the public value, the progressive introduction of the public eProcurement is included in the online programme of Public Administration, aiming to transform its functioning and development. The publication of European Union directives on this subject provided an legislative framework uniform way through European Union ensuring, via electronic public procurement, the realization of the basic freedoms of the European Union area: (i) single market; (ii) free movement of persons, goods, services, and capital; (iii) transparency and competition; and (iv) prohibition of discrimination based on nationality (European Comission, 2010).

5. Discussion

Portugal is referenced in the Green Paper on Electronic Public Procurement as a good example in terms of public eProcurement (European Commission, 2010), as a result of the measures introduced by virtue of the entry into force of the Code of Public Contracts, in 2008. However, when analysing the Portuguese reality, one considers that the recognition of that merit is only in the legal field and in the obligation of the adoption of electronic platforms. With regard to the technological development, expressed in terms of models and organizational practices and technological applications the perception is different. The technological market does not offer end-to-end solutions, falling the desired de-materialisation far short of expectations. In some cases, there is, including, a double proceeding, in different stages of the process –some phases go through the procedure in paper format, others in electronic format, or both. In other words, in the Portuguese case, technological solutions in public organizations without a preliminary reflection in terms of changes in the structure and working methods and, in a broader perspective, with concerns in terms of impact in public value.

One considers, therefore, the lack of an integrated vision of the public procurement that aligns models of formulation of public policies (dynamics of public value related to the formulation of public policies) with the models of implementation of those same policies by the different public entities and the technological development to support all that management. There is, thus, a fragmentation between models of policy, management and technology.

The lack of a conceptual vision of the transversal management of public contracts impedes, both politics and responsible technicians, the monitoring and management of those sam processes, as well as the evaluation of their impact on the organization and the society. That is to say, they hamper the formulation of good purchase practices guided towards the public value. Figure 4 represents that integrated and transversal vision that one defends.

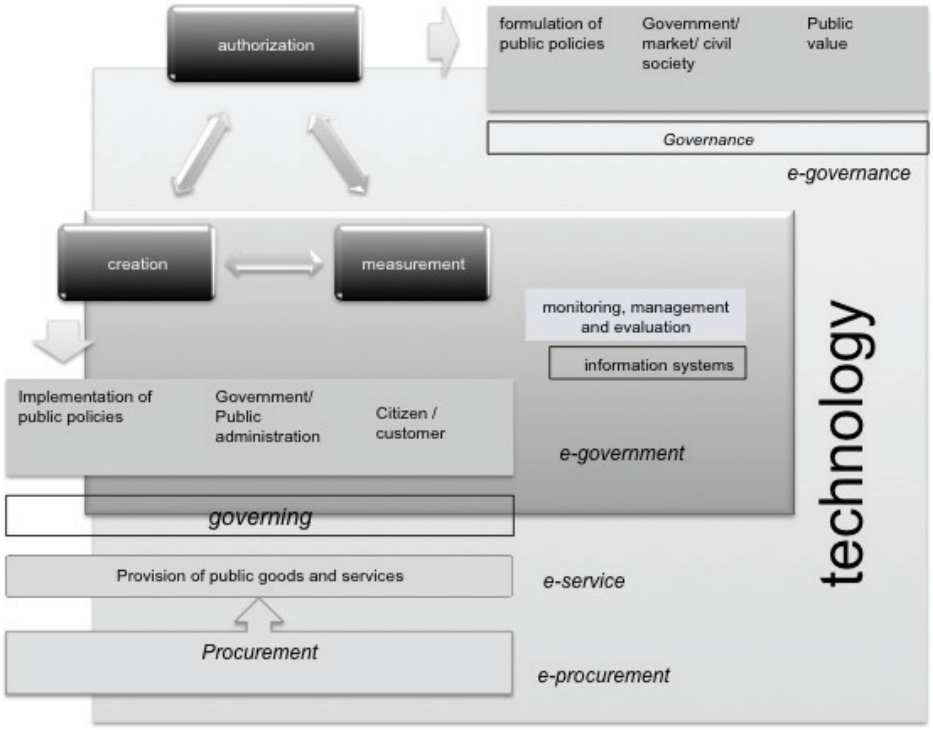


Figure 4: Public value dynamics and the technology as endogenous factor

It is understood that the lack of an integrated and transversal vision, according to Figure 4, on the other hand, one of the potentialities of public procurement found in literature, while an instrument of innovation and territorial development, in economic and social terms. A lever instrument of the innovation policy, namely technological, and sustainability policy.

The majority of the investments in the public eProcurement must be carried out at the national or regional level, according to the specific needs and the available resources. Therefore, the transition to a new European Union policy, in terms of public contracts, must be a bottom-up approach and in a in a decentralized manner, aligned with EU guidelines (European Commission, 2010).Bof and Previtali (2010), in a study involving national models of public eProcurement, showed a centralizing trend, by governments, in the adoption of technological solutions of public procurement, in most Member States. The case studies focus on the strategies made by governments at a central level, with options varying between the public model and the private model (Oliveira and Amorim, 2001).

When one observes the Portuguese reality, one registers, thus, a clear trend in terms of public eProcurement. There are no solutions at the regional and municipal level, for example, in terms of development of shared initiatives and in line with the aim of enhancing the opportunities expressed in the PPC, although the potentialities which may arise within the field of the intermunicipal communities In this context, at the level of local administration, opportunities for redefining shared services whose outcomes will contribute to local territories' development and social and economic welfare are wasted(Uyarra, 2010). One considers, therefore, opportune and fundamental a local governance network for strategic decision-making which aim the promotion of the territory, without this implying to privilege only the local suppliers, in the pursuit of creating business opportunities. What is at stake here is: (i) the definition of common strategies that aim to define public value; (ii) strategic acquisition by public bodies that will enhance the in ovation in the provision of the respective services (Uyarra, 2010); (iii) shared services design, namely, at the level of purchasing centres. This local governance network finds room at the level of what is expected from the Intermunicipal Communities acting.

The transformation of public governments, entities and bodies, using the potential of ICT, is in the services design which will result from a co-creation process and aim the transparency, the collaboration and the participation, as was stated by Barry Libert, in the communication presented in the event "Portugal 2.0",organised in November 2010, at Lisbon. Vasconcelos in the audio conferencing of INA - National Administration Institute Communities about "Public Administration of

the XXI century: Restart – new challenges, new solutions ”has highlighted the need to develop studies on shared services design related to public procurement and their impacts in society and citizens.

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References

Bof, F. and Previtali, P. (2010)“National models of public eProcurement in Europe”, [online],Journal of eGovernment Studies and Best Practices, www.ibimapublishing.com/journals/JEGSBP/jegsbp.html.

Chalmers, J. and Davis, G. (2001)“Rediscovering Implementation: Public Sector Contracting and Human Services”,Australian Journal of Public Administration, Vol 60, No. 2, pp 74–85.

Coats, D. and Passmore, E. (n.d.) Public Value: The Next Steps in Public Service Reform, The Work Foundation.

Coleman, S. (2008)“Foundations of Digital Government”, In Hsinchun et al (ed.), Digital Government: eGovernment research, case studies and implementation, pp 4-19, Springer.

European Comission (2010) Green Paper on Electronic Public Procurement, [online], European Comission, www.ec.europa.eu/internal_market/consultations/2010/eProcurement_en.htm.

European Network on Debt and Development – EURODAD. (2009)Procurement and Development Effectiveness: A literature Review, [online], EURODAD, www.eurodad.org.

Fraunhofer [Institute Systems and Innovation Research]. (2005)Innovation and Public Procurement. Review of Issues at Stake,European Comission,Bruxeles.

Hood, C. (1991) “A Public Management for All Seasons?”,Public Administration, Vol 69, No.1, pp 3–19.

Horner, L. and Hazel. (2005)Adding Public Value, The Work Foundation,London.

Hui, G. and Hayllar, M. (2010)“Creating public value in eGovernment: a public-private-citizen collaboration framework in web 2.0”,The Australian Journal of Public Administration, Vol 69, No. s1, pp 120-131.

Johnston, R. and Clark, G. (2001)Servive Operation Management, Harlow,Pearson.

Kassim, E. S. and Hussin, H. (2010) “Public eProcurement: A Research Synthesis”, Paper read at the 2010 International Conference on e-Education, e-Business, e-Management and e-Learning.

Kelly, R.M. (1998)“An Inclusive Democratic Polity, Representative Bureaucracies, and the New Public Management”, Public Administration Review, Vol 58, No. 8, pp 201–208.

Moreira, M. (2002) Ética, Democracia e Estado, Principia,Cascais.

Moore, M. (1995)Creating Public Value: Strategic Management in Government, Harvard University Press, Cambridge.

Moore, M. (1994)“Public Value as the Focus of Strategy”, Australian Journal of Public Administration, Vol 53, No. 3, pp 296–303.

O´Flynn, J. (2007)“From New Public Management to Public Value: Paradigmatic Change and Managerial Implications”,The Australian Journal of Public Administration, Vol 66, No. 3, pp 353–366.

O’Flynn, J. and Alford, J. (2005) “Inside and Beyond the Black Box of Contracting Out: Evidence from Local Government”, Paper read at the PAC Annual Conference – Public Administration and Management, Nottingham, United Kingdom, September.

OECD [Organisation for Economic Co-operation and Development]. (2009)Efficiency Study, OECD,Paris.

OECD [Organisation for Economic Co-operation and Development]. (1995)Governance in Transition: Public Management Reform, OECD, Paris.

Oliveira, L.M.S. and Amorim, P.P. (2001)“Public eProcurement”, International Financial Law Review, Vol 20, No. 3, pp 43–47.

Porter, M.E. (1980)Competitive Strategy, Free Press,New York.

Ronchi, et al (2010)“What is the value of an IT eProcurement systems?”,Journal of Purchasing & Supply Management,Vol 16, pp 131-140.

Scholl, H. J. (2008)“Discipline or interdisciplinary study domain?”, In Hsinchun et al (ed.), Digital Government: eGovernment research, case studies and implementation, pp 21-43. Springer.

Soares, S. D. (2009)Interoperabilidade entre Sistemas na Administração Pública, Tese de Doutoramento apresentada à Escola de Engenharia da Universidade do Minho.

Stoker, G. (2006)“Public Value Management: A New Narrative for Networked Governance?”,American Review of Public Administration, Vol 36, No.1, pp 41–57.

Talero, E. (2001)Electronic Government Procurement: Concepts and Country Experiences, The World Bank.

Uyarra, E. (2010) Opportunities for innovation through local government procurement: a case study of Greater Manchester, NESTA,Manchester.

Vidigal, L. (2009)“Ponto de Situação do eGovernment em Portugal”, Paper read at comunidades@ina, Lisboa, Portugal, Junho.

Vasconcelos. D. (2010) “Administração do séc. XXI: Restart - novos desafios. Novas soluções”, Paper read at comunidades@ina, Lisboa, Portugal, Novembro.

Innovation of Decentralised Power Production: The Sustainability of Micro-Cogeneration for the Portuguese Market

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Abstract: Achieving sustainable development in the energy supply chain represents nowadays a technological challenge. This challenge requires innovation in many different aspects: development of new technologies, new laws to regulate the energy sector and new pathways to achieve more efficiency and meet the energy needs. In the building sector, an emerging pathway is the decentralized power production via small thermal units. Therefore, micro-cogeneration offers a valuable opportunity for studying the potential of Combined Heat and Power (CHP) production for a specific niche market, the residential sector. The introduction of micro-cogeneration combines the perspectives of engineering, economics and political regulations. The micro-cogeneration success is influenced by a set of social and technological developments that may support or constrain it. For instance, the development of advanced grid-access technologies, the subsidized tariffs for selling electricity to the grid and the possibility of using renewable energy sources as a fuel would simplify the micro-cogeneration installation process and enhance the possibility of attaining a return on capital investment. In fact, micro-cogeneration technologies are very efficient energy conversion devices, combining a cost effective energy generation with reduced CO_2 emissions. According to a study from COGEN Europe, based on information from its Portuguese branch, for cogeneration units with an electric power below 150 kW, there is an estimated technical potential of 500 MW_e. If this technical potential were totally used by micro-CHP systems, reductions of CO_2 emissions of around 287 000 tonnes per year could be achieved. In addition, this technology has received a great recognition for its potential in Europe and policies are introduced for its promotion. The purpose of this research is to contribute for the identification of the potential of micro-cogeneration in the residential sector in Portugal, given the current energy scenario, the legal constraints and regulations for micro-scale CHP. Given the current technical performance, the economic constraints, the analysis of the growth drivers and market diffusion barriers of micro-CHP technologies, the economic viability of such systems in Portugal deeply depends on the investment purchase costs of these power plants. In fact, the acquisition of these systems represents a great investment for any consumer at private sector. The consideration of the socio-environmental aspects on the cost/benefit analysis for economic viability evaluation should be included. Thus, it would be useful to include a wider policy assessment in terms of environmental impact and develop a strategy where the renewable energy carriers, energy efficiency, and energy savings are taken into account.

Keywords: micro-cogeneration systems; sustainability; energy efficiency

1. Introduction

Nowadays, the conversion of energy is a challenging task due to constraints on primary sources, environmental concerns, or even to economic criteria. Its profitability, its applicability and its use, are the most important factors in the selection of an energy production system. Cogeneration, the simultaneous production of heat and power, is a proven technology able to address positively to these criteria in a very effective way, achieving high total efficiencies (from 75% to 90%)(Chicco & Mancarella, 2009). Typically, CHP capacities for single-family dwellings range from 1 kW_e to 10 kW_e, while for multi-family dwellings, there are systems available from 30 kW_e to 500 kW_e. The application of this technology at a micro scale level is still incipient. In fact, the overall efficiency and sustainability of cogeneration depends on many factors, such as the technology, fuel types, heat demands, load curves, the unit size, and also on the properties of the heat (e.g. heating fluid type and levels of required temperatures). Micro-cogeneration units usually comprise a small prime-mover driving an electrical generator, from which the waste heat is used in the domestic heating and the electricity generated is either self-consumed or exported to the grid (Shaneb, Coates, & Taylor, 2011).

A number of different conversion technologies have been developed for application in the domestic sector. These include reciprocating engines, Stirling engines, low and high temperature fuel cells,

micro gas turbines and other emergent technologies, such as Rankine cycle machines (Onovwiona & Ugursal, 2006).

First generation micro-CHP has been generally designed to meet the heating needs, while the electricity production has been considered a by-product (in accordance with the philosophy of the European Cogeneration Directive). The purpose is to fulfil the energy needs of the buildings preventing that cogeneration implementation becomes only a profitable business by leveraging the guaranteed feed-in-tariffs and wasting the heat. Therefore, these systems should be able to replace conventional boilers in a central heating system avoiding the costs with the heat generation.

A cogeneration system typically consumes less 20% of input energy, when compared with the separate production of heat and power, for the same level of energy outputs. This reduction in primary fuel consumption is the key to lower operational costs and to the environmental benefits of CHP, as burning a smaller amount of fuel means fewer emissions (Gullí, 2006). Operational cost savings provide additional competitiveness for commercial and residential buildings. This represents an opportunity towards more decentralized forms of energy generation, where plants are designed to meet the thermal and electrical needs, providing high efficiency, avoiding transmission losses, deferring grid and centralized power station investments, increasing flexibility in system use and promoting liberalization in the energy markets.

A specific strategic approach is necessary to adequately embed the new technology, its investment and operation practices, in the expectations, skills, routines and living conditions of the stakeholders involved. In this sense, the small and micro-scale cogeneration has been supported by favourable economic and policy conditions as it represents a considerable market segment with a high sustainability potential. In 2004 the European Union approved the Cogeneration Directive (Directive 2004/8/EC), with the purpose of creating a framework for the development of high efficiency cogeneration, based on the useful heat demand of the customer and the Primary Energy Savings (PES).

According to this directive, the member states should translate the directive from the European level into member state law. However, during the period 2004-2008, not all countries increased their CHP installed capacity, which slowed the dissemination of these systems (CODE, 2010).

The purpose of this work is to understand the actual status of micro cogeneration diffusion in the European scenario and, particularly, at the Portuguese market level. The investigation aims to evaluate if micro-cogeneration is part of the solution to improve the security of energy supply, while allowing environmental benefits and a strategic way to manage energy consumption. The challenging question is: can the innovative potential of micro-CHP technology be a competitive advantage in the residential market?

The organization of the paper is as follows. Section 2 presents an overview on the policies that are supporting the implementation of micro-cogeneration in the Portuguese market, as well as, a brief overview of the energy sector. In section 3, a brief comparison between the most applied technologies to micro CHP systems is presented. The most successful strategies and benefits from micro-CHP systems are discussed in order to access the potential of micro-CHP for the building sector. Subsequently, section 4 summarizes the most relevant aspects related with the micro-CHP competitiveness (technology drivers and market constraints). Finally, section 5 presents the main conclusions of this research work.

2. Background for micro-CHP Portuguese scenario

The European Union is already developing strategies to dissociate the economic growth from the incentives in energy consumption increase. The action plans include legislative initiatives and programs for the energy efficiency in order to promote competitive and efficient technologies. However, it is the role of each member state to transpose to their national laws these initiatives via national action plans, taking into account the respective energy market needs.

2.1 Policy frame work

The Portuguese government has been implementing and promoting energy efficiency policies, most of them based on subsidized schemes for renewable energies. Cogeneration has benefited from this

political push and it contributes with more than 12% of total national electricity production and 16% of useful thermal energy. In 2002, the Decree-Law 68/2002 allowing the power production in low voltage: at least 50% of the produced electric energy must be self-consumed and the maximum power that can be delivered to the power utility is 150 kW_e. So, the fact that consumers can reach incomes from selling electricity to the national grid opened a good opportunity for the application of cogeneration to micro-scale (Directive 2002/91/EC). The European Directive 2004/8/EC enforces the energy efficiency and improves security of supply by creating a framework for promotion and development of high-efficiency cogeneration of heat and power, based on useful heat demand and PES. The Directive differentiates "small-scale cogeneration" as the units with an installed capacity bellow 1 MW_e from "micro-cogeneration unit" as the systems with a maximum capacity of 50 kW_e, and indicates that member states may particularly facilitate these two classes of smaller size systems. This directive, which came into force in 2006, identified the covered technologies by the methodology for calculating the electricity from cogeneration and a methodology for determining the efficiency of cogeneration process. According to the Directive 2004/8/EC, cogeneration systems for micro-scale applications can be classified as high-efficiency cogeneration systems if primary energy savings are positive.

In 2010, the Decree-Law 23/2010 established the guidelines for high-efficiency cogeneration based on useful heat demand, which is considered a priority due to its potential primary energy savings and thus reducing CO_2 emissions. This Decree-Law also established the remuneration scheme for the cogeneration production. Moreover, the Directive 2010/31/EU introduced the philosophy that buildings should become energy producers and outlined a goal for 2020 in which the new building external energy requirements should be near to zero (Directive 2010/31/EU).It is expected that the rising costs of fossil resources and the future economic incentives associated with this legislation, will lead to a strong growth of micro-CHP systems in the building sector.

2.2 Energy market demands

The current national energy scenario is characterized by a strong external dependency, with an energy sector heavily dependent on fossil fuels (fuel oil, natural gas and coal) as primary energy sources. In addition, a growth of the energy occurred until 2006, although Portugal has a lower level of electricity consumption per capita when compared with the EU's average (DGEG, Caracterização Energética Nacional 2010, 2012). However, the electricity consumption has greatly increased in recent years, mainly in the building sector. These two aspects lead to a growing dependence on foreign energy sources. According to Eurostat statistics, Portugal, in 2007, was one of the European Union (EU) countries with the highest energy dependence, importing in that year 82% of the total primary energy consumed, when compared to the EU-27 average of about 53% (EUROSTAT, 2009). Energy demand has been increasing slightly faster than the rate of economic growth and consequently, the energy intensity of the economy is 4% higher than it was in 1991, and it is 10% above the EU 15-average (EUROSTAT, 2009). Thus, the Portuguese energy scenario is characterized by a huge import of primary fossil sources that justifies the high energy dependence. In fact, the energy costs of imported fuel has been suffering a significant growth and, together with the external factors, notably those which cause variations of exchange rates in the international markets as well as the energy price variations, lead to the research and development of cleaner and more efficient alternatives of energy production.

Portugal has significantly shifted its electricity production system by introducing natural gas power plants, new hydroelectric power plants and wind energy. Electricity production from natural gas has increased from zero to near to 12.3TWh between 1996 and 2006. The total installed capacity for production from all types of renewable energy sources has doubled from 1995 to 2009 and has reached 9.2GW, by March 2010.

Concerning the energy consumption, a considerable change in habits of energy consumption in the last 15 years has been reported. Electricity demand in Portugal has grown considerably in the last decade, at an average annual growth rate of 4.4 %. Electricity consumption has increased particularly fast in households and the services and commercial sector, by 37.8% and 38.3% respectively since 2000(IEA, 2012). Figure 1 presents the final consumption of heat and electricity in Portugal in 2009, by activity sector.

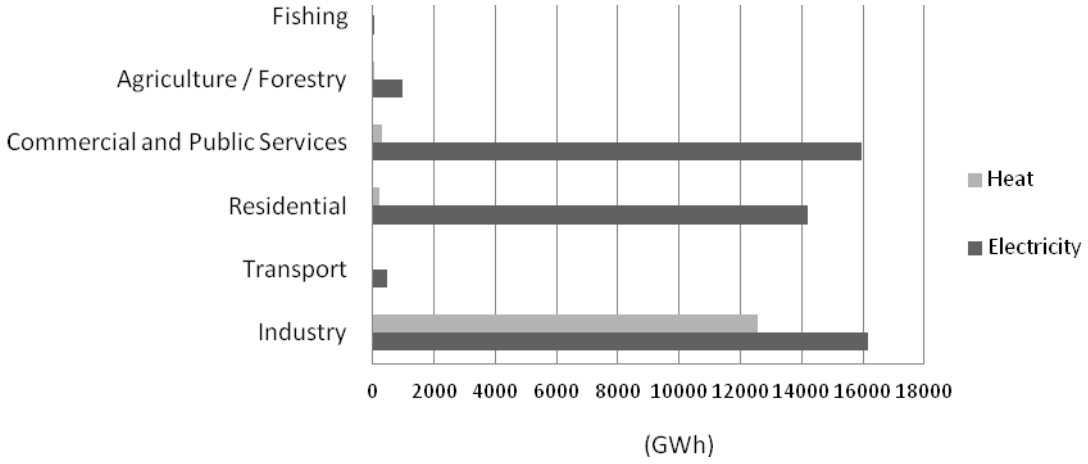


Figure 1: Portuguese final consumption of Electricity and Heat in 2009 (IEA, 2012)

Domestic energy consumption can be defined as the amount of energy that is spent on the different appliances (heating, lightening, hot water, electrical equipment, etc.). The amount of energy used per dwelling varies, depending on the standard of living, climate of the country and the building characteristics. Although significant improvements in energy efficiency have been achieved in household appliances, the electricity consumption in household has been increasing during the past years. Some of the reasons for such increase in the residential sector electricity consumption are associated with a higher level of basic comfort and level of amenities and also with the widespread utilization of relatively new types of loads whose penetration and use has experienced a very significant growth in recent years.

According to DGEG data, the average Portuguese citizen consumes 20% less electricity than the average citizen of the European Union.

The mix of energy consumption in the Portuguese residential sector by energy source in 2009 was made of 16% of liquefied propane, 8% of natural gas, 1% of other oil derived fuels, 38% of electricity, 1% of solar thermal and 36% of biomass (DGEG, 2010).

The proper sizing of the micro-CHP system depends significantly on the daily profiles of the thermal and electrical needs over the year. Thus, for a specific sizing of the system, it is very important to define the consumption profile considering the thermal and electrical requirements. Taking into account the data, there is a noticeable intention to reduce the energy dependence on fossil sources, throughout new technological developments, mainly if that potential could be used with renewable energy sources (COGEN EUROPE, 2010). Figure 2 shows the typical electricity demand throughout a day for a single familiar household. The electricity peak demands correspond to the periods where the thermal needs are more required.

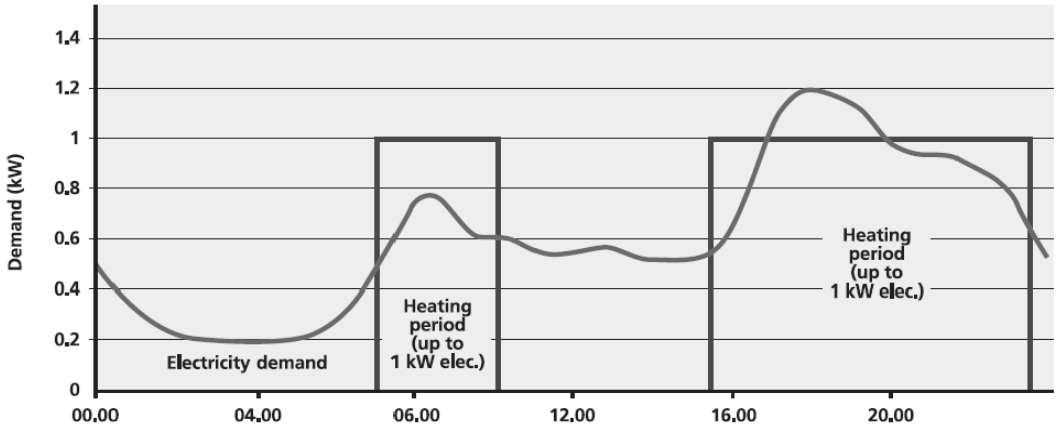


Figure 2: Electricity demand throughout the day (COGEN EUROPE, 2010)

Micro-CHP systems should integrate heating systems, upgrading the inefficiencies of residential energy supply.

3. Potential of micro-CHP systems

A range of micro-CHP appliances is already commercially available, allowing financial savings to thousands of businesses and residences across several European countries (COGEN EUROPE, 2010). These units have saved millions of tonnes of CO_2 and saved billions of kilowatt-hours of energy. This outcome is only possible due to the suitable performance of micro-CHP systems. The potential of each technology is now analysed and the performance criteria between them is compared.

3.1 Performance of micro-CHP systems

The micro CHP market is primarily classified according to the prime move used in the unit and each of them is at a different stage of development. A number of prime mover technologies have been proposed for micro-CHP applications, based on ICE (Internal Combustion Engine), Stirling engines, Fuel Cells and Organic Rankine cycles. The ICE-based micro CHP continues to be the most dominant in the current market scenario because, technologically, these micro-CHP units are very mature and their efficiency and durability have been well demonstrated.

Stirling engines benefit from a high variety of fuels with which it is possible to operate, allowing in particular the use of bio fuels, biomass or solar energy. Stirling engines have a great potential to achieve high overall efficiencies despite the moderate electrical efficiency.

Fuel cells, which convert the chemical energy into electricity, are under development by several companies. The main disadvantage of this technology is that heat cannot be extracted at well-defined points in the system. A recent technological development is the Organic Rankine cycle units. The most familiar Rankine engine is the steam engine, in which water is boiled by an external heat source, expands and exerts pressure on a piston or turbine rotor and hence produces useful work. Some of these systems use an organic fluid and operate at temperatures and pressures much closer to conventional heating and refrigeration purposes. Typically these systems are able to produce 1 kW of electricity and 10 kW of heat. Although with rather low electrical efficiency, it is well matched to many domestic applications and it appears to offer relatively low manufacturing costs and good service life characteristics. In Table 1, the different technologies are compared considering the electrical and the total efficiencies, the stage of the technology development, the fuel versatility and the noise level (Ferreira, Nunes, Teixeira, & Martins, 2012). Comparing the most emergent technologies, reciprocating engines have similar values for electrical efficiency when compared with the Stirling engines, but theoretically require more periodic maintenance representing a cost increase.

Table 1: Comparison of different micro cogeneration technologies

Technology	η_{el} (%)	η_{total} (%)	*Energy Source*	*Stage of Technology*	*Noise Level*
Internal Combustion Engine	20-35	85	Liquid fuel Natural gas	Commercially available	Medium
Stirling Engine	11-35	> 85	Any type of fuel, solar radiation	Some models are already commercially available	Low
Fuel Cells	28-30	80-85	Hydrogen hydrocarbon	In R&D and test prototypes	Low
Rankine Engines	10-20	70-85	Any type of Fuel	In R&D	Low

Fuel Cells and Rankine engines are still under development with some pilot plants being currently tested. The major potential of these two technologies lies in the highest electrical efficiency and the nearly zero pollutant emissions. However, and due to the fact that both are emerging technologies, capital costs are considerably high (Alanne, Soderholm, Sirén, & Beausolei-Morrison, 2010)

3.2 Benefits of micro-CHP

Cogeneration, and in particular the micro-CHP, provides a mean to substantially reduce fuel consumption without compromising the quality and reliability of the energy supply to consumers. In fact, the possibility to produce both thermal and power, in a more efficient way, using a single energy source, reduces the total fuel burned to fulfil the power and heat demands, and so, the pollutant emissions are also reduced. This represents a great contribute to the goals established by the commitment with European targets and it provides a cost-effective means of generating low-carbon energy. In 2007, the European Commission proposed an energy policy to be accomplished by all the member states, with the goal to combat climate change and boost the EU's energy security and competitiveness. This set out the need for the EU to draw up a new energy path towards a more secure, sustainable and low-carbon economy, for the benefit of all users (EUROPEAN COMMISSION, 2007).

The residential sector users are typically low voltage consumers with a contracted power below 50 kW_e. In the centralized power production, several inefficiencies are associated. Firstly, part of the energy contained in the fuel is lost as heat during the conversion process by the large power plants. Typically, the coal conventional power plants only convert of about 35 % of the energy contained in fuel into electricity. Even the most efficient combined cycle plants convert no more than 55% of the fuel energy into electricity. Furthermore, these plants are usually located far from populations, and so, the electricity needs to be transported through the distribution grid up to the end consumer. This leads to distribution losses between 5-15 %. All these disadvantages associated to the conventional power production highlight the great potential of decentralized power production. Energy is saved and gas emissions are reduced by generating electricity at the point of use, avoiding the distribution losses associated with the central power production. Moreover, there are economic savings generated by the reduction of imported electricity.

The economic viability of micro-CHP systems depend on both the capital investment and the value of the electricity produced by the plant. For any given system, the payback relies on the total unit operating hours, the amounts of energy produced annually, and the payback tariffs (variable or fixed).The possibility of selling the surplus electricity back to the grid corresponds to the higher incomes from the micro-CHP systems operation. This benefit can be magnified if the micro-CHP systems operate during the periods at which a great demand of energy is required. The power reinforcement in the national grid could represent a valuable contribution to the security of energy supply and a decrease on centralised power investments. In any case, the profitability of cogeneration systems is influenced by the rise in fuel prices over the price of electricity. Therefore, the economic viability of cogeneration projects deeply depends on the price difference between these two energies, and also on the stability of the purchase price of the plants (Ferreira, Martins, Teixeira, & Nunes, 2012).

4. Analysis of micro-CHP competitiveness

When a new technology or its use in a new field of application arises, the study and the assessment of its competitiveness are required. It is well recognized that micro-CHP systems are an innovative technology with a great potential to supply the building energy needs. However, and considering the actual worldwide economic crises, some investments were significantly reduced, particularly at the private sector. Thus, not only the technological challenges have to be discussed, but also the evaluation of growth drivers and market constraints, which could make these technologies a sustainable solution.

4.1 Technological challenges of micro-CHP

The technical and economic challenges linked to micro-CHP technology dissemination are significantly higher than those faced by larger scale systems. However, once these challenges are overcome, the potential environmental, social and economic benefits are substantial because of the technology potential for retrofitting existing dwellings. In order to achieve economic viability, micro-CHP plants must be manufactured at a cost that can be recovered from the savings in operating costs. Considering the actual capital costs for these power systems, this could represent the main challenging objective for the success of micro-CHP dissemination. In fact, the cost per output power unit tends to rise exponentially as size decreases. Only through the economies of scale the costs can be reduced to a viable level for micro scale systems, reducing commercial and regulatory risks, uncertainties and, so, the existence of a significant potential market.

Operation costs can also represent a significant fraction and, for some technologies, maintenance service may represent a significant charge for CHP plants below 30kW$_e$. Optimally, the challenge is to produce power plants with long life expectancy, low service and maintenance requirements. Regarding the technical aspects, the micro-CHP plant should be compatible with the operational parameters of central heating, such as water flow rates or temperatures, avoiding, for example, additional large storage tanks to provide thermal buffering.

Most micro-CHP systems are currently heat-led, so the plants only operate when there is a heat demand, being the electricity a by-product. The most likely situation corresponds to a higher number of hours heat demand. According to (Pehnt, 2008), micro-CHP plants are only economically viable if operated at least for about 3,500 to 5,000 hours at full load, and if the electricity is used at the production site. Thus, applications with a rather constant heat demand and an electricity demand matching the CHP electricity production profile are particularly well suited for micro CHP installation.

The economic incentive to export electricity from a CHP installation linked to the improvement of system electrical efficiency turn micro-CHP systems on a more attractive investment. Also, micro-CHP units must meet the consumer expectations: similar in size when compared with the power devices they are trying to be a replaceable solution, quiet and free from excessive vibration.

4.2 Sustainability drivers and market constraints

The performance of micro CHP technologies, regarding environmental aspects, depends mainly on the total conversion efficiency that can be achieved. The introduction of these systems in the residential sector is intended to the replacement of gas-condensing boilers that are their competing heat-supply technology. The actual challenge is to make those technologies more competitive. The emission reduction and potential of micro-CHP could partially be offset by a “rebound effect”, implying that energy savings achieved by a more efficient technology are annulled, by an increase in energy demand. This depends, among other aspects, on the degree to which micro-CHP possession is perceived as ecologically relevant, and on an understanding of its effects. Micro-CHP systems have mainly relied on natural gas, although other fossil fuels, and in a limited extent, renewable energy carriers, can be used with most technologies. One of the important questions that arise nowadays is if most micro-CHP systems, which operate on fossil sources, can compete with renewable energy supply systems, for example, solar collectors or biomass boilers. Although micro-CHP and solar collectors require different integration in the respective building, for a new building that can be equipped with a micro CHP plant, this could improve the competitiveness of developing renewable-fuel-based technologies for operating micro CHP systems, particularly Stirling engines (Chicco & Mancarella, 2009).

Therefore, several important advantages regarding to key sustainability criteria can be summarized: micro CHP reduces greenhouse emissions and resource consumption, when compared to the average energy supply and even when compared to efficient and state-of-the art separate production of electricity in conventional power plants and heat in condensing boilers; micro-CHP systems are part of the transformation process for power generation, since the use of micro CHP allows more flexibility solutions when compared to centralized power production; micro CHP plants can have positive effects on the supply security of electricity grids, particularly where heat storage facilities exist and an integration with smart grids is possible; and finally, micro-CHP reduces the external energy dependency through cuts in fossil fuel imports (Pehnt, 2008). Figure 3 summarizes the growth drivers and the most relevant constraints that micro-CHP units have to overcome.

Summarising, it can be said that assessing the sustainability of the micro cogeneration may be based on the balance between the growth drivers of these technologies and the market constraints they face. Therefore, the most relevant growth drivers for micro CHP are: the reduction of the external energy dependency, by reducing the fossil fuel imports; the favourable policies that ensure improved tariffs; the environmental concerns and the need to reduce the pollutant gas emissions; the possibility to replace the heat production systems (e.g. boilers) by a system able to supply the thermal needs and additionally produce electricity where the surplus production can become an economic profit.

The key market constraints that micro-CHP face are: the high manufacturing costs of these power plants; the lack of available money for risky investments; the competition from the conventional power production, as it’s still the easier way to access energy; and, finally, fuel prices fluctuations which can be determinant in the determination of these plants profitability.

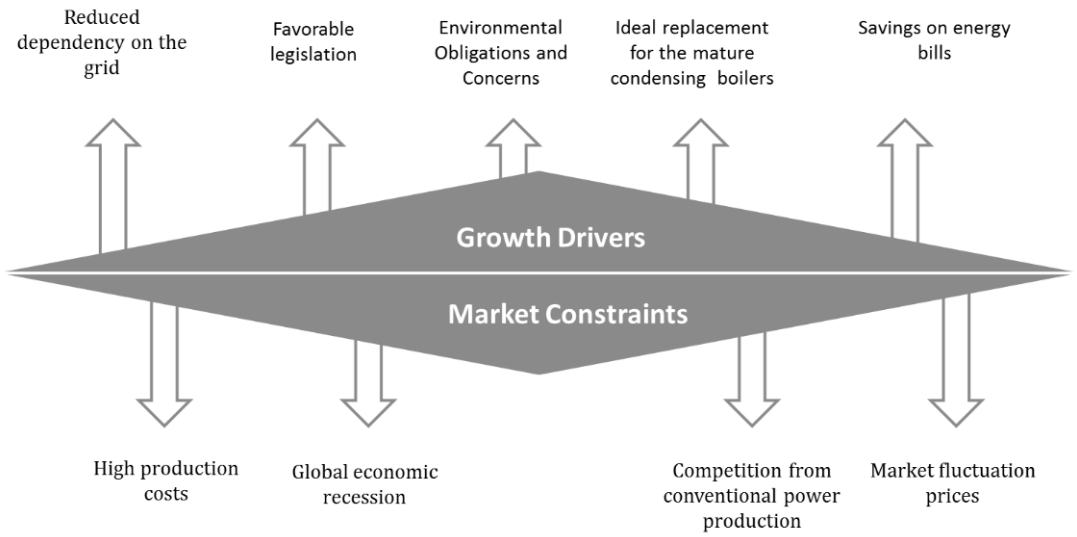


Figure 3: Growth drivers and the market constraints for micro-CHP units

5. Final remarks

The present research is focused on the conditions and impacts of micro-CHP, and how they could contribute to a sustainable transformation on the energy scenario for certain application segments and under certain techno-economic conditions.

First of all, micro CHP has several important advantages with regard to key sustainability criteria:

- Micro CHP reduces greenhouse gas emissions and the consumption of primary resources, compared to the average energy supply and even when compared to NG combined-cycle power plants together with condensing boilers.
- Micro CHP plants can have positive effects on the energy supply, having a great importance on energy self-sufficiency.
- Micro CHP creates opportunities for new, smaller market players and may, in this way, pave the way to more competition in electricity supply and reduced market concentration.

Availability, current technical performance and economic prospects of micro-CHP depend strongly on the specific technology considered. Fuel cell technology is still in the R&D phase, Stirling engines are approaching market introduction, and reciprocating engines are commercially available. Efforts must be done on technological research to use renewable energy sources. This may complement a smooth transformation process of the power generation portfolio, since the use of micro-CHP allows for more flexibility and better adaptation to the unforeseen future changes, compared to centralized large power plants. Concluding, it can be said that it is necessary to embed the use of micro cogeneration units into a strategy of renewable energy carriers, energy efficiency, and energy savings, for the innovative potential of micro-CHP technology to become effective under the economic, environmental and social frameworks.

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References

Alanne, K., Soderholm, N., Sirén, K., & Beausolei-Morrison, I. (2010). Techno-economic assessment and optimization of Stirling engine micro-cogeneration systems in residential buildings. *Energy Conversion and Managment, 51*, 2635-2646.

Chicco, G., & Mancarella, P. (2009). Distributed multi-generation: A comprehensive view. *Renewable & Sustainable Energy Reviews, 13*, 535–551.

CODE, C. (2010). *European Summary Report on CHP Support Schemes: a comparision of 27 national support mechanisms.* CODE Project Report .

COGEN EUROPE. (2010). *Micro CHP: Empowering people today for a smarter future tomorrow.* The European Comission for the Promotion of Cogeneration.

COGEN EUROPE. (2010). *Micro CHP: Empowering people today for a smarter future tomorrow.*COGEN EUROPE.

DGEG. (2010). *ESTUDO DO POTENCIAL DE COGERAÇÃO DE ELEVADA EFICIÊNCIA EM PORTUGAL.* Direcção Geral de Energia e Geologia.

DGEG. (2012, 03 20). *Caracterização Energética Nacional 2010*. Retrieved 03 20, 2012, from Direcção Geral de Energia e Geologia: http://dgge.pt

Directive 2002/91/EC. (s.d.). *Directive 2002/91/EC of the European Parliament and of the Council. On the energy performance of buildings.* Official Journal of the European Union, 16 December 2002.

Directive 2004/8/EC. (s.d.). *Directive 2004/8/EC of the European Parliament and of the Council. On the promotion of cogeneration based on a useful heat demand.* Official Journal of the European Union 11 February 2004.

Directive 2010/31/EU. (s.d.). *Directive 2010/31/EU of the European Parliament and of the Council. On the energy performance of buildings.* Official Journal of the European Union, 19 May 2010.

EUROPEAN COMMISSION. (2007). *An Energy Policy for Europe .* Brussels: COMMISSION OF THE EUROPEAN COMMUNITIES.

EUROSTAT. (2009). *Energy Panorama - Energy statistics to support EU policies and solutions.*European Comission.

Ferreira, A. C., Nunes, M. L., Teixeira, S. F., & Martins, L. B. (2012). A Review of Stirling Engine Technologies applied to micro-Cogeneration Systems. *PROCEEDINGS OF ECOS 2012 - nternational Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems.*Perugia, Italy: ECOS.

Ferreira, A., Martins, L., Teixeira, S., & Nunes, M. (2012). Techno-Economic Assessment of Micro-CHP Systems. *International Conference on Industrial Engineering and Operations Managment.* Guimarães.

Gullí, F. (2006). Small distributed generation versus centralized supply: a social cost-benefit analysis in the residential and service sectors. *Energy Policy, 34*, 804-832.

IEA. (2012). *International Energy Agency - Statistics*. Retrieved 03 12, 2012, from International Energy Agency - IEA: http://www.iea.org/

Onovwiona, H. I., & Ugursal, V. I. (2006). Residential cogeneration systems: review of the current technology. *Renewable & Sustainable Energy Reviews, 10*, 389-431.

Pehnt, M. (2008). Environmental impacts of distributed energy systems—The case of micro cogeneration. *Environmental Science & Policy, 11*, 25-37.

Shaneb, O. A., Coates, G., & Taylor, P. C. (2011). Sizing of residential mCHP systems. *Energy and Buildings, 43*, 1991–2001.

The Influence of Innovative Capacity on Firms Performance: Portuguese and Spanish Evidences

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Abstract: This article analyses the importance of two types of innovation and the impact of innovation capacities on financial performance among small and medium sized enterprises (SME) on either side of the border between two countries (Portugal and Spain). Based upon a sample of 61 companies, the results show significant differences in terms of both the drivers and inhibitors to innovation in these two countries. The introduction of products into new markets only proved significant at Spanish companies whilst innovations in both products and processes are significant in both sets of Iberian companies.

Keywords: innovation, innovation capacities, financial performance

1. Introduction

Innovation is a process involving the transformation of opportunities into practical utility (Tidd et al., 1997). The effective implementation of innovation has gained an increasing level of recognition as synonymous with constructing sustained competitive advantage thereby boosting organisational performance (Koc & Ceylan, 2007). Within an ever more competitive environment, innovation proves a critical factor both for companies attempting to retain dominant positions and for raising profit levels (Hu & Hsu, 2008; Kaminski et al., 2008). Various authors point to innovation as the only route to companies adapting to increasingly dynamic surrounding environments (Roberts & Amit, 2003; Hua & Wmmerlov, 2006; Doloreux & Melancon, 2008). Through analysis of the introduction of new processes, products or ideas at the organisational level, we may measure firm innovation capacities (Hurley & Hult, 1998).

Innovation derives from the flexibility of companies able to make recourse to different options for meeting the demands of their consumers (Banbury & Mitchell, 1995), through a sustained strategy focused upon the resources and capacities in place at companies, which are not only able to satisfy those desires in the present but also into the future (Wernerfelt, 1984; Barney, 1991; Drazin & Schoonhoven, 1996; Tushman & O'Reilly, 1997; Souitaris, 2002; Hwang, 2004; Lemon & Sahota, 2004). However, despite this growing awareness of how innovation extends beyond technical processes and products, some recent research has tended to take technical innovation exclusively into consideration and especially in the transformation industrial sector (Becker & Dietz, 2004; Huergo & Jaumandreu, 2004; Lynskey, 2004; Nieto & Santamaria, 2005).

There is also a range of different research findings on the performance of companies in relation to their innovation based activities (Klette & Griliches, 2000; Klette & Kortum, 2001, 2004; Thompson, 2001; Lentz & Mortensen, 2005). Many of these studies concentrate on interpreting the endogenous growth models, for example, the works by Gossman and Helpman (1991) and Aghion and Howitt (1992) based on the perspective that companies operate at the macro level and thereby assuming heterogeneous firm behaviour and the influence of these activities on innovation and consequently on their investment in research and development (R&D). Other studies directly approach the relationship between R&D expenditure and firm innovation activities and demonstrating that there is a positive relationship between these two variables (Dasgupta, 1985; Phillips, 1971; Hopenhayn, 1992).

This article aims to analyse the importance of innovation types and the actual impact of innovation capacities on the financial performances of companies located in two neighbouring countries (Portugal and Spain).

After this brief introduction, the article is structured as follows: section two provides a review of the literature on innovation capacities and the influence of innovation on firm financial performance. In section three, we set out our methodology and describe the sample and the statistical methods applied. Section four presents our results before closing with some final considerations in section five.

2. Literature review

Currently, there is agreement that in addition to differences in innovation performances between regions, innovation capacities and firm innovation strategies also depend on the region of location (Cooke et al., 2004). Furthermore, beyond these innovative capacities in themselves, government innovation support policies are fundamental alongside technological changes in the regions, especially in more rural locations (Doloreux & Dionne, 2008). Indeed, according to the OECD (2007), the motivation underpinning studies about differences in regional innovation should be that of enabling the design of policies ensuring less advantaged regions return better innovation performances.

On analysing firm growth, two characteristics are always underlying, the age and the scale of the firm under study (Cucculelli & Ermini, 2012). These variables are posited by Jovanovic (1982) in his model of passive learning. This model fundamentally reflects the idea that small and young companies innovate more than their older and larger scale counterparts. The same conclusions were reached by other authors (Evans, 1987a; 1987b; Hall, 1987; Dunne & Hughes, 1994; Lotti et al., 2003; Audretsch et al., 2004). More recently, some empirical evidence does report a positive correlation between firm growth, its age and the ongoing level of innovation activities (Das, 1995; Heshmati, 2001; Ermini, 2008; Teruel-Carrizosa, 2010). Cucculelli and Ermini (2012) go so far as to identify innovation as the key factor to firm growth.

Other researchers have analysed the impact of technological innovation on firm productivity (OECD, 1986; Crepon et al., 1998,; Bönte, 2003; Hall et al., 2008; Ortega-Argilés et al., 2009). Through the adoption of R&D or innovation capacity based indicators (innovations in products, processes, or patent numbers), various researchers conclude in favour of the positive impact of innovation on firm performance levels (Nolan et al., 1980; Hall, 1987; Amirkhalkhali & Mukhopadhyay, 1993; Singh, 1994; Lefebvre et al., 1998; Del Monte & Papagni, 2003; Nurmi, 2004; Yang & Huang, 2005; Coad & Rao, 2008). However, Mishra (2005) finds that only the innovation capacity variables impact on the firm performance of Indian firms and not those related to R&D and concluding that indices of R&D expenditure do not contribute towards evaluating firm growth and performance (Geroski, 1995; Geroski et al., 1997; Coad & Rao, 2008; Hölzl, 2009). Other researchers hold, however, that these results stem from companies being unable to separate R&D expenditure from other operational costs with the knowledge driving innovation activities taking place in the informal node (Dosi et al., 1995; Michie, 1998; Flor, & Oltra, 2004). This means that despite R&D expenditure representing an indicator demonstrating a greater or lesser propensity towards innovation, its adoption may nevertheless cause bias in the results for the aforementioned reasons (Arundel, & Kabla, 1998; Becheikh et al., 2006). Thus, for Kirner et al. (2009), innovation capacities are very much associated with R&D activities, with innovations in terms of new products the output of these activities. In this way, new products require new capacities or, alternatively expressed, a new combination of already existing competences (Koch & Strotmann, 2008). New competences as a pre-condition for generating new products or services may be seen as the result of the acquisition, assimilation and dissemination of new knowledge (Cohen & Levinthal, 1989; 1990) and thus susceptible to reference as innovation capacities. Innovation capacities stem from individually held competences, pre-acquired knowledge and the specific competences of the companies as well as through recourse to diverse means of knowledge production (Cohen & Levinthal, 1990; Malerba & Torrisi, 1992; Becker & Petrs, 2000; Schmidt, 2005).

Thus, innovative companies tend to record better economic-financial performances than their non-innovative competitors (Ferreira, 2010; Cucculelli & Ermini, 2012). Innovation is, in every sector of the economy, fundamental to surviving and to prevailing in an increasingly globalised world. Innovation aids companies seeking to respond to diversified patterns of demand undergoing constant change and enables improvements to the different fields and activities taking place in society (Cooke, 1998). Therefore, innovation is perceived as the motor of progress, of competitiveness and economic development (Romer, 1994; Johansson et al., 2001).

3. Methodology

Sample and Data

The questionnaire was structured to inquire about innovation activities and their respective influence on financial performance across a sample of 61 companies in two neighbouring countries (Portugal and Spain).

Table 1 below details the main sample characteristics.

Table 1: Survey data collection

Temporal Basis	Cross-sectional
Geographic Area	Portugal and Spain
Sectors	Manufacturing and service industries (Agro-food, Logistics and transport
Analysis Unit	25 Portuguese firms 36 Spanish firms
Sample	Intentional/convenience: 61 valid questionnaires
Questionnaire date	October - December, 2011
Data gathering	Postal questionnaire
Key Informant	Owner–managers or CEO
Data Analysis	Univariate and Linear Regression

Defining and measuring the variables

Analysis of the numerical variables produced their averages, medians, minimum, maximum, and standard deviation while qualitative variables were analysed according to their absolute and relative frequencies. In the comparative bivariate analysis of Portuguese and Spanish companies, we applied the Mann-Whitney test and the t-test for continuous variables and the chi-squared test for the categorical variables. In multivariate terms, linear regression was the methodology deployed to analyse the importance of innovation types (differences between Portugal and Spain). To analyse the extent to which the innovation capacity variables influence financial performance (turnover), we made recourse to Probit Regression models.

We classify associations as statistically significant when returning p-values of less than 0.10. We furthermore applied the Nagelkerke calculated determinant coefficient (Pseudo R^2). In the bivariate analysis, we rank as significant p-value differences lower than 0.05 with this level set at 0.10 in the multivariate analysis. We applied the latter value in recognition of the sample containing only 61 companies.

Firm profile

Firm characteristics, such as age, sector of activity or scale in terms of number of employees have been broadly defended as crucial to innovation based processes (Mills & Marguiles, 1980; Acs & Audretsch, 1988; Gallouj, & Weinstein, 1997; Tether, 2003; Drejer, 2004; Criscuolo et al., 2012).

Regarding firm profile by location, there were statistically significant differences ($p<0.05$) between Portuguese and (PT) and Spanish (SP) companies in terms of their core business activity. In Portuguese companies, the most common activity is Transporter (46.2%) while the main activity among Spanish firms is Production and Distribution (54.3%). There are also statistically significant differences ($p<0.05$) in terms of levels of firm employment. The majority of Spanish companies employ less than ten employees (60%) and the largest category of Portuguese companies was that classifying firms employing from 10 to 49 employees (61.5%). According to the European Commission (1996) criteria, these companies are classified as micro and small companies respectively.

Inhibitors to Innovation

Different authors defend how factors such as financing issues, difficulties in predicting potential demand, the lack of qualified employees and the difficulties inherent to organising innovation are perceived as some of the inhibitors to innovation (Banbury & Mitchell, 1995; Wheelwright & Clark, 1995; Amabile et al., 1996; Slappendel, 1996; Damanpour & Gopalakrishnan, 1998; Hwang, 2004;

Lemon & Sahota, 2004; Koc & Ceylan, 2007). As regards the level of difficulties regarding innovation, Spanish companies, in comparison with their Portuguese peers, consider the difficulties are significantly greater ($p<0.05$) due to insufficient firm equity and externally sourced financing, very high wage costs, the difficulty to predict demand, the difficulty in organising innovations as well as an overall lack of qualified employees in the fields of R&D, Production and Marketing/Sales.

Factors of Innovation

The literature demonstrates that firm innovation activities directly derive from certain specific factors, such as cooperation with suppliers, with clients, with universities, the existence of risk capital investors and business angels, an innovation friendly climate in addition to infrastructures (Roberts & Berry, 1985; Cooper, 1990; Wheelwright & Clark, 1995; Slappendel, 1996; Dussage et al., 1992; Lemon & Sahota, 2004; Koc & Ceylan; 2007; Tidd & Bessant; 2009). In terms of regional factors and their level of importance as regards firm innovation capacities, Spanish companies attribute significantly higher importance ($p<0.05$) than their Portuguese peers to the following factors: risk capital, research laboratories and centres, universities, study offices and specialist publications.

Innovation capacities

Wonglimpiyarat (2010) proposes measuring innovation capacities through organisational innovations across the dimensions of processes, services, products and marketing.

We provide the descriptive results for the level of importance attributed to the innovation capacity variables. Despite the averages showing how greater importance is attributed to product innovations, the results are not statistically significant.

4. RESULTS

Multiple regression estimates for innovation capacities

With the objective of analysing the importance of innovation types to companies (and the respective differences between Portugal and Spain), we applied multiple linear regression by country to ascertain the factors determinant to the level of importance attributed to innovation across the following areas: processes, products, organisation, and introduction of already existing products into new markets.

In relation to process innovations, no variable returns a statistical level of significance ($p>0.05$) in terms of the importance attributed at either Portuguese or Spanish companies. The level of importance attributed by Portuguese companies to product innovations is significantly associated with the importance attributed to the following factors of innovation: (I) Public support ($B=-1.81$, $p<0.01$); (II) Suppliers ($B=1.31$, $p<0.01$), (III) Clients ($B=1.40$, $p<0.01$) and (IV) Innovation friendly climate ($B=-1.25$, $p<0.05$).

In Spanish companies, the descriptor “firm age” bears influence on rates of product innovation ($B=-2.34$, $p<0.01$) as do the levels of importance attributed to the following factors of innovation: (I) Innovation friendly climate ($B=-0.69$, $p<0.05$) and (II) Local labour supply ($B=0.73$, $p<0.05$). They all significantly influence the importance levels attributed to product innovations. Therefore, companies in business for up to 15 years of age (young companies) and which endow greater importance to the innovation friendly climate factor attribute significantly less importance to production innovations, which may be approached as obstacles to innovation. Hence, when Spanish companies are young in age, then this implies lower levels of product innovation. In the case of the local labour supply factor, the greater the importance attributed to this factor, the greater the importance attributed to product innovations.

The level of importance attributed by Portuguese companies to organisational innovation is significantly associated with the importance attributed to the factors of innovation: (i) Clients ($B=1.20$, $p<0.05$), (ii) State support ($B=-1.25$, $p<0.05$) and (iii) Research ($B=-0.61$, $p<0.1$). The greater the importance attributed to clients and to research, the greater the importance awarded to organisational innovations with the inverse holding in the case of the state support factor where the greater the importance attributed to this factor, the lesser the importance attributed to organisational innovation with this factor perceived as an obstacle to innovation.

Meanwhile, the level of importance attributed by Spanish companies to organisational innovation is associated with the following factors: (i) Research (B=0.31, p<0.1); (ii) Consultants (B=0.84, p<0.05) and (iii) Innovation friendly climate (B=-0.53, p<0.05). as well as the firm descriptive variable "number of employees" (B=3.36, p<0.01). Companies currently employing between 50 and 249 employees (annual firm average) are those endowing organisational innovations with greater levels of importance with the higher the level of importance attributed to the consultants and research factors, the greater the important attributed to organisational innovation. However, the inverse is observed for the innovation friendly climate factor where the greater the importance, the lesser that attributed to organisational innovations and thus ranked as an inhibitor to innovation.

The importance granted by Portuguese companies to the introduction of already existing products in new markets is not linked to any variable.

In Spanish companies, the level of importance attached to the introduction of already existing products in new markets is significantly associated with the importance attributed to the factors of innovation: (I) Clients (B=-0.73, p<0.01), (II) Qualified human resources (B=1.43, p<0.001), (III) Local labour supplies (B=-1.85, p<0.001), (IV) Transport infrastructures (B=0.81, p<0.01), (V) Research (B=-0.55, p<0.01) and (VI) Risk capital (B=0.51, p<0.05), as well as the firm description variables: (i) firm age (B=2.40, P<0.001) and (II) number of employees (B=0.69, p<0.1). Companies in business for less than 15 years (young) and employing between 50 and 249 employees (firm average) award significantly greater importance to the introduction of already existing products in new markets and the greater the importance of qualified human resources, transport infrastructures and risk capital, the greater the importance attributed to the introduction of already existing products in new markets. This returns an inverse relationship in the case of the factors of clients, local labour supplies and research, which may thus be perceived as obstacles to this innovation type.

Relationship between modes of innovation and financial performance

With the objective of analysing the influence of the respective innovation types on financial performance, we calculated Probit Regression models, for each country in order to determine which innovation related factors, whether innovating products, processes, organisations or introducing already existing products into new markets, influence financial performance as measured through turnover (Table 2). At Portuguese companies, we find there is no statistically significant association (p> 0.10) between the importance attributed to the different factors of innovation and turnover.

Table 2: Probit regression – Influence of innovation types on financial performance

		B	Std. Error	Wald	p	R^2
PT	Constant	-0.81	1.00	0.65	0.421	0.297
	Product innovations	0.42	0.41	1.07	0.301	
	Process innovations	0.75	1.05	0.50	0.478	
	Organisational innovations	-0.60	0.71	0.71	0.398	
	Introduction of already existing products in new markets	-0.63	1.29	0.24	0.625	
SP	Constant	-1.76	1.50	1.38	0.240	0.381
	Product innovations	0.38	0.23	2.81	0.094	
	Process innovations	0.42	0.40	1.13	0.288	
	Organisational innovations	-0.14	0.26	0.31	0.579	
	Introduction of already existing products in new markets	-0.47	0.33	2.03	0.154	

As regards Spanish companies, the level of importance attributed to product innovations is significantly associated with turnover (B=0.38, p<0.10), with the greater the importance attributed to this innovation type associated with a greater probability of the level of sales breaking the €2 million mark (average level of turnover).

5. Final considerations

To the extent by which globalisation has advanced and deepened the level and consequences of interdependence between national economies, the business world has become ever more complex

and exponentially more competitive. This scenario has driven companies to adopt proactive strategies designed to seek out sustainable competitive advantage. Innovation has thereby now emerged as one of the core strategic priorities for companies seeking success in their business dealings. Innovation is strongly dependent on the capacities of companies to acquire, generate and apply knowledge.

Many business leaders already perceive business success as depending on the capacity to bring new products, services or processes to the market and before their competitors manage to do so. Innovation requires timely decision making about the investments going into knowledge, assets, brands and reputation from the perspective of developing capacities beyond those already wielded and deployed by the respective firm. The competitive pressures and the desire for greater returns further boost the incentives acting to drive innovation.

This paper sets out the findings of research undertaken to study the factors and obstacles verified within the framework of the innovation capacities reported by a sample of companies located in the border regions of two neighbouring countries from a perspective of identifying similarities and differences between the companies and their respective national location as regards both their innovation capacities and their financial performance.

The empirical results return significant differences between the companies in the two countries under study in terms of the innovation capacities across products, organisational innovation and the introduction of existing products into new markets. In the case of Portuguese companies, the leading regional factors of innovation were the relationships with suppliers, with clients and the level of commitment to R&D. However, in the case of Spanish companies, the most significant regional factors of innovation were the existence of local labour supplies, R&D expenditure, firm size, consultants, qualified human resources, transport infrastructures and the capital available for investment.

In terms of innovation inhibitors, Portuguese companies reported that the lack of state support and weak innovation friendly climates were the main obstacles. On the Spanish side, companies identified firm age (young companies), weak innovation friendly climates, local labour supplies, client relationships and the lack of investment in R&D as the primary innovation inhibitors.

The relationship between innovation and financial performance was statistically validated in the case of Spanish companies that confirmed the introduction of greater numbers of product innovations did drive higher overall turnover.

Carrying out cluster analysis led to the identification of two groups of companies with different innovation typologies. The first group proved to be less innovative in character with lower levels of importance attributed to the different innovation types with companies defined by being smaller in scale with lower turnovers and attributing greater importance to product and process innovations. The second group is clearly more innovative in nature and placing greater emphasis on all types of innovation and made up of companies of average scale, with higher sales volumes and awarding importance to product and process innovations. There is, however, no particular association between either of the groups and the countries under study, which means that these border regions are actually very similar in the influence they exert over firm innovation capacities.

The identification of regional factors enabling and hindering innovation generates worthwhile indicators for public innovation support policies as they may now be tailored to take into account the specific properties of companies actually located in the border regions under study.

Given this study contained a sample of only 61 companies, this limits the generalisations that may be drawn from its findings. Nevertheless, it did prove possible to compare the innovation capacities in effect in two countries and would therefore correspondingly suggest a future research engaging with not only a larger study sample to ensure the conclusions are more robust and more generally applicable but also expanding the research approach to other countries.

References

Amabile, T., Conti, R., Coon, H., Lazenby, J., Herron, M. 1996. Assessing the work environment for creativity". *Academy of Management Journal* 39 (5), 1154–1184.

Amirkhalkhali, S., Mukhopadhyay, A.K., 1993. The influence of size and R&D on the growth of firms in the U.S. *Eastern Economic Journal* 19, 223–233.
Arundel, A., Kabla, I., 1998. What percentage of innovations are patented? Empirical estimates for European firms. *Research Policy* 27, 127–141.
Audretsch, D.B., Klomp, L., Santarelli, E., Thurik, A.R., 2004. Gibrat's law: are the services different? *Review of Industrial Organization* 24, 301–324.
Banbury, C.M., Mitchell, W., 1995. The effect of introducing important incremental innovations on market share and business survival. *Strategic Management Journal* (summer special issue) 16, 161–182.
Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17(1), 99 – 120.
Becheikh, N., Landry, R., Armara, N., 2006. Lessons from innovation empirical studies in manufacturing sector: a systematic review of the literature from 1993–2003. *Technovation* 26, 644–664.
Becker, W., Dietz, J., 2004. R&D Cooperation and Innovation Activities of Firms – Evidence for the German IPO Data. *Economics of Innovation and New Technology*, 15(1), 71-81.
Becker, W. Peters, J. 2000. Technological Opportunities, Absorptive Capacities, and Innovation. Volkswirtschaftliche Diskussionsreihe 195. Universität Augsburg.
Bönte, W., 2003. R&D and productivity: internal vs. external R&D – evidence from west German manufacturing industries. *Economics of Innovation and New Technology* 12, 343–360.
Ccucculelli, M., Ermini, B (2012). New product introduction and product tenure: What effects on firm growth?. *Research Policy*, 41, 808-821.
Coad, A., Rao, R., 2008. Innovation and firm growth in 'complex technology' sectors: a quantile regression approach. *Research Policy* 37, 633–648.
Cohen, W. Levinthal, D. 1989. Innovation and Learning: the Two Faces of R&D – Implications for the Analysis of R&D Investment. *Economic Journal*, 99, 569-596.
Cohen, W.M., Levinthal, D.A., 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly* 35, 128–152.
Cooke, P., (1998). Origins of the concept. In: Braczyk, H.-J., Cooke, P., Heidenreich, M. (Eds.), Regional Innovation Systems — The Role of Governance in a Globalized World. UCL Press, London, 2–25.
Cooke, P., Heidenreich, M. Braczyk, H.-J. (Eds) (2004) *Regional Systems of Innovation* London: Routledge.
Cooper, R.G. (1990) New products: what distinguishes the winners? *Research and Technology Management* 33 (6), 27–31.
Crepon, B., Duguet, E., Mairesse, J., 1998. Research, innovation and productivity: an econometric analysis at the firm level. *Economics of Innovation and New Technology* 7, 115–158.
Damanpour, F., Gopalakrishnan, S. 1998. Theories of organizational structure and innovation adoption: the role of environmental change. *Journal of Engineering and Technology Management* 15, 1–24.
Das, S., 1995. Size, age and firm growth in an infant industry: the computer hardware industry in India. *International Journal of Industrial Organization* 13, 111–126.
Del Monte, A., Papagni, E., 2003. R&D and growth of firms: empirical analysis of a panel of Italian firms. *Research Policy* 32, 1003–1014.
Doloreux, D. Dionne, S. 2008. Is regional innovation system development possible in peripheral regions? Some evidence from the case of La Pocatière, Canada", *Entrepreneurship & Regional Development – An International Journal*, 20 (3), 259-283.
Doloreux, D., Melancon, Y. 2008. On the dynamics of innovation in Quebec's coastal maritime industry. *Technovation* 28, 231–243.
Dosi, G., Marsili, O., Orsenigo, L., Salvatore, R., 1995. Learning, market selection and the evolution of industrial structures. *Small Business Economics* 7, 411–436.
Drazin, R., Schoonhoven, C.B. 1996 Community, population, and organization effects on innovation: a multilevel perspective. *Academy of Management Journal* 39 (5), 1065–1083.
Dunne, P., Hughes, A., 1994. Age, size, growth and survival: UK companies in the 1980. Journal of Industrial Economics 42 (2), 115–140.
Dussage, P., Hart, S. Ramanantsoa, B. 1992 *Strategic Technology Management*. Wiley, New York.
Evans, D.S., 1987a. Tests of alternative theories of firm growth. *Journal of Political Economy* 95, 657–674.
Evans, D.S., 1987b. The relationship between firm growth, size, and age: estimates for 100 manufacturing industries. *Journal of Industrial Economics* 35, 567–581.
Ermini, B., 2008. Capitale umano, fonti di finanziamento esterno e crescita delle nuove imprese italiane ad alta tecnologia. *Studi Economici* 96, 73–107.
Ferreira, J. (2010) Corporate entrepreneurship and small firms growth. *International Journal of Entrepreneurship and Small Business* 10 (3) 386 – 409.
Flor, M.L., Oltra, M.J., 2004. Identification of innovating firms through technological innovation indicators: an application to the Spanish ceramic tile industry. Research Policy 33, 323–336.
Geroski, P.A., 1995. Innovation and competitive advantage. In: Working Paper No. 159. OECD, Economic Department.
Geroski, P., Machin, S., Walters, C., 1997. Corporate growth and profitability. *Journal of Industrial Economics* XLV, 171–189.
Hall, B.H., 1987. The relationship between firm size and firm growth in the U.S. manufacturing sector. *Journal of Industrial Economics* 35, 583–605.

Hall, B.H., Lotti, F., Mairesse, J., 2008. Innovation and productivity in SMEs: empirical evidence for Italy. *Small Business Economics* 33, 13–33.
Heshmati, A., 2001. On the Growth of Micro and Small Firms: Evidence from Sweden, *Small Business Economics*, vol. 17, no. 3, 213–228.
Hölzl, W., 2009. Is the R&D behaviour of fast growing SMEs different? Evidence from CIS III data for 16 countries. *Small Business Economics* 33, 59–75.
Hua, S.Y., Wemmerlov, U., 2006. Product change intensity, product advantage, and market performance: an empirical investigation of the PC industry. *Journal of Product Innovation Management* 23, 316–329.
Hu, J.L., Hsu, Y.H., 2008. The more interactive, the more innovative? A case study of South Korean cellular phone manufacturers. *Technovation* 28, 75–87.
Huergo, E., Jaumendreu, J., 2004. How does probability of innovation change with firm age? Small Business Economics, 22(3-4), 193-207.
Hurley, R., Hult, G.T.M., 1998. Innovation, market orientation, and organizational learning: an integration and empirical examination. *Journal of Marketing* 62, 42–54.
Hwang, A., 2004. Integrating technology marketing and management innovation. Research-Technology Management 47 (4), 27–31.
Johansson, B., Karlsson, C., Stough, R. 2001 Theories of Endogenous Regional Growth, Lessons for Regional Policies, Berlim; Springer – Verlag.
Jovanovic, B., 1982. Selection and evolution of industry. *Econometrica* 50, 649–670.
Kirner, E., Kinkel, S. & Jaeger, A. (2009). Innovation paths and the innovation performance of low-technology firms – an empirical analysis of German industry, *Research Policy,* 38 (3), 447–458.
Klette, T.J., Griliches, Z., 2000. Empirical patterns of firm growth and R&D investment: a quality ladder model interpretation. *The Economic Journal* 110, 363–387.
Klette, T.J., Kortum, S., 2001. Innovating firms: evidence and theory. In: Levine's Working Paper Archive. UCLA Department of Economics, Los Angeles.
Klette, T.J., Kortum, S., 2004. Innovating firms and aggregate innovation. *Journal of Political Economy* 112, 986–1016.
Koc, T., Ceylan, C. 2007. Factores impacting the innovative capacity in large – scale companies. *Technovation* 27, 105 – 104.
Koch, A. Strotmann, H. 2008. The impact of functional integration and spatial proximity on the post-entry performances of Knowledge Intensive Business Service Firms. *International Small Business Journal*, 24 (6), 610-634.
Lefebvre, E., Lefebvre, L.A., Bourgault, M., 1998. R&D-related capabilities as determinants of export performance. *Small Business Economics* 10, 365–377.
Lemon, M., Sahota, P.S., 2004. Organizational culture as a knowledge repository for increased innovative capacity. Technovation 24, 483–498.
Lentz, R., Mortensen, D.T., 2005. Productivity growth and worker reallocation. *International Economic Review* 46, 731–751.
Lotti, F., Santarelli, E., Vivarelli, M., 2003. Does Gibrat's law hold among young, small firms'? *Journal of Evolutionary Economics* 13, 213–235.
Lynskey, M.J. 2004. Determinants of innovative activity in Japanese technology-based start-up firms. *International Small Business Journal*, 22 (2), 159-196.
Malerba, F. Torrisi, S. 1992. Internal Capabilities and External Networks in Innovative Activities. Evidence From the Software Industry. *Economics of Innovation and New Technology*, 2(1), 49–71.
Michie, J., 1998. Introduction. The Internationalisation of the innovation process. *International Journal of the Economics of Business* 5 (3), 261–277.
Mishra, V., 2005. Size, age & firm growth: the computer industry in India. *Review of Development and Change* 10.
Nieto, M. J. Santamaria, L. 2005. Novelty of product innovation: the role of different networks. Business Economics Series. Universidad Carlos III de Madrid. Working Papers #05-65. November 2005.
Nolan, M.P., Oppenheim, C., Witheis, K.A., 1980. Patenting profitability and marketing characteristics of the pharmaceutical industry. *World Patent Information* 2, 169–172.
Nurmi, S., 2004. Plant size, age and growth in Finnish manufacturing. Finnish Economic Papers 17 (1), 3–17.
OECD, 1986. Science and Technology Indicators, no. 2. R&D Innovation and Competitiveness, Paris.
OECD. 2007. Competitive Regional Clusters: National Policy Approaches (Paris: OECD, Directorate for Public Governance and Territorial Development).
Ortega-Argilés, R., Piva, M., Potters, L., Vivarelli, M., 2009. Is corporate R&D investment in high-tech sectors more effective? Some guidelines for European research policy. In: IZA Department Paper No. 3945.
Roberts, P.W., Amit, R., 2003. The dynamics of innovative activity and competitive advantage: the case of Australian retail banking, 1981 to 1995. *Organization Science* 14 (2), 107–122.
Roberts, E. Berry, C. 1985. Entering new business: selecting strategies for success. *Sloan Management Review* 26, 3–17.
Romer, P.M. 1994 The Origins of Endogenous Growth. *Journal of Economic Perspectives*, 8(1), 2–22.
Schmidt, T. 2005. Absorptive Capacity–One Size FitsAll?AFirm-levelAnalysis ofAbsorptive Capacity for Different Kinds of Knowledge. ZEW Discussion Paper No. 05-72. Mannheim: ZEW.
Singh, L., 1994. Productivity, competitiveness and export growth in a less developed economy: a study of Indian Punjab. In: Working Paper, Yale Economic Growth Center Discussion Paper No. 714.

Slappendel, C., (1996) Perspectives on innovation in organizations. *Organization Studies* 17 (1), 107–129.
Souitaris, V., 2002. Technological trajectories as moderators of firm-level determinants of innovation. *Research Policy* 31, 877–898.
Thompson, P., 2001. The microeconomics of an R&D based model of endogenous growth. *Journal of Economic Growth* 6, 263–283.
Tidd, J. Bessant, J. (2009): *Managing Innovation – Integrating Technological, Market and Organizational Change*, John Wiley & Sons, England.
Teruel-Carrizosa, M., 2010. Gibrat's law and the learning process. Small Business Economics 34 (4), 355–373.
Tidd, J., Bessant, J., Pavitt, K., 1997. *Managing Innovation*. Wiley, Chichester.
Tushman, M.L., O'Reilly, C.A., 1997. Winning through innovation: a practical guide to leading organizational change and renewal. III. Harvard Business School Press, Boston.
Wheelwright, S.C., Clark, K.B. 1995 *Leading the Product Development*. Free Press, New York.
Wernerfelt, B. 1984. A resource –based view of the firm, *Strategic Management Journal*, 5 171 – 180.
Wonglimpiyarat, J., 2010. Innovation index and the innovative capacity of nations. *Futures* 42 (3), 247 253.
Yang, C.H., Huang, C.H., 2005. R&D, size and firm growth in Taiwan's electronics industry. *Small Business Economics* 25, 477–487.

Integrated Product Development in Multisite PLM Platform

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Abstract: It is well known that the challenges in Automotive industry, namely reducing time to market, risks and development costs, could be reached thanks to innovative design methods supported by PLM technologies. Such methods are based on integrated design or collaborative engineering enabling close exchanges of data and information between different platforms and departments. The paper proposes a synthesis of the different programs on platforms who is leading to development issue during conception and manufacturing process. It presents also the development of a collaborative design platform, which aims to improve partners' cooperation in the automotive supply chain. The paper also discusses how to include multiple expertise and integrated design in the collaborative platform. By integrating of the product conception, the technology processes and the manufacturing in the computer integrated manufacturing have been achieved a raise in the manufacturing flexibility, the reducing of the delivering times and the improvement of the realized products' quality. The present paper also presents the relevant items for building a multisite PLM platform for collaborative integrated product development based on the common researches developed in automotive industry. Based on these arguments, it is necessary to build a collaborative multisite platform. Who will integrate Teamcenter as the base software platform for documents and technical data management that is joining together different applications for collaborative product development methodology and the multisite PLM platform architecture: Virtual Design (Catia, Creo), for manufacturing and Virtual Prototyping (3D Via, Creo Mechanica, Creo Simulate), etc. The model of building such collaborative design environment was inspired by different solutions delivered by companies with great names: Dassault, Siemens, PTC, but these solutions are expensive and heavy to be implemented by small and medium companies. Our mission is to analyze the advancement and implementation of PLM platforms through research department in partnership with manufacturing industry.

Keywords: PLM, PDM, platform, Teamcenter, Dassault, SAP, Windchill, Autodesk

1. Introduction – definitions and overview of PLM

Product development is the result of a network based collaborative design process, since most of the projects, which are usually geographically distributed for the design of a new product, require co-operation among expert groups with diverse competence.(Chryssolouris, 2006). A collaborative product design project is necessary to take into consideration issues related to the users' integration, organization and communication, as well as to product data sharing, management and visualization. New and efficient paradigms of a web-based collaborative product design, in a global economy, will be driven by increased outsourcing and the reduction of product development time (Draghici *et al.*, 2007).

PLM (Product Lifecycle Management) provides a shared platform for product development, organization and dissemination of product related knowledge and includes product-oriented processes covering concept, design, fabrication, assembly, testing, delivery, and disposal of products. PLM extends PDM (Product Data Management) out of engineering and manufacturing into other areas like marketing, finance and after sale service and at the same time, addresses all the stakeholders of product throughout its lifecycle (Farhad and Dutta, 2004)

PLM was the basic vision of the PDM for many years and this vision has turned into what today we call PLM. According to a Gartner analyst Marc Halpern, PLM has exceeded concept centering on engineering and has become a strategic initiative for businesses (Stark, 2005).

Companies that are using PLM software and services to run their businesses increasingly require their suppliers and their own IT departments to provide open solutions that promote seamless interoperability and data sharing. These companies don't want to worry about incompatible data formats and versioning problems that inhibit their ability to collaborate. They don't want to deal with PLM suppliers whose proprietary business models prevent the implementation of a multi-vendor solution. While PLM Components help promote standardization and interoperability within your target markets, they also can help make your solutions appealing to new and/or expanded markets. The same instant compatibility that makes implementation easier with your traditional customers also creates compatibility and opportunity in rising new markets. (Siemens documents, 2011).

For Jean-Yves Mondon 3, manager of aerospace group EADS: PLM is defined as a strategic capital for the extended enterprise, in the heart of the industrial system.

CIMdata, a consulting firm working in this field, defines PLM as a strategic approach, using a consistent set of practices to support the collaborative creation and organization, transmission and use of information on the product within the company among its staff information about conception to end of life, and to integrate processes and information systems organization. (CIMData, 2012)

Bertil Turesson, PLM Strategist at Volvo Car Corporation associated himself with (Berkooz, 2007) the views expressed by (Stark, 2005): PLM is the activity of managing the company's products throughout their life cycle, the most efficient manner. PLM scope covers many elements such as processes, data, people and applications. According to the author, PLM can be seen as a paradigm to meet: it brings together many processes, disciplines, functions and applications previously heterogeneous and independent, that address the same product with different vocabularies, business rules, cultures or languages. (Siemens documents, 2011)

PLM can be considered (Ameri and Dutta, 2005): "*A solution that supports information management throughout the product life cycle process in the extended context of an enterprise.*"

"Product life cycle management or PLM is an all-encompassing approach for innovation, new product development and introduction (NPDI) and product information management from ideation to end of life. PLM Systems as an enabling technology for PLM integrate people, data, processes, and business systems and provide a product information backbone for companies and their extended enterprise." (PLM Technology Guide: http://plmtechnologyguide.com/site/).

The definition with the widest spread and accepted by all users is (Dassault Systèmes, 2012): *„Product Lifecycle Management (PLM) is an integrated business approach based on information made up of people, processes / practices and technology that covers all aspects of the life of a product, from design to production, use and maintenance, culminating in decommissioning and recycling in order to increase efficiency and productivity"*

2. PLM platforms for product development

PLM is based on a concept related to information management in the company more efficient targeting of resources through proper planning. Fierce competition on the market today, involves the need for rapid and efficient management while the volumes of data that classical works are huge and seem to be outdated systems, so solutions are needed to enable rapid retrieval of knowledge required in the background intelligent decisions.

Designing a single product to meet the needs both technical department personnel, financial, as well as those from human resources or those of the production is not easy, because each department has its own systems specialized and optimized for their particular needs. But PLM / PDM platforms combine them all in one software connected to a common database so that interdepartmental communication is much easier.

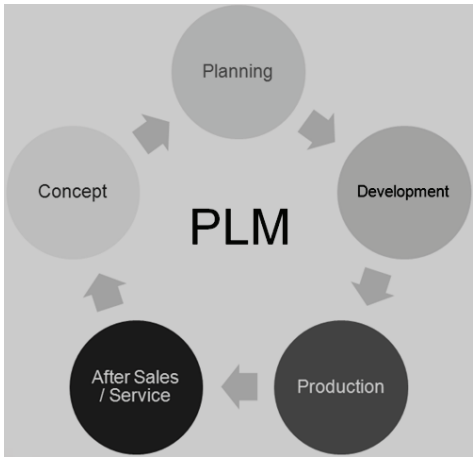


Figure 1: PLM components (Voskuil, 2010)

Structuring and decomposing each department and activity, may be seen in greater detail the components of a system PLM / PDM.

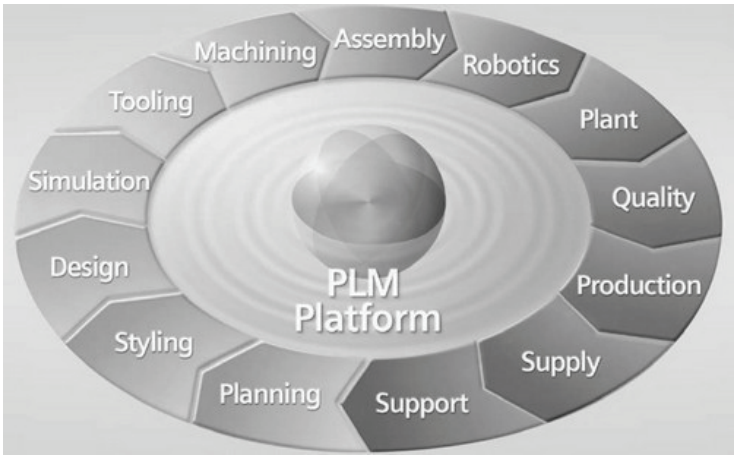


Figure 2: PLM process (Siemens PLM solution Partner: http://www.itsplm.co.rs/)

On numerous occasions companies, having already invested in ERP (Enterprise Resource Planning) systems with high levels of integration and customization, are unsure how an additional investment in a PLM solution would be beneficial. The following matrix of functionalities helps understand the operational requirements in a much better manner.

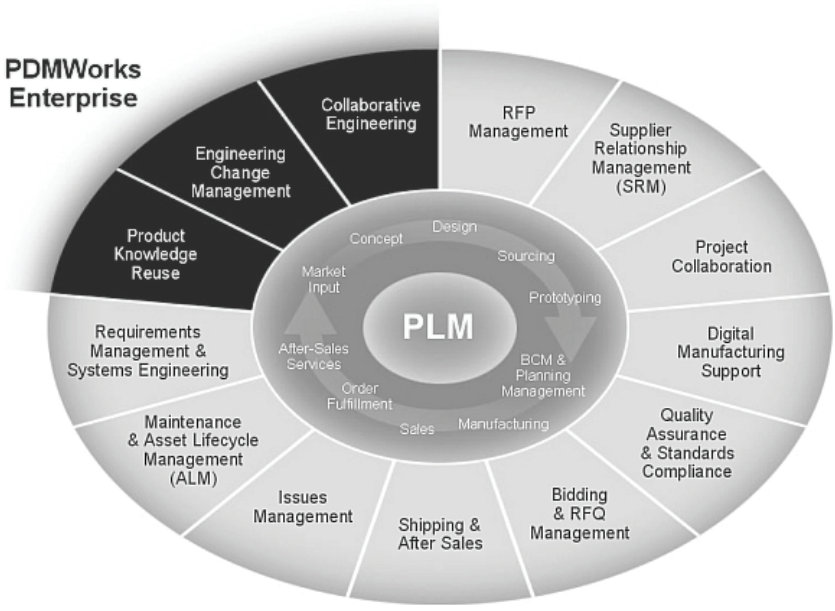


Figure 3: Differences between PLM and PDM

A closer look at the matrix helps us understand the differentiation between PLM and PDM. It is common to find a PLM solution being used predominantly for the PDM functionalities since the other facets of PLM have either already been developed on an ERP/ MRP system or a home-grown specialized toolset addresses most of the other aspects of the PLM. (Manage Critical Design Knowledge, 2008)

The main advantage of PLM, in this case, is that it allows the integration of all information about a product or service and it can organize all this information in order to improve efficiency between different departments within the company. Dividing the activities of a company of a several departments such as design, manufacture, sales and service, it can reduce the complexity. Increasing the effectiveness of each department, result is the increase of productivity throughout the company.

Currently, most of companies use PLM / PDM platforms from the same developer. This has the major disadvantage because some platforms are difficult to be understood, manage and to use. This situation can be improved by testing and implementing various platforms from various developers,

reducing the disadvantages mentioned, because some platforms PDM are much easier to use and to manage and the search of any document is made much easier.

Existing standardized market structures do not allow the introduction of other resources or software, or their cooperation with individual structures. To solve these problems, it is necessary to create a platform for integrated product design and manufacturing, using different systems for effective management as the product life cycle.

Increasing efficiency for software and hardware, this will change the user's working habits. In particular, increased memory capacity gives the result of a huge volume of stored data. On the other hand, however, modern user is highly concentrated to use backup data. Consequently, a large number of versions are recorded and stored in a project in order to ensure continuous data availability, in case if this information is needed again. In addition, identical data are often stored redundantly on different servers.

A unified PLM architecture eliminates problems associated with these integration methods for all applications that are delivered as components of the overall framework. Within the application suite delivered as part of unified architecture solutions, information created in one module or function is immediately visible and available in all other modules without additional data entry or transformation. (Paviot, 2010)

The main elements of PLM concept are: people, technology, processes and practices, all combined in Virtual Design, Virtual Prototyping, Virtual Manufacturing, etc.

Virtual Design – refers to design and graphical representation of physical objects with computer in a virtual environment. Using existing CAD applications, it can help to develop new products, according to the requirements imposed by the client or by the market. These applications allow real-time collaborative development of products, by project teams with experts from various fields and locations, the communication between team members for the rapid determination of the errors, design problems and also to decrease the time for launching a product.

Main advantages are:

- easy modeling of complex shapes;
- cost reduction for repetitive redesign;
- Increasing model quality.



Figure 4: Virtual design process

Virtual Prototyping – Digital simulation of product behavior occurs in a controlled environment, mainly using finite element analysis methods, but the product can be analyzed for other various applications, such as: static, dynamic, modal (vibration), nonlinear analysis, high-speed impact, thermal analysis, fluid flow, etc.

P*roduct Data Management (PDM)* – PDM applications have developed a new way to organize information in different formats, CAD and EDM in a single database. PDM has proposed a new way to organize different types of CAD formats that an organization produces a relatively small time.

In the first phase of development, PDM allowed companies to capture CAD information realized by users and turn them into the company's intellectual capital. This was possible by adding the old database records created before implementation of PDM. While some PDM systems began to incorporate some form of workflow processes (information flows), other PDM systems only managed the products information. A first step, with the implementation of PDM in a company, was to replace the old archive data with an electronic format. During PDM systems development was needed the ability to configure these systems, to enable the implementation in different companies with different areas of activity, but also to enable the implementation of processes and practices within the company.

3. Main advantages and disadvantages of PLM platforms

The main advantages are listed below:

- Considerable reduction in processing time of an order or of a new development process. Since going through the automatic route, it is clear that time is greatly reduced.
- Employees in each department have access to any information, they can view and / or modify it if it is necessary. When the department completes the work on a specific command, it is automatically directed by the PLM / PDM platform to the next department.
- Using appropriate PLM application can enhance company performance.
- it is easier to manage complex structures, marketing channels and business scenarios
- accelerates the time to launch the product on market and also the recovery time
- Improve services offered to the employees and customers and their satisfaction.

Although the benefits brought to the company are large, at the same time the disadvantages can be greater than advantages when a PLM platform is not well implemented, especially when it is accompanied by changes in the organization of the company. The main disadvantages of PLM platforms are:

- Cost of PLM systems / PDM can be considerable;
- Implementation can be difficult and lengthy, although many sellers have the ads that implementation is achieved in 3-6 months, often real time can be 1-3 years on average
- On first steps the company may halt the work because employees were familiar with the old process and the new integrated computer programs not only introduce new programs but also can introduce many changes in their work;
- Implementation involves many changes in the working of company departments.

Furthermore, the implementation of PLM / PDM platforms have some hidden costs that are difficult to predict and measurable. Researchers and those who implement these platforms consider that the following factors are often responsible for underestimating the budget:

Training of employees - Usually this is the most important factor which is underestimated by creating the budget for implementation. Preparation costs are very high because workers almost always have to learn new procedures and new processes, not just to become familiar with the new interface.

Integration and testing - Creating and testing package links between PLM / PDM and other software that has implemented in the company before is also one of the most underestimated costs. Creating links is quite difficult, especially when the existing software components from company are older and the company who created is not offering support or it is no more on the market.

Pay the consultants - PLM implementation requires calling on consulting and training of employees that tend to grow without limits. To prevent this, after signing the contract with consulting firm that provides quantitative data, it must be established the needs of company employees to be able to promote some tests at the end the training.

Replacement of top employees - The market of these PLM / PDM platforms is very competitive, so when the company PLM system implementation is complete, in-house are formed some specialists for PLM / PDM. This is likely to attract competitors giving them higher salaries and bonuses than the parent company is prepared to offer. If that can't be prevented from leaving their employees, the companies will pay double or triple amounts to the same people to return as consultants on similar positions.

Expect immediate benefits - One of the most common mistakes is that the business is pending immediately benefits after PLM implementation. In fact, a recent survey by Deloitte revealed that more than a quarter of companies surveyed have suffered declines of performance immediately after PLM / PDM implementation, due to of numerous changes that it entails. Benefits are felt only after using for some time these platforms and after making some changes in production.

4. Comparison of some virtual team collaboration tools

Most widely platforms used by big companies are:

Teamcenter - Siemens PLM's Teamcenter product suite has a long history. Its roots were founded in the 1980s with technology and products from Control Data, SDRC, and UGS such as Metaphase and iMan. Those products became the original Teamcenter applications called Teamcenter Enterprise and Teamcenter Engineering respectively. Siemens PLM also both acquired and developed additional PLM functional applications that expanded the overall Teamcenter suite over the years, with many of these solution expansions built on different architectures (Teamcenter, 2012).



Figure 5: Teamcenter structure

Autodesk PLM 360 – Autodesk PLM 360 is the next-generation cloud-based alternative, providing a powerful, affordable and easy-to-implement solution at a fraction of the cost of traditional product lifecycle management (PLM) systems. [7]. Autodesk is transforming product lifecycle management with an affordable, easy-to-use, and simple-to-deploy PLM solution that makes the benefits of PLM available to anyone, anytime, anywhere. Autodesk® PLM 360 is a total PLM solution for the entire enterprise and includes engineering, business process management (BPM), program and project management, new product introduction (NPI), and quality and compliance capabilities. (http://usa.autodesk.com/360-lifecycle-management-software/plm/)

The main advantages of this PLM platform are: *PLM for everyone*—Extend the reach of PLM to your entire organization, *PLM instantly*—Product lifecycle management in the *cloud* means that the teams can get up and running in minutes to days, not months to years, *Easy to use*—The Autodesk PLM 360 experience is just like browsing a website, whether from any desktop or on a mobile device.

Dassault PLM: Enovia - Fully integrated with design, engineering and analysis solutions from Dassault Systems, and other software vendors, ENOVIA's intuitive user interface delivers powerful capabilities via a standard web browser. ENOVIA has proven and ready-to-use business processes,

so you can rapidly benefit from the true rewards of effective collaboration. ENOVIA is committed to providing products and solutions individuals at organizations of all sizes – from small businesses to the largest global enterprises – to participate in effective and rewarding collaborative innovation.

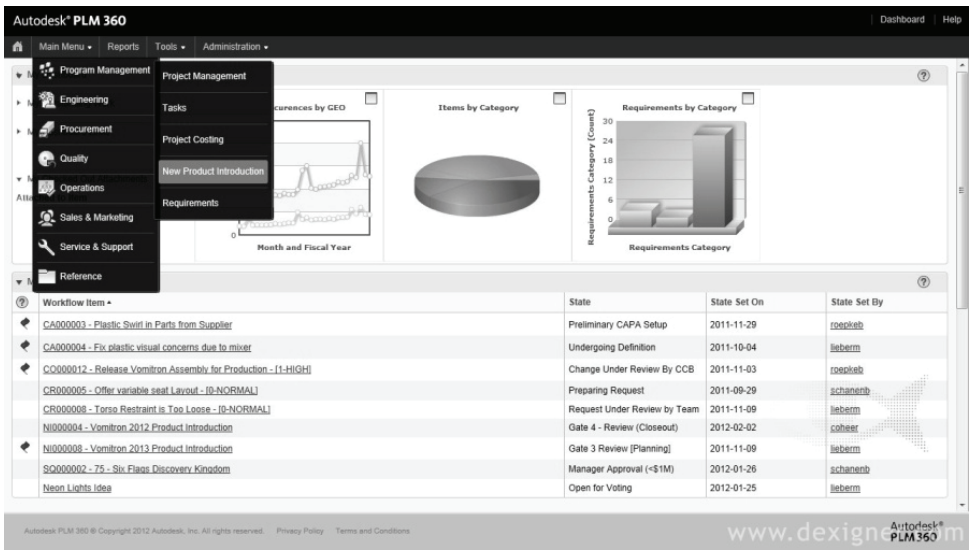


Figure 6: Autodesk PLM 360 structure

The power of ENOVIA lies in its capability to deploy and enforce business processes, workflows and deliverables throughout the enterprise. Whether it's managing a product portfolio, a program, a costing scenario or a design-to-production cycle, the focus is on streamlining the delivery of critical information and enabling better decisions to be made.

Although mid-sized enterprises share similar needs as larger companies and understand the importance of PLM, they have certain concerns about implementing PLM, including limited IT resources for services and training; resistance to changes to standard operating procedures (SOPs), unknown total costs and disruption to users' daily work.

For several years, ENOVIA has been targeting their solutions to mid-sized enterprises by:

Taking into account your financial and capability needs – with out-of-the-box Express offerings that are quick to implement and easy to learn– not a scaled-down version of a larger solution.

Growing as you go – with an unmatched breadth of solutions with our robust PLM product portfolio for Auto and Aero, to High-Tech, Medical devices and more.

Addressing all PLM needs at all stages – with core SmarTeam products for collaborative Product Data Management (PDM) and full PLM, from concept to manufacturing, ideal for design, engineering and enterprise scopes.

Enabling rapid ROI, low TCO – with full flexibility for adapting to an organization's way of doing business and enabling a low total cost of ownership.

Delivering worldwide distribution & support network – contact us for a representative in your geographical area.

The biggest Dassault's challenge remains V6 adoption and finding a way for companies to optimize their transition in this platform. (http://www.3ds.com/products/enovia/mid-market/)

SAP PDM - SAP supports an integrated distributed implementation of various applications including PDM. This fills the requirement set by users for cost effective concepts for distributed application systems that offer a high degree of integration and can be detached for local use. SAP's technological innovation for distributed application systems is *Application Link Enabling (ALE)*. ALE makes business process controlled communication between technically independent applications possible.

You can use ALE to distribute data such as materials, BOMs, documents and original files, change master records, revision levels, and classification data from one R/3 System to another.

Computer-aided design (CAD) data plays a very important role in the overall product development process. SAP PLM offers a leading CAD authoring tool embedded into its product development process. You can use this authoring tool to develop and prepare CAD files, leveraging design information seamlessly – including three-dimensional geometry, drawings, and bills of material (BOM) for such processes as costing, sourcing, manufacturing, and more. The tool helps ensure data consistency by providing direct CAD-tool integration – beneficial for managing changes, documents, BOM, material masters, and reuse of components.

Through this direct embedding of CAD data into the product development process, all follow-up processes receive data much faster and with higher quality, while CAD engineers work in a familiar CAD environment. SAP PLM supports required actions that include versioning, check-in, check-out, and creation of master data such as material masters and documents. Main benefits of a seamless CAD integration in SAP PLM include:

Integrated processes

- Integrated into change and release process
- Integrated into SAP Business Suite
- Integrated viewing solution

Simultaneous design collaboration throughout your organization

- "Single source of truth" for all participants
- Location-spanning access to information
- Role-based authorization and real-time access to all relevant information
- Same integration process for different CAD systems

Verifiably lower total cost of ownership and investment

- No additional data management system necessary
- No additional system interfaces or CAD-centric team data management solution necessary
- No data redundancy and synchronization necessary
- One central user management and use of SAP classification system
- Sold and supported by SAP – reduces TCO and TCI by leveraging existing SAP infrastructure and knowledge. (SAP Product Lifecycle Management)

PTC Windchill - *Windchill* is a Product Lifecycle Management (PLM) solution that was designed from the ground up to work in an Internet-based, distributed design environment. Windchill technology forms the foundation of the packages PTC offers to address data, change, configuration, and process management; product development collaboration; project management and execution; and the release of product information to manufacturing management systems.

Windchill PDMLink consolidates scattered islands of information into a single information source, which can help bring order to chaotic change processes and speed the development of new product configurations.

Windchill ProjectLink creates a virtual workspace that becomes the central access point for a project, which helps provide team members with access to information. By automating project management activities, Windchill ProjectLink can help PTC customers better manage all of their programs, project schedules, information, and processes.
All Windchill solutions include visualization capabilities that allow individuals anywhere in the organization to review complex product information in meaningful terms. (Technology Evaluation Center, http://vs.technologyevaluation.com/software/221-16916/Product-Lifecycle-Management-PLM/PTC-Windchill.html)
Features and Benefits:

Reduced cycle time -- ensures on-schedule product launches and first-mover market-share advantages;

Improved quality -- boosts brand value and customer loyalty, and enables premium pricing;

Increased efficiency and process optimization -- drives team productivity and enhances breadth of portfolio;
Improved regulatory compliance for market segments such as consumer products -- ensures adherence to mandates such as REACH and the Consumer Products Safety Act;

Reduced direct material cost -- improves margins and profit contribution.

Table 1 show a brief analysis of the presented software for collaborative work, communication that are most used in virtual teams. This comparison was made using information from the vendors and users, but from our experiences gain in different projects when such software was available for use.

The differentiations between: Teamcenter, Autodesk 360 PLM, Enovia 3D, SAP, Windchill has been done by considering criteria related to their efficiency and effectiveness to support, development process, manufacturing, project management and entire product lifecycle process.

Table 1: Comparison between PLM / PDM platforms

Functionality	Teamcenter	Autodesk PLM 360	Dassault Enovia	SAP	PTC Windchill
Easy Access	X	X	X	X	X
Easy to use	X	X	X		X
Specialized advanced trainings needed	X	X	X	X	X
Different servers access	X	X	X	X	X
Product visualization		X	X	X	X
Show / edit BOM (Bill of material)	X	X	X	X	X
Multiple modification at the same time	X	X	X	X	X
Securized data	X	X	X	X	X
Cloud computing accessibility		X			
Mobile devices access		X			
Integration of other CAD software	X			X	
Possibility of direct collaboration between project teams	X		X	X	
Easy integration			X		
Personalization possibility	X	X	X	X	X
CAD integration	X	X	X	X	X

5. Conclusions

Experts have shown that in general, for small and medium companies these platforms can get cheaper significant performance improvement for projects.

The organization and synchronization of the design process tend to be collaborative and this process is facilitated by PLM solutions delivered by various renowned companies that strive to ease the development and production work.

A future challenge is the need of management of specific know-how from companies to prevent losses in an appropriate manner. The workflow and the experience must be recorded so it is needed to be available and useful to all employees. Especially in collaborative development, special requirements are imposed for data maintenance and version management. Companies must ensure that updates are continuous and can offer immediate results to all stakeholders, especially in case of changes. Large amounts of data and the high volumes of data formats is one of the main problems in big companies.

Therefore, it must be concluded that it is inherently necessary the creation of networking standards, which is not feasible, because structures do not allow encoding with other modules or applications, in the best case can be done some adaptation between different environments. In addition, the issues of translation in different formats and data management have not yet been resolved. These factors could increase the multitude of software solutions in various departments in the company. Whatever of the decision who will be taken in favor of a general supplier, particularly for some PDM software, from this choice will always result some advantages and disadvantages for each company.

Acknowledgements

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References

Ameri, F., Dutta, D. (2005). Product Lifecycle Management: Closing the Knowledge Loops. Computer-Aided Design & Applications, 2(5), 577—590.

Gahl Berkooz (2007). Viewpoint: Steven Ray on Information Standards in Manufacturing

Chryssolouris, G. (2006) Manufacturing Systems: Theory and Practice, 2nd Edition, Springer-Verlag, New York.

CIMData, Teamcenter (2012). Siemens PLM Software's Next Generation PLM Platform.

Draghici, G., Savii, G., Draghici, A. (2007). Platform for collaborative product and processes development, Annals of DAAAM for 2007 & Proceedings of the 18th International DAAAM Symposium (Ed. B. Katalinic), Vienna, Austria, 253-254.

Draghici G., Draghici A. (2009). Collaborative Product Development in PLM Multisite Platform, In Advances in Manufacturing Engineering, Quality and Production Systems, Proceedings of the 1st International Conference on Manufacturing Engineering, Quality and Production Systems, MEQAPS '09 2, vol. II, Brasov, Romania, September 24-26, WSEAS Press, 327-332

Draghici, G., Draghici, A. (2009). Collaborative Multisite PLM Platform, Proceedings of the CENTERIS 2009, Conference on Enterprise Information Systems, Ofir, Portugalia, 651-662.

Draghici, G., Drăghici, A., (2011). Multisite PLM Platform: A Collaborative Design Environment, in Enterprise Information Systems Design, Implementation and Management: Organizational Applications, Maria Manuela Cruz-Cunha and Joao Varajao (Eds.), Business Science Reference, Copyright © 2011 by IGI Global, 456-475

Farhad, A., Dutta, D. (2007). Product Lifecycle Management: Needs, Concepts and Components.

Gahl, B., Viewpoint: Steven Ray on Information Standards in Manufacturing

http://www.dexigner.com/news/24692#ixzz1vrewFyi7

http://usa.autodesk.com/360-lifecycle-management-software/plm/

http://www.egsindia.com/solidworks/newsletter/1/PDMWorks-Insight-1.html

http://www.3ds.com/products/enovia/mid-market/

Manage Critical Design Knowledge, (oct 2008)

SAP Product Lifecycle Management (PLM) http://www.sap.com/solutions/business-suite/plm/index.epx

Siemens PLM solution Partner: http://www.itsplm.co.rs/

Siemens documents (2011) PLM Components Support tools for CAD, CAM, CAE and PLM software development and interoperability

Stark, J. (2005). Product Lifecycle Management 21st Century Paradigm for Product Realization.

Technical Report PLM-TR-2004, University of Michigan

Technology Evaluation Center http://vs.technologyevaluation.com/software/221-16916/Product-Lifecycle-Management-PLM/PTC-Windchill.html

The Increasing Value of SOA-Based Unified Architectures for PLM "Harmonizing the Environment", 2011.

Paviot, T. (2010) Méthodologie de résolution des problèmes d'interopérabilité dans le domaine du Product Lifecycle Management.Thèse de doctorat, École Centrale Paris.

Voskuil, J. (2010) PLM for the mid-market

Engaging Communities of Lead Users With Technology: Findings From a European eParticipation Project

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Abstract: eParticipation tools aim to facilitate intrinsic engagement from communities of stakeholders and citizens to develop more effective, bottom-up and inclusive public policies, raising the potential to become an efficient engagement tool. It is argued that eParticipation tools such Electronic Town Meeting (eTM) are technological intermediaries that have the potential to efficiently engage communities of sought-after 'lead users' to leverage economically valuable 'sticky knowledge' in a public policy arena. While the lead user method has been demonstrated to be very effective (Lüthje and Herstatt, 2004), challenges remain around the sustainability of such an approach, particularly on a large-scale. Olson and Bakke (2001) point out that one of the challenges of embedding lead user processes is overcoming the perception that the method is itself "overly burdensome", and that "it is very likely that the time and effort required to sustain the lead user method is a major obstacle to its adoption and/or regular use".A possible mediating tool that might be able to efficiently leverage communities of lead users is the eTMeParticipation tool. This paper links the theoretical work in the field of user innovation and eParticipation. Empirical research comprised eight eTM (Electronic Town Meeting) case studies that were part of a large EC eParticipation project called PARTERRE. Findings show that the eTM has had a very positive effect on engaging lead users to reveal sticky knowledge as well as providing users benefits such as enhanced peer learning.

Keywords: user communities, innovation, eParticipation, lead users

1. Introduction

As the body of academic research in e-government widens,the concept of e-government itself, has been established as an effectivemechanism for increasing government productivity and efficiency and a key enabler of citizen-centric services (Irani et al, 2012).eParticipationfalls under the rubric of eGovernment and has been defined as a technology-mediated interaction between the civil society, the administration and the formal politics sphere's usually over some decision making, legislation or simple deliberation process (Sanford and Rose, 2007). Generally, eParticipation has been promoted as means to re-engage and re-activate citizens in the decision-making process (Koussouris et al, 2011) and address diminishing participation in public debate and declining voter turnout (Demo-net, 2006).Although technology is the medium for offering cutting edge eParticipation services to the public, the main barrier resides on the non-technical aspect as the problems and issues that have to be dealt by eParticipation are far more important than drawing a technical plan that will lead to sophisticated eParticipation offerings (Charalabidis et al., 2009). A range of digital tools and online methodologies have been developed in recent years in support of the European Commission's eParticipation agenda.These solutions have been designed to support citizen engagement in political processes in order to improve policy-making and support the evolving needs of civic society.

As eParticipationtools aim to facilitate intrinsic engagement from communities of stakeholders and citizens to develop more effective, bottom-up and inclusive public policies, it has the potential to become an efficient engagement tool. It is argued that eParticipation case studies are seedbeds to investigate the potential of efficiently engaging communities of sought-after 'lead users' toleverage economically valuable 'sticky knowledge' in a public policy arena.While the lead user method has been demonstrated to be very effective (Lüthje and Herstatt, 2004), challenges remain around the sustainability of such an approach. Olson and Bakke (2001) point out that one of the challenges of embedding lead user processes is overcoming the perception that the method is itself "overly burdensome", and that "it is very likely that the time and effort required to sustain the lead user method is a major obstacle to its adoption and/or regular use". One possible mediating tool that might be able to efficiently leverage communities of lead users is the Electronic Town Meeting (eTM) eParticipation tool.The Electronic Town Meeting (eTM) is an example of an eParticipation methodology and toolset that has been tested in a variety of cultural contexts and policy areas. In particular,it was piloted in the PARTERRE project, which was funded byEuropean Framework 7's

Competiveness in Innovation Programme. A key part of the innovation strategy of the PARTERRE project was to pilot a series of pan-EuropeaneTMworkshops that were aimed at addressing a range of public policy issues and the learning outputs from these pilots wereto help ascertain the level of user engagement andcommercial viability of the eTM. The aim of thispaper isto investigate how effective the eTM is as a tool to engage with communities of 'lead users' in the context of developing public policy. The findings in this paper are conceived from eight eTM case studies that took place in Northern Ireland. Therefore, the structure of this paper will review relevant literature in eParticipation, user innovation and innovation communities. Then, an overview of the research methodology and case studies will be discussed, followed by findings and conclusions.

2. Literature review

2.1 eGovernment and eParticipation

While early studies in eGovernmentfocused on researching the issues surrounding implementation (e.g. Layne and Lee, 2001; Gant and Chen, 2001;Irani et al., 2007), more recent efforts have looked at adoption and diffusion, including e-participation and digital divide (e.g. Brandtzæg et al., 2011). However, in the context of adoption, "citizen satisfaction" in e-government has been an area that has had little research (Irani et al, 2012).

Research on user satisfaction in e-government context has highlighted that e-government cannot be successful if there is a weak affiliation between the citizens (users), ICT and government authority (employees).Hence,if the systems are used by citizensas a service provisionthen it is must satisfy their needs (West, 2004; Irani et al, 2012). Although understanding the emerging field of eParticipation is not straightforward – given the lack of an agreed definition and unclear research boundaries – recent emerging technologies, government reports and academic programmes demonstrate an increasing level of interest in the subject (Sæbø et al., 2008). However, as the literature in eParticipation expands, researchers have articulated key challenges. Charalabidis et al (2009) argue that the main barrier resides on the non-technical aspect as the problems and issues that have to be dealt by eParticipation are far more important than drawing a technical plan that will lead to sophisticated eParticipation technical functions that are offered by computer systems.MacIntosh et al (2008) have called for further research on the applicability ofeParticipation tools to particular contexts, and to integrate fieldwork methods to assess social acceptance of eParticipationand represent the diversity of views obtained from citizens, community groups and other stakeholders.

The linkages with eParticipation and user innovation

There has been considerable interest in innovation resulting from user activities (Rothwell et al. 1974; 1988). Many explored innovations are at least directly initiated by requests and concrete needs of users (Biemans 1991; Utterback et al. 1976; Mansfield, 1988) and the idea or the concept for innovations often stems from the user (Voss 1985; Baker et al. 1986). There are many different approaches and denominations for user involvement such as; design for, with or by users (Kaulio, 1998), customer as co-producer (Wikström, 1995), participatory-design (Namioka and Schuler, 1993), user-centered approaches (Newman and Lamming, 1995) and living labs (Galbraith et al. 2008; Galbraith and McAdam 2012).

It has been shown that users are frequently the first to develop and use prototype versions of what later became commercially significant new products and processes (von Hippel, 1988; Vanderwerf, 1990; Shaw, 1985). Moreover, it was found that innovation by users tended to be concentrated among 'lead users' of those products and processes (von Hippel, 1986). The lead users experienced needs for a given innovation earlier than the majority of the target market – early adopters (von Hippel, 1986). Urban and von Hippel (1988) found that users in their lead user cluster adopted technologies on average seven years before users in their no-lead user cluster.An important conceptual component of user innovation and lead users is '*sticky knowledge'* (von Hippel, 1993). Von Hippel (1993) argues information that is often used in technical problem solving is costly to acquire, transfer, and use in a new locus – making it *'sticky information'*. Von Hippel (1993) states that there are several dimensions of 'sticky knowledge'. For example, to solve a problem, needed information and problem-solving capabilitiesmust be brought together - physically or "virtually" - at a single locus.Moreover, intensity and iteration are crucial dimensions of knowledge combination (internal and external knowledge) processes - especially, in cases of sticky knowledge (Andersen and

Christensen, 2005). This iteration of sticky knowledge means that problem-solving activity often shuttles back and forth between internal and external task groups, as information cannot be passed across simply trough directions or specifications, using for instance prototypes as the information carrier (Kristensen, 1992).

The literature also emphasises the role of various mediating artifacts in combining and transferring 'sticky'knowledge (Bechky 2003). A key linkage that this paper attempts to explore is better understanding of the transfer of 'sticky knowledge' in public policy domains, namely in the context of eParticipation. In summary, there are several dimensions that are important for leveraging valuable sticky knowledge such as: intensity and iteration, problem-solving capabilities, and the role of mediating artifacts (including technology). These dimensions would appear to align well with antecedents of eParticipation. For example, researchers argue that placing a premium on comments that are well thought out raises the bar of participation (Fishkin, 2000). To underline the importance of engagement and iteration it has been argued that not everyone agrees that deliberation *alone* can deliver sound policy (Parkinson, 2003).Another similarity with the user innovation field is thateParticipationalso engages with communities of citizens (users) and possibly large number of 'lead users' in areas related to public policy.In the innovation literature, several studies show that users with similar interests and needs often form user-innovation communities, where members freely reveal their innovations and assist each other with innovation development (Franke and Shah, 2003; Hienerth, 2006; Tietz et al., 2005). Empirical research suggests that his type of 'user-driven' innovation is a more fruitful major source of innovation (von Hippel, 1988, 2005). Von Hippel (2005) argues that one of important functions of innovation communities is:"The practical value of the 'freely revealed innovation commons' these users collectively offer will be increased if their information is somehow made conveniently accessible". Moreover, because online communication drastically lowers the costs of firm-to-user and user-to-user interaction compared to that of an "off-line," physically based community, online communities have been adopted by firms to build brands (Muniz and O'Guinn 2001), support product use (Moon and Sproull 2001), collect feedback and ideas (Williams and Cothrel 2000), and to charge community-based customer access fees (Armstrong and Hagel 1996).Recent studies of community-based innovation models in which users join "peer-to-peer communities of common interest" both online (Lerner and Tirole 2002, Lakhani and von Hippel 2003, O'Mahony 2003, von Krogh and von Hippel 2003) and "off-line" (Shah 2000, Lüthje 2004, Franke and Shah 2003) suggest that innovative user communities may yield important value, for example, new product concepts or product features.

During the course of the PARTERRE project, it became clear that eParticipation tools, which are designed primarily to engage stakeholder communities in order support policy decision-making, might also function as a more general tool for engaging with communities lead users in order to support innovation.In this sense, the Electronic Town Meeting system can be viewed as a toolset and methodology for lead user and user community engagement, with the potential for improving access to sticky knowledge and reducing the cost of knowledge transfer.In attempting to understand the effectiveness and impact of the Electronic Town Meeting as a tool for engaging communities of lead users, the following questions were formulated:

- How effective was the eTM as an engagement mechanism from the perspective of the user communities?
- How satisfied were organisers and participants of the eTM?
- What factors would attract user communities to participate in another eTM?
- Specifically, what did the eTM help with?
- What were the most important aspects with regards to stimulating creativity?

2.2 Methodology

The objective of the CIP-funded PARTERRE project is to deploy ICT to enhance the direct participation of citizens, stakeholders and civil society in democratic decision-making processes using specific electronic tools. One tool which being piloted as part of the PARTERRE project is the Electronic Town Meeting (eTM), a deliberative democracy methodology and toolset combining small-groups discussion with the advantages of electronic communication.

The process of the Electronic Town Meeting (eTM) that was adopted in Northern Ireland was as follows; after information on a given topic has been provided, participants can express themselves individually within small groups (typically round tables). Instant minutes of the table discussions are kept by facilitators - using electronic means – with the aim of enabling opinions and views to emerge from the debate, without any attempt to formulate a unitary (or compromise) vision. A central team (known as the "Theme Team"), composed of domain experts, collects and reviews the minutes, clustering the issues that emerge – with a special eye on conflicting perspectives – and then provides rankings of statements which are finally submitted to a collective vote by all participants. The voting mechanism is typically supported by the provision of numeric keypads to each participant in the eTM. At the end of the day an "Instant Report" is drawn up and distributed to all participants, summarizing the general aims of the debate, the process undertaken and the main results of the work done, particularly issues prioritised through the collective vote.

For each of the eTM pilots outlined below, the topic was identified by a representative of the lead user community, who approached the project team with a request for an event. User-centred research methodologies were also employed during the organisation and implementation of each eTM. The participants of each eTM pilot ranged from 40-50 and eight case studies were debated concerning public policy in a variety of sectors.

3. Findings

3.1 Research question 1: How effective was the eTM as an engagement mechanism from the perspective of the user communities?

The processes associated with preparing an eTM placed great emphasis on the organisers agreeing a theme and agenda before the event, and communicating these to participants through the "Discussion Guide". Perhaps as a result of this, 94% of users felt that the goals of the eTM were either "clear" or "complex but graspable". Only 6% thought that the goals were either "vague/not transparent" or "too broad".

As a result of the eTM enabled discussion, most users thought that the discussion had a positive impact. 40% believed that the topic became "more graspable";while 36% felt that it had become "an exciting new development". According to survey results, a minority of participants came to the event with a fixed opinion (17%). A majority of participants (65%) viewed the eTM as an opportunity to "understand the missing parts". Only 9% felt that they had insufficient information to form an opinion prior to the event.

With regard to suggested outcomes to the discussion, 50% of respondents indicated that there were several good solutions, but that they voted for what benefited them individually the most. 12.5% stated that they found a new solution during the meeting, while 10% simply joined the majority view.Satisfaction levels of participants appeared to be very high, with 94% either agreeing or strongly agreeing that they would participate in another eTM. When questioned whether meetings of this kind had the potential to increase democratic engagement, most agreed (or strongly agreed) that it could.

3.2 Research question 3: What factors would attract user communities to participate in another eTM?

The most popular response to the question of what would attract users to participate again in an eTM event was "communicating with others on an important topic and reaching a consensus" (50% ranked this as the most important motivation). Many users saw the eTM as an opportunity to gain understanding into complex issues (27%). These results suggest that the ability of the system to promote interaction and enable shared understanding is key aspects from the point of view of user communities.

3.3 Research question 4: Specifically, what outputs were achieved by the user communities as a result of using the eTM?

The most valued results of the eTM according to the abovequestion were clarification of the topic, the testing of views and opinions and the definition of the problem or problems to be solved. Interestingly, technical aspects such as polling and reporting did not score as highly in the evaluation results. The opportunity to reach a consensus was also only chosen by 12% as the most important result. As with

Research Question 3, the emphasis of the respondents seemed to focus on the benefits to the individual that derived from interaction with other members of the user community.

3.4 Research question 5: What were the most important benefits of using the eTM to engage with the user communities?

The leading benefit of the eTM according to the table above was “as a source of ideas to be captured and collected in an idea bank for future reference”, with 41% of respondents choosing this as the most important aspect of the meeting. The ability to define future agendas and to influence policies at a higher level was also seen as key benefits – although perhaps not as important as the generation and recording of ideas. In this poll, as with previous questions, the benefits to the user community in terms of improved knowledge or expertise were perceived as more important than potential impacts on policy-makers.

4. Conclusion

Overall, the level of engagement from the user communities was very positive, with a large majority of users indicating that they would be keen to use such a tool again in the future. The primary value to users seemed to focus on the ability to enhance the quality of community interaction, knowledge sharing and debate, and generally to enable individuals to improve their understanding and expertise on complex topics. Despite the primary focus of eParticipation systems such as eTM to improve citizen engagement in the policy-making process, the lead users in this study viewed external impacts as less important than the direct benefits to the community and its members.This level of efficacy from the users seems to confirm that they are indeed ‘lead users’ and their positive experience using the eTM tool adds credence to the important role of technology in engaging communities of lead users.

Feedback on the interaction betweenmulti-stakeholders [lead users] was very positive, reflecting the impression that peer learning and engagement was a key benefit for participants. Comments such as “guidance without control”, “good participation”, “opinions from top/middle/bottom was fantastic”, “shared andindifferent opinions valued”, “excellent range of stakeholders prompted good discussion”, and “excellent - intimate and open conversations held” reflected the general tone of the responses.The technology itself was also well-received, with users observing that it was “very user-friendly, slick”, “gave great results on various issues”, “worked well and helped the process”, “worked without being intrusive”, and was “simple to use”. This was particularly encouraging, given that many IT systems fail to meet users’ needs and requirements (Fitzgerald et al, 2002). It seems likely that with the increased deployment of engagement tools such as eTM, user-familiarity will increase and the technology will become more embedded and less visible.

Given the positive response to the pilots from both eTM participants and user community coordinators, it seems likely that eTM has the potential to increase uptake of the lead user method among organisations. The simplicity and ease-of-use of such an approach may reduce the perceived burden of engaging with lead users – a burden which has been identified by Olson and Bakke (2001) as a significant barrier to lead user method adoption. Another important finding is that the primary motivations for lead users were the opportunities for networking and learning, rather than influencing policy (which appeared to be a secondary consideration for participants).

Further research in this area might consider whether tools such as eTM can enhance user innovation communities by facilitating activities such as “free revealing” (Von Hippel, 2005) and peer learning. Also, while eTM and other similar toolsets have been developed to supportpolicy-making processes, more investigation isneededinto their potential for helping firms to engage with lead users in a commercial context in order to support product and service innovation. Finally, the potential for eParticipation technologies to link real-world discussions with asynchronous online debate merits further exploration.

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References

Andersen, P.H. and Christensen, P.R. (2005) From localized to corporate excellence: How do MNCs extract, combine and disseminate sticky knowledge from regional innovation systems? Druid Working Paper No. 05-16. www.druid.dk.

Armstrong, A., J. Hagel. 1996. The real value of on-line communities. Harvard Bus. Rev. 74(3) 134–141.

Baker, N. R., Green, S. G. and Alden, S. (1986) Why R&D project succeed or fail. Research Management. 29 6 pp 29-34.

Bechky B 2006 Gaffers, gofers and grips: Role based coordination in temporary organizations. *Organization Science* 17:3-21.

Biemans, W. G. (1991) User and third-party involvement in developing medical equipment innovations. Technovation. 11 3 pp 163-182.

Brandtzæg, P.B., Heim, J. and Karahasanovic, A. (2011) Understanding the new digital divide – a typology of internet users in Europe. International Journal of Human Computer Studies, 29 3 pp 123-138.

Charalabidis, Y., Koussouris, S., Gionis, G. and Askounis, D. (2009). Promoting electronic participation systems in the Balkans: the case of national press agencies. International Journal of Electronic Governance, Vol. 2 No. 3, pp. 272-6.

Demo-net (2006) Mapping eParticipation. White Papers in conjunction with MCIS 2006, The 7th Mediterranean Conference on Information Systems, Venice.

Fishkin, J.S. (200) The 'filter', the 'mirror' and the 'mob': Reflections on deliverative democracy. http://www.la.utexas.edu/research/delpol/conf2000/papers/FilterMirrorMob.pdf

Franke, N., S. Shah. (2003). How communities support innovative activities: An exploration of assistance and sharing among end-users. Res. Policy 32(1) 157–178.

Gant, J. and Chen, Y. (2001) Transforming local e-government services: the use of application service providers. Government Information Quarterly. 18 2 pp 343-355.

Galbraith, B. and McAdam, R. (2011) The promise and problem with open innovation. Technology Analysis and Strategic Management. 23 1 P 1-6

Galbraith, B., Mulvenna, M., McAdam, R, and Martin, S. (2008) *Open Innovation in Connected Health: An Empirical Study and Research Agenda.* In: Conference on Open Innovation: Creating Products and Services through Collaboration (ISPIM-2008), Tours, France. ISPIM.

Hiernerth, C. (2006) The development of the rodeo kayaking industry. R&D Management. 36 3 pp 273-294.

Irani, Z., Weerakkody, V., Kamal, M., Hindi, N.M., Osman, I.H., Anouze, A.L., El-Haddadeh, R., Lee, H., Osmani, M. and Al-Ayoubi, B. (2012) An analysis of methodologies utilised in e-government research: A user satisfaction perspective. Journal of Enterprise Information Management. 7 3 pp 186-195.

Irani, Z., Elliman, T. And Jackson, P. (2007) Electronic transformation of government in the UK: a research agenda. European Journal of Information Systems. 16 4 pp 327-335.

Kaulio, M.A. (1998) Customer, consumer and user involvement in product development: A framework and a review of selected methods. Total Quality Management. 9 1 pp 141-149.

Koussouris, S., Charalabidis, Y. And Askounis, D. (2011) A review of the European Union eParticipation action pilot projects. Transforming Government: People, Process and Policy. 5 1 pp 8-19.

Kristensen, P. S. (1992): Product Development Strategy In the Danish Agricultural Complex:

Global Interaction with Clusters of Marketing Excellence, *Journal of International Food and Agro business Marketing,* 4, 3, pp. 107-118

Lakhani, K. R., E. von Hippel. 2003. How open source soft- ware works: "Free" user-to-user assistance. Res. Policy 32(6) 923–943.

Layne, K. And Lee, J. (2001) Developing fully functional e-government: a four-stage model. Government Information Quarterly. 18 2 p 122-136.

Lerner, J., J. Tirole. 2002. Some simple economics of open source. J. Indust. Econom. 50(2) 197–234.

Lüthje, C. 2004. Characteristics of innovating users in a consumer goods field: An empirical study of sport-related product con- sumers. Technovation 24(9) 683–695.

Lüthje, C. and Herstatt, C. (2004), The Lead User method: an outline of empirical findings and issues for future research. R&D Management, 34: 553–568. doi: 10.1111/j.1467-9310.2004.00362.x

MacIntosh, A. and Whyte, A. (2008) Towards and evaluation framework for eParticipation.Transforming Government: People, Process and Policy. 2 1 pp 16-30.

Mansfield, E. (1988) Industrial R&D in Japan and the United States: A comparative study. American Economic Review. 78 2 pp 223-228.

Moon, J. Y., L. Sproull. 2001. Turning love into money: How some firms may profit from voluntary electronic customer communi- ties. Working paper.

Muniz, A. M., T. O'Guinn. 2001. Brand community. J. Consumer Res. 27(4) 412–432.

Namioka and Schuler, (1993). Participatory Design: principles and practices. Erlbaum Associates, Hillsdale.

Newman, and Lamming. (1995) Interactive System Design. Addison-Wesley, Cambridge.

O'Mahony, S. 2003. Guarding the commons: How community man- aged software projects protect their work. Res. Policy 32(7) 1179–1198.

Olson, E.L., Bakke, G. (2001), "Implementing the lead user method in a high technology firm: a longitudinal study of intentions versus actions", *Journal of Product Innovation Management*, Vol. 18 No.6, pp.388-95.

Parkinson, J. (2003) Legitimacy problems in deliberative democracy. Political Studies. 51 1 pp 180-196.

Sanford, C. and Rose, J. (2007) Characterizing eParticipation, International Journal of Information Management, Volume 27, Issue 6, December 2007, Pages 406-421.
Shah, S. K. 2000. Sources and patterns of innovation in a consumer product field: Innovation in sporting equipment. Working Paper 4105, Sloan School of Management, MIT, Cambridge, MA.
Shaw, B. (1985) The role of the interaction between the user the manufacturer in medical equipment innovation. R&D Management. 15 4 pp 283-292.
Smith, H., Fitzpatrick, G. and Rogers, Y. (2004). Eliciting reactive and reflective feedback for a social communication tool: A multi-session approach. In DIS2004. Cambridge, Massachusetts.
Tietz, R., Morrison, P.D., Lüthje, C. and Herstat, C. (2005) The process of user-innovation: A case study in a consumer goods setting. International Journal of Product Development. 2 4 pp 321-338.
Urban, G. L. and von Hippel, E. (1988) Lead user analyses for the development of new industrial products. Management Science. 34 5 pp 569-582.
Utterback, J. M., Hollomon, T. J., Sirbu, J. H. and Marvin, A. (1976) The process of innovation in five industries in Europe and Japan.IEEE Transactions on Engineering Management. EM-23 1 pp 3-9.
VanderWerf, P. (1990) Product typing and innovation in U.S. wire preparation equipment. Research Policy. 19 pp 83-96.
von Krogh, G., E. von Hippel. 2003. Open source software and the “private-collective” innovation model: Issues for organization science. Organ. Sci. 14(2) 209–223.
von Hippel, E. (1986) Lead user: a source of novel product concepts. Management Science. 32 7 pp 791-805.
von Hippel, E. 1988. The Sources of Innovation. Oxford University Press, New York.
vonHippel, E. (1993) "Sticky Information"" and the Locus ofProblem Solving: Implications for Innovation. MIT Sloan School of Management Working Paper. Management Science 40 4 pp 429-439
von Hippel, E. (2005) Democratizing Innovation. MIT Press, Cambridge, MA.
Voss, C. A. (1985) The role of users in the development of applications software. 2 1 pp 113-121.
West, D.M. (2004) e-government and the transformation of service delivery and citizen attitudes.Public Administration Review. 64 1 pp 15-27.
Wikström, S. (1995).The customer as co-producer.European Journal of Marketing. 30 4 pp 6-19.
Williams, R. L., J. Cothrel. 2000. Four smart ways to run online communities. Sloan Management Rev. 41(4) 81–91.

Where are They now? A Entrepreneurship Education Follow-Up

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Abstract: During 2005-2006 students who studied Entrepreneurship during their degree in one of four Scottish Universities were invited to participate in a survey about their entrepreneurial intentions and their background. The paper reports, 6 years on, a follow-up to identify if and how the original respondents' entrepreneurial intentions have developed since graduating. Using a qualitative methodology involving face to face or telephone interviews, a sample of the original study from two of the four universities has been investigated. Specific issues explored include: Examination of whether those who were measured as likely to be entrepreneurial are pursuing entrepreneurial careers. Contribution of evidence to support or not support the Theory of Planned Behaviour (Azjen, 1991) which hypothesises that ambitions are a good indicator of outcomes. Identification of the extent to which participants perceive that the entrepreneurship education they received has been valuable in their careers (whether or not they are entrepreneurs).

Keywords: entrepreneurship education, theory of planned behaviour, impact assessment

1. Introduction

Throughout the last decade students who have completed an elective module in entrepreneurship at selected universities have participated in a survey about the impact of the module on their skills and entrepreneurial intentions. Using a snapshot of this survey from 2005/06, the current paper reports a follow-up that compares respondents reported ambitions for their careers, and in particular their entrepreneurial intentions, with the actual outcomes as they are living them in 2012.

In the original study, students were asked at the end of their entrepreneurship course to complete a questionnaire. The aims of the questionnaire were to capture information about perceived skills and ambitions towards entrepreneurship and to provide some background information. The background information included items, both endogenous and exogenous, identified throughout the entrepreneurship literature as antecedents, or at least influencers, of entrepreneurship. Outcomes of the research include that few students aimed for entrepreneurship, inferring the classic Schumpeterian idea that entrepreneurs are somehow 'special' (Galloway and Brown, 2002); that skills and ambitions for entrepreneurship can be developed by entrepreneurship education at university (Galloway, et al., 2005); and that there is observable a link between endogenous and exogenous influencers of entrepreneurship and that these appear to have some utility in terms of predicting who might be most likely to start firms (Galloway and Kelly, 2009).

The purpose of the current paper is to report follow-up research that investigates the extent to which entrepreneurship education at university is effective in so far as it has resulted in actual entrepreneurship (defined as business start up or self employment) amongst those originally sampled. In so doing, the current paper provides some inspection of the utility of the Theory of Planned Behaviour (Azjen, 1991) to studies of entrepreneurship.

The paper starts with a review of the literature about entrepreneurship education in universities and about the use of the Theory of Planned Behaviour in several studies. After identifying research questions a description of the methodology employed to address them is given. Results and analysis are reported and the paper concludes with implications for further research and for those of us engaged with the development and provision of entrepreneurship education.

2. Entrepreneurship education in universities

There is much speculation within academia and national and regional governments that entrepreneurship education at university has the potential to generate good economic outcomes (Oosterbeek, et al., 2010). This is based on the idea that those with higher education possess the skills and attributes, vocational and professional, to create innovative, high value companies (Rae, et al., 2010). As a result, many universities have amongst their offerings provision of entrepreneurship education, whether as specific modules, or comprising part or all of the focus of programmes. The

literature abounds with case studies and profiling papers that explain, impact assess and often celebrate individual entrepreneurship education initiatives (eg., Rosa, 2003; Klapper, 2004), and there appears little doubt that the contribution entrepreneurship education can make to higher education programmes can be valuable, whether it exists as the focus of a programme or as integrated or added on to vocational education (eg., Keogh and Galloway, 2004; Johnson, et al., 2006). The former, entrepreneurship-focused programmes, are usually rationalised by modern structural conditions conducive to independent economic activity, innovation and opportunity, based on the growth in importance of small firms. They encourage the search for an exploitation of opportunities borne of a knowledge and service-based economy, and the development of lucrative niches, often facilitated by that other entrepreneurship-friendly opportunity landscape, the internet (Kirby, 2004; Neck and Greene, 2011). Similarly, the use of entrepreneurship education to foster enterprise - and enterprises - in vocational disciplines is usually rationalised by identifying that in the modern economy, an awareness of opportunity in one's discipline is good for individuals who could be successful entrepreneurs, and for industries, in that innovation and entrepreneurship contribute to the development of the sector. However, it is widely known that innovation and sectoral development is fostered by opportunity exploitation in large firms to a far greater extent than in small or new firms in most vocational sectors (eg., Cooper, 1985). There is plenty of evidence that entrepreneurship has a greater role to play and that perhaps entrepreneurship, at its opportunity-exploiting, innovative best, is in fact not in the start-up sector at all, but in the large firms or even institutional sectors, where there is appropriate resource, knowledge and R&D capability (Avnimelech and Feldman, 2010).

Despite this, it remains the case that entrepreneurship education can contribute value to individuals and to industries in that it can unlock latent skills and attitudes and develop opportunity recognition and exploitation potential. The problem for those engaged with measuring the impact of entrepreneurship education is that most often the measurement is based on business start-up to the exclusion of other forms of entrepreneurial behaviour, especially in-firm entrepreneurship.

Essentially, since the assumption has been that entrepreneurship is identified in studies of entrepreneurship education as business start-up and/or self-employment, the outcome measurements for the success (or otherwise) of entrepreneurship education is the rate of these activities. Thus, there are methodological problems besetting entrepreneurship education impact studies – how do we know if it has made a contribution greater than if students had taken generic business studies – or even nothing? This brings us back, full circle, to identifying whether entrepreneurship education has fostered entrepreneurship in the business start-up/self-employment senses again. Assuming at least some students will select entrepreneurship education on the basis that they are already interested in starting a firm or working for themselves, we can ask them the extent to which their entrepreneurship education experience has helped. If they show positive results, we might extrapolate that those who are not interested in starting firms might still have learned something that will add value to the organisations they do eventually work in, or even prove useful as and when they find themselves compelled to self-employment in the increasingly contracted graduate workforce (Baldry, et al., 2007). At the same time, we can test student to find out which of them claim to want to start firms and check if they have the background features that often have been found amongst successful entrepreneurs and are therefore assumed to be those that shape, or at least influence, the intention and ambition for it. From there, countless studies use the Theory of Planned Behaviour to justify, and measure the utility of, entrepreneurship education provision (Kautonen, et al., 2011). It is to the Theory of Panned Behaviour therefore that we now turn.

3. Theory of planned behaviour

Academic research has classified entrepreneurship as an intentional action (Arenius and Kovalainen, 2006; Patzelt and Shepherd, 2011). Therefore, research has sought to understand the motivations as measured by intentions of those who pursue entrepreneurial activities. The most commonly used framework for understanding behaviour based on motivations and its antecedents is the Theory of Planned Behaviour (TPB) (Ajzen, 1991; Wiklund *et al.*, 2003).

The TPB originated in social psychology and seeks to explain behaviour through a simple framework, based on three antecedents: *attitudes* (ATT), which describe favourable or unfavourable personal evaluations of a behaviour; *social norms* (SN), which describes an individual's perceived social pressure to engage in a particular behaviour; and, *perceived behavioural control* (PBC), which describes the degree of perceived control that an individual thinks they have over achieving the end behaviour (Ajzen, 1991). Previous research has validated each of the TPB antecedents as

contributing to entrepreneurial behaviour (Kautonen *et al.*, 2011). Therefore, measurement of the antecedents of intention should correspond to actual intention, and in turn, where they do correspond, intention should predict entrepreneurship as an outcome. This is the underpinning thesis in studies such as Krueger (2005), Kolvereid and Isaksen (2006) and Galloway and Kelly (2009). Notwithstanding this, TPB has been criticised, particularly in terms of Block and Koellinger's (2009) argument that end outcomes such as entrepreneurial behaviour 'predicted' on the basis of intentions may not reflect the decision-making processes undergone in order to achieve that end outcome.

Theory of Planned Behaviour and the Current Study

Like other studies, the original study tested the background characteristics of respondents with a view to reconciling these with the Theory of Planned Behaviour, and in particular the antecedents to intention. Intention itself is included in the measurement along with three other criteria that correspond to its antecedents. Table 1 presents the items measured, the measurement applied and the link with TPB.

Table 1: Background measurements taken in original study using TBP

Item	Question	Possible Answers	Score	TPB
Intention	Do you plan to become self-employed or own a business? If so, when?	Immediately/in 5 years 5-10 years More than 10 years Never	1 0 0 0	Intention
Activity	Have you done anything so far to start a firm or make money independently?	Yes No	1 0	Perceived Behavioural Control
Role Models	Do you have family or friends in business?	Parent, spouse, sibling Other (eg. friend)	1 0	Social Norms
Desire	Do you want to be your own boss?	Yes No	1 0	Attitude; Perceived Behavioural Control

As Table 1 implies, students in the original study could be assigned a score in terms of their likelihood to become an entrepreneur. Those least likely to start a firm or become self employed would score 0, while those most likely would score 4.

Each of the items included in the measurement are discussed below.

Intention

Intention is the primary predictive variable in the Theory of Planned Behaviour and in entrepreneurship research has been described as the "crucial antecedent" (Lee *et al.*, 2011, p.124; also Carsrud and Brännback, 2011; Elfving *et al.*, 2009). Intention in the entrepreneurial context has been defined as "a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future" (Kautonen *et al.*, 2011, p.699).

Activity

As a measurement of *perceived behavioural control* (PBC), activity is defined as actions undertaken to start a firm or become self-employed. Baron (2007) claims that entrepreneurship is a process that requires entrepreneurial behaviour prior to start-up. In fact, he identifies that business success is unlikely to be early in this process as learning and experience are key elements of the successful entrepreneurial business. There is growing consensus that entrepreneurship starts long before business success outcomes in many cases (van Gelderen, et al., 2005), and that activity, trial and error, false starts and practice are characteristic of the nascent entrepreneur (Steiner, 1998).

Role Models

Entrepreneurial activity does not occur in isolation, therefore *social norms* (SN), developed through exposure to role models, have been found to increase motivation towards entrepreneurship (Krueger *et al.*, 2000; Taylor, 1996; Krueger, 2005). Further, Hout and Rosen (2000) and Dunn and Holtz-Eakin (2000) find that parents who are in business often act as role models and influence their offspring's

decision to become an entrepreneur. Numerous researchers corroborate that role models are critical to entrepreneurial potential (e.g., Brockhaus and Horwitz, 2004; Baron, 2007).

Desire

Desire to be self-employed or own a business seems a reasonable antecedent for actually doing so, and is related to PBC - in particular, locus of control. Locus of control (Rotter, 1966) is the degree to which individuals feel in control of their destinies, and can be affected by internal (psychological) and external (social, environmental) circumstances. Several researches have found high locus of control to be a common personality trait of entrepreneurs (e.g., Llewellyn and Wilson, 2003) and a significant moderator of intentions and behaviour (Obschonka, et al., 2010). Further, other studies such as Collins, et al. (2004) have shown that items which suggest high locus of control, e.g. "desire to be my own boss", correlate with entrepreneurial potential. Similarly, desire to start a firm or become self-employed is an obvious attitudinal (ATT) signal; one is likely to be predisposed to entrepreneurship if one perceived it as desirous. At first sight this appears obvious and intuitive. Upon inspection, however, desire for entrepreneurship as an antecedent to intention to be an entrepreneur is far more cloudy a link than we might expect. It is to this complex issue that we now turn.

The use of the Theory of Planned Behaviour in Entrepreneurship Education Studies

The desire to be self-employed or own a firm appears self-explanatory – you are unlikely to do either unless you want to. However, this is not, in fact, a safe assumption. Increasingly there is acknowledgement that self-employment and business ownership can be disparate from any positive agency-based choice. GEM (eg., Bosma, et al., 2008) identifies 'necessity entrepreneurship' and defines it as self-employment on the basis that there are few or no other financial alternatives for an individual. This type of entrepreneurship is not innovation driven nor value-adding, and while represented in all countries, is most prevalent amongst the least wealthy in countries with no welfare state. As such, its relevance to a study of entrepreneurship education in universities is apparently limited. However, for graduates in Western economies there is a type of necessity entrepreneurship reported increasingly in the employment literature.

Employment scholars such as Baldry, et al. (2007) identify the increasing contractualisation of graduate and professional jobs. Whole industries, including opportunity-rich sectors such as IT, are increasingly based on sub-contracted self-employment rather than traditional employment (eg. Bergvall-Kareborn and Howcroft, 2011). The reasons for this include that it is more cost effective for large firms to subcontract work (Baldry, 2007). Pertinent for the current paper, is that increasingly graduates and other professionals are finding themselves in an employment environment that *requires* them to be self-employed (Robert, et al., 2009). This is a type of entrepreneurship that is contrary to both PBC and ATT in that choice, efficacy and desirability as antecedents are no longer valid, and indeed entrepreneurship, thus defined, is in fact a negative outcome for the individual.

Debate about the applicability of the theory of locus of control to entrepreneurship continues (Chell, et al., 1991), but it seems increasingly clear that entrepreneurship as an outcome may not be as a result of any control on the part of the individual at all. Despite this, an entrepreneurship education impact assessment study would measure self-employment as a positive outcome.

The literature therefore suggests two research questions:

- Can the Theory of Planned Behaviour 'predict' an action which will lead to entrepreneurial activity measured by self-employment or the establishment of an SME?
- Did the engagement with an Entrepreneurship course influence 'planned bahaviour'?

4. Methodology

Qualitative analysis was considered most appropriate for the current study because it allows for results that reflect the positions of those being studied (Bryman, 1988) and includes therefore that which cannot be quantified or where being quantified does not provide any meaningful insight (Cassell and Symon, 1994). While it can be more difficult to generalise results with qualitative methods than in studies where quantitative methods have been used, Stake (1995, p.40) claims that through qualitative research we gain vicarious "experiential understanding" of a subject.

In the original study, students who had just completed an entrepreneurship module as part of their degree were asked to complete a questionnaire. The entrepreneurship modules were all elective classes in one of four universities. The modules included in the survey were of two types: one was applied business venturing, where students participated in a business start-up simulation in teams of 4 or 5; the other type was 'about entrepreneurship' in which the objectives focused on learning what entrepreneurship and enterprise are, and the value of them and the small firms sector to economies and competitiveness. Previous studies using the original data found no significant differences in attitudes or ambitions of students between module types (Galloway, et al., 2005), and in most cases, since both types were available in all the participating universities, students attended both during their degree programmes. Where both types had been taken, one response per student was included in the survey analysis and this varied depending on the order in which students took the modules, therefore both types were represented without bias.

The current study follows up with participants from two of these four institutions. A sample of 600 participants completed the original questionnaire in 2005 or 2006, and so the current study sought to follow up on them six or seven years since they received one of the entrepreneurship classes.

In the original study, personal email and telephone numbers were gathered, and this was the means by which participants were contacted for the follow-up. However, as is characteristic of students, once graduated, lives move on and they become hard to find. Contact details change as lives develop. Other means by which the study sought to 'find' those from the original was by using social network sites such as Facebook and Linkedin therefore. Despite the plethora of communications and networking mechanisms facilitated by the internet and other technologies, it proved extremely difficult to source participants. Ultimately, while several participants were found, the number of them was low, and amongst them only ten agreed to be interviewed. However, while originally disappointing, the low number did make possible interviews and inspection at some depth to follow-up on the stories of these participants. Ultimately, this proved beneficial to the research.

In the original study, as per Table 1 above, each participant was given a score in terms of how entrepreneurial he or she was. Table 2 below provides details of the ten participants of the follow-up study, including their original entrepreneurship score. Each informant participated in a semi structured interview, in which they were asked to broadly outline their experience so far in their career, their ambitions for the future, and the extent to which they considered entrepreneurship education had impacted or been useful (or not) in their careers. The limited number of questions was intended to allow for as much conversation as possible, facilitate rapport and through that, allow participants to respond as openly as possible.

Table 2: The interview participants

Informant	Score in Original Study (0-4)	Entrepreneur or nor entrepreneur (BO or SE)
A	3	entrepreneur
B	3	entrepreneur
C	3	student
D	2	entrepreneur
E	1	employed
F	1	employed
G	2	entrepreneur
H	1	entrepreneur (franchisee)
I	2	doing a PhD
J	0	employed and entrepreneur

5. Results

Two interviewees who had a high score in the original survey are now 'entrepreneurs' and both established their businesses within two years of finishing their degree. In fact one of the interviewees was establishing their business whilst still finishing their degree. Both had a positive experience of their entrepreneurial experience at university. For example, interviewee 'A' stated

"I think entrepreneurship module is very important part of what the University offers. It enables the students to understand the value of innovation, marketing and gives confidence in setting up their own business...Learning about the business plan during the entrepreneurship course was useful. It made

me aware that the business plan is not a set of numbers but it is more of a road map of where you want to take your practice."

'A' is a sole trader, with no direct family link to entrepreneurship though 'A's mother "encouraged me to be independent, to set goals and work towards these goals." However, 'A' states that ...."(I) was inspired by my tutors." 'A' has ambitions to grow the business through web sales and exporting.

'B' started in business whilst at university. Whilst the core of the business has remained the same s/he is aware of opportunities and niche areas in which to take the business. 'B' identifies a direct link with her/his studies and establishing the business and notes in particular the opportunity afforded by a university organised business plan competition as a source of invaluable help from the entrepreneurs who were judging the entrants.

'C' who scored a three in the original survey is at odds with the 'other 3s' in that she/he has not had any experience of self-employment or setting up a business, this is in-spite of the claim that "I really enjoyed the entrepreneurship modules" and acknowledgement that... "Part of the course was to provide a business plan, which although I have not gone into the this sector it has helped me work with friends to help them develop their own business plans." Indeed 'C' does not ever envisage becoming self-employed.

While relatively low scoring, informants D and G are also business owners. For 'D', whilst it has taken several years to establish his/her sole-trader business, having several jobs along the way, s/he did attempt to establish a business whilst still at university. The motivation for the establishment of his/her business..... "I think the variety aspects enticed me into self-employment." There is no family connection with entrepreneurship, and no-one acted as a 'role model' for 'D' and this perhaps explains the relatively low score of 2.

'G' who likewise scored a 2 in the original survey established a business ... "because I like entrepreneurship. I was looking for business when I finished my study.." The partnership business is international in its operation and trains traders on the New York Stock Exchange, and has ambitions of establishing... "an international import-export company." 'G' has an uncle who has a large company ... "and wishes me doing international business in the future." 'G' engaged with her uncle for advise prior to starting her/his business.

The final interviewee who scored a 2 in the original survey, 'I', whilst currently studying for a PhD and lecturing does not rule out establishing a business in the future... "Yes, it's a possibility, probability greater than 50 percent".

For those who scored lower than 2, there is also evidence that value is ascribed to entrepreneurship education. For example, 'E' believes that entrepreneurship education at university was important: "Yes, in some aspects e.g. practical things as how to write and present a business plan: see the 'big picture' of a company....and not only the bits and pieces as you typically experience when working at big companies."

There is also evidence of entrepreneurship amongst this group. In particular, after several years working for another company, 'H' established an accountancy franchise where he now employs two other people. 'H' claims "I had slight motivation to be self-employed while at university....I always had a spirit to be self-employed, but it depends on support either from parents or having savings." As with the other interviewees 'H' found entrepreneurship education useful; "I did a lot of group work and produced a business plan and I suppose now realise there was a lot I didn't know, like basic things, what kind of company to set up." 'H' has no family connection with entrepreneurship.

Similarly, Interviewee 'J' whilst scoring 0 on the original survey and being currently employed as a fireman also operates a business letting holiday accommodation. 'J' previously worked in the family business and began renovating outbuildings beside the family home. 'J' states that .. "I am a calculated risk taker." On leaving university.. "I became a business partner to a friend in a software engineering business." But this did not work out. Entrepreneurship education .. "was useful, other subjects not so much." Before embarking on the holiday renting business 'J' consulted with "my family and family links to our accountant, solicitor and architect."

6. Discussion

There is some logic to the assumption that all students who have undertaken a course in entrepreneurship at a higher educational institution will have thought about setting up in business. So it comes as little surprise to find that all our interviewees have had the intention to some degree to set up in business. All interviewees similarly acknowledge some kind of debt to the usefulness of their course though the precise 'value' does vary. Whilst some such as 'I' have not done so as yet does not deter s/he from contemplating doing so in the future. On the question of intent it is perhaps surprising that someone such as 'J' who recorded a 0 in the original survey and after having the experience of a business 'failure' has persevered to establish a business albeit whilst also in full-time employment, highlighting her/his claim to be a 'calculated risk-taker'.

Of interest also is the attempt to establish a 'correlation' between the 'high scorers' and whether a growth business rather than self-employment or income-substitution business has been established. 'A', 'B' 'G' and 'H' appear to have established businesses which have or will have generated additional employment. 'H' scored a 1 in the original survey with 'A', 'B' and 'G' recording a 3 or 2.

In terms of Activity as an identified component of planned behaviour again all our interviewees had been engaged in activity prior to start-up. Some of this activity may have resulted in a decision not to start-up at a particular moment in time, 'I' for example. Some of the interviewees are clearly 'serial' entrepreneurs and hence have continued to engage in 'Activity' prior to start-up, 'J' for example, whilst others such as 'G' envisage being a serial entrepreneur.

The issue of role models is an interesting topic with 'J' clearly identifying his immediate family connection a key factor in informing his decision in establishing a business. Yet 'H' 'A' and 'D' categorically state that there was no family influence on their decisions to establish a business. 'C' would appear to be the counter-factual the high scorer who has had no experience of 'entrepreneurial activity' and no intention of experiencing any, though scoring highly on the original survey.

7. Conclusions

Any substantive conclusions are limited due to the small sample size. Having stated that, though, it would appear that all those who scored either 2 or 3 in the original survey have either established a small business or have become self-employed, apart from 'I', who has not ruled this out after completion of his/her studies, and 'C', who in spite of scoring a 3 has never engaged in entrepreneurial behaviour and claims s/he has no intention of doing so in the future. In analysing the information provided by 'C', however, we need to be aware of criticisms levelled at research which attempts to measure the impacts of entrepreneurship education. Von Graevenitz et al (2010) for example point out that entrepreneurship education has the potential to 'sort' those who might be suited to entrepreneurship from those who might not. 'C' could be a case in point. On an indication of planned behaviour we find that there is an intention to engage in enterprising activity on C's part, by our narrow definition, yet on reflection does not do so. 'C' is engaged in a rewarding career, currently undertaking further study, developing human capital to enable progression through this chosen career path.

A further interesting conclusion from the limited results reported here is that two of the small sample who recorded low scores from the original sample have in fact undertaken entrepreneurial activity. 'H' with a score of 1 has set up a franchise business which appears to be growing and 'J', attempted to set up a business with a partner which was not successful, and has a business letting holiday accommodation whilst employed full-time. On reflection it could be that these low scoring entrepreneurs would be classified as 'necessity' entrepreneurs. 'H' established the franchise company after being made redundant and not finding other suitable employment. 'J''s motivation for entering full-time employment is for financial security, after losing his original partnership business.

In relation to the two research questions posed in this paper the results and discussion suggest that in some circumstances the Theory of Planned Behaviour can 'predict' an action which will lead to entrepreneurial activity. The examples of 'A', 'B' and 'G' would suggest this. Before exiting their course of study they were actively engaged in the process of establishing a business. However, it must be remembered that as Block and Koellinger (2009) argue, the end outcomes such as entrepreneurial behaviour 'predicted' on the basis of intentions do not necessarily reflect the decision-making processes undergone in order to achieve that end outcome. The second research question

posed, on the evidence provided could likewise be positive, however, given the small sample size and the propensity for 'selected research bias', that is, those who had a positive experience are more likely to respond to a speculative eMail than those who had had a negative experience, this observation must be somewhat tentative. As with other longitudinal studies, this research suffers the limitations of individuals being mobile, and hence difficult to find. Despite this limitation, the study does provide some positive stories of students post entrepreneurship education, and in particular, it shows that while life may have developed in unexpected ways for some of them, including leading to business ownership, that they perceive utility in their entrepreneurship education experience.

References

Ajzen, I. (1991) The theory of planned behavior. *Organizational behavior and human decision processes,* 50 **(2)** pp. 179-211.

Arenius, P. and Kovalainen, A. (2006) Similarities and Differences Across the Factors Associated with Women's Self-employment Preference in the Nordic Countries. *International Small Business Journal,* 24 **(1)** pp. 31-59.

Avnimelech, G. and Feldman, M. 2010. The regional context of corporate spawning. Paper presented at the Summer Conference on Opening Up of Innovation: Strategy, Organisation and Technology, London.

Baldry, C., Bain, P., Taylor, P., Hyman, J., Scholarios, D., Marks, A., Watson, A., Gilbert, K., Gall, G., and Bunzel, D. (2007) *The meaning of work in the new economy*, (London, Palgrave).

Baron, R.A. (2007), "Entrepreneurship: A process perspective" in Baum, J.R., Frese, M. and Baron, R.A. (eds) *The Psychology of Entrepreneurship*, New York: Society for Industrial and Organisational Psychology.

Bergvall-Kareborn, B. & Howcroft, D. (2011) "Crowdsourcing and ICT work: A study of Apple and Google mobile application developers" available at http://www.crowdsourcing.org/document/crowdsourcing-and-ict-work-a-study-of-apple-and-google-mobile-phone-application-developers/4274

Block, J. and Koellinger, P. (2009) I Can't Get No Satisfaction—Necessity Entrepreneurship and Procedural Utility. *Kyklos,* 62 **(2)** pp. 191-209.

Bosma,N., Acs, Z.J., Autio, E., Coduras, A. and Levie, J. (2008), *Global Entrepreneurship Monitor,Executive Report*, Global Entrepreneruship Monitor Research Consortium.

Brockhaus, R.H. and Horwitz, P.S. (2004), "The psychology of the entrepreneur" in Krueger, N.F. (ed) *Critical Perspectives on Business and Management*, Oxford: Routledge.

Bryman, A.(1988) *Quantity and Quality in Research* London: Unwin Hyman.

Carsrud, A. and Brännback, M. (2011) Entrepreneurial Motivations: What Do We Still Need to Know? *Journal of Small Business Management,* 49 **(1)** pp. 9-26.

Cassell, C. and Symon, C. (1994) "Qualitative Research in Work Contexts" in Cassell and Symon (eds) *Qualitative Methods in Organizational Research: A Practical Guide* pp.1-13 London: Sage Publications.

Chell, E., Haworth, J. & Brearley, S. (1991) *The Entrepreneurial Personality*, Routledge, London.

Collins, L., Hannon, P. D. and Smith, A. (2004) 'Enacting Entrepreneurial Intent: the gaps between student needs and higher education capability' *Education and Training,* Vol.46, No.8/9, pp.454-463.

Cooper, A.C. 1985. The role of incubator organizations in the founding of growth oriented firms. *Journal of Business Venturing* 1: 75-86.

Dunn, T.A. & Holtz-Eakin, D.J. (2000) 'Financial capital, human capital and the transition to self-employment: Evidence from intergenerational links', *Journal of Labor Economics*, Vol.18, No.2, pp.282-305.

Elfving, J., Brännback, M. and Carsrud, A. (2009) Toward A Contextual Model of Entrepreneurial Intentions. *In:* Carsrud, A. L.andBrännback, M. (eds.) *Understanding the Entrepreneurial Mind.* New York, NY: Springer New York.

Galloway, L. & Brown, W. (2002) 'Entrepreneurship education at universities as a driver in the creation of high growth firms'. Education and Training, 44,8/9, 398-405

Galloway, L. & Kelly, S. (2009) 'Identifying Entrepreneurial Potential? An Investigation of the Identifiers and Features of Entrepreneurship,' International Review of Entrepreneurship, 7,4.

Galloway, L., Brown, W. & Anderson, M. & Whittam, G. (2005) 'Investigating the Impact of Entrepreneurship Education in HE'. Report for LTSN Business and Economics Support Team, Institute of Higher Education.

Hout, M. & Rosen, H.S. (2000) 'Self-employment, family background and race', *Journal of Human Resources,* Vol.35, No.4, pp.670-692.

Johnson, D., Craig, J.B.L. & Hildebrand, R. (2006) "Entrepreneurship education: towards a discipline-based framework", *Journal of Management Development*, 25(1): 40-54.

Kautonen, T., van Gelderen, M. and Tornikoski, E. T. (2011) Predicting entrepreneurial behaviour: a test of the theory of planned behaviour. *Applied Economics,* 45 **(6)** pp. 697-707.

Keogh, W. & Galloway, L. (2004) 'Teaching enterprise in vocational disciplines: reflecting on positive experience'. Management Decision, 42,3/4, 531-541.

Kirby, D.A. (2004), "Entrepreneurship Education: Can Business Schools Meet the Challenge", *Education and Training,* 46(8/9): 510-519)

Klapper, R. (2004) "Government goals and entrepreneurship education – an investigation at a Grande Ecole in France" *Education and Training*, 46(3): 127-137

Kolvereid, L. and Isaksen, E. (2006) New business start-up and subsequent entry into self-employment. *Journal of Business Venturing,* 21 **(6)** pp. 866-885.

Krueger Jr, N. F., Reilly, M. D. and Carsrud, A. L. (2000) Competing models of entrepreneurial intentions. *Journal of Business Venturing,* 15 **(5-6)** pp. 411-432.
Krueger, N. F. (2005) The Cognitive Psychology of Entrepreneurship. *In:* Acs, Z. J.andAudretsch, D. B. (eds.) *Handbook of Entrepreneurship Research.* New York: Springer-Verlag.
Lee, L., Wong, P. K., Foo, M. D. and Leung, A. (2011) Entrepreneurial intentions: The influence of organizational and individual factors. *Journal of Business Venturing,* 26 **(1)** pp. 124-136.
Llewelleyn, D. J. and Wilson, K. M. (2003) 'The Controversial Role of Personality Traits in Entrepreneurial Psychology' *Education and Training* Vol.45, No.6, pp.341-345.
Neck, H.M. & Greene, P.G. (2011) 'Entrepreneurship education: known worlds and new frontiers' Journal of Small Business Management, 49(1), pp.55-70.
Obschonka, M., Silbereisen, R. K. and Schmitt-Rodermund, E. (2010) Entrepreneurial intention as developmental outcome. *Journal of Vocational Behaviour,* 77 **(1)** pp. 63-72.
Oosterbeek, H., van Praag, M. & Ijsselstein, A. (2010) 'The impact of entrepreneurship education on entrepreneurship skills and motivation', European Economic Review, 54, pp.442-454.
Patzelt, H. and Shepherd, D. A. (2011) Negative emotions of an entrepreneurial career: Self-employment and regulatory coping behaviors. *Journal of Business Venturing,* 26 **(2)** pp. 226-238.
Rae, D., Martin, L., Antcliff, V. & Hannon, P. (2010) 'The 2010 Survey of Enterprise and Entrepreneurship in Higher Education' presented at the 33rd ISBE Conference, London.
Robert, F., Marques, P., Lasch, F. & Le Roy, F. (2009) "Entrepreneurship in emerging high-tech industries: ICT entrepreneurs between experts and kamikazes", *International Journal of Entrepreneurship and Small Business*, Vol.7 No.3, pp. 258-283.
Rosa, P. (2003) "'Hardly likely to make the Japanese tremble': the business of recently graduated university and college 'entrepreneur'", *International Small Business Journal*, 21(4): 435-459
Rotter, J.B. (1966) 'Generalised expectations for internal versus external control of reinforcement' *Psychological Monographs: General and Applied*, Vol.80, No.1, pp.1-27.
Stake, R.E. (1995) *The Art of Case Study Research,* London: Sage Publications.
Steiner, R. (1998) *My First Break*, News International.
Taylor, M. P. (1996) Earnings, independence or unemployment: why become self-employed? . *Oxford Bulletin of Economics & Statistics,* 58 **(2)** pp. 253-253.
vanGelderen, M., Thurik, R. and Bosman, N. (2005), "Success and risk factors in the pre-startup phase" *Small Business Economics*, 24(4): 365-380.
Von Graevenitz, G., Harhoff, D. & Weber, R. (2010) 'The effects of entrepreneurship education', Journal of Economic Behaviour and Organisation, 76, pp.90-112.
Wiklund, J., Davidsson, P. and Delmar, F. (2003) What Do They Think and Feel about Growth? An Expectancy-Value Approach to Small Business Managers' Attitudes Toward Growth. *Entrepreneurship Theory and Practice,* 27 **(3)** pp. 247-270.

Finding Risk Factors of Innovation Activity Enterprises

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Abstract: High risk creates a powerful disincentive for innovation activity. The risk is considered not to be a threat of expected return failure but rather an obstacle to involve enterprises in innovative activity. To analyse innovation bottlenecks, a five-stage procedure is proposed. At the first stage, the system of innovation activity factors is determined. The second stage of the procedure identifies the factors that have a negative impact on innovation activity, e.g. the risk factors. The system of innovation activity factors suggests that its elements are attached to the components of the innovation process. At this stage, the set of the risk factors is distinguished according to their specificity. In other words, the factor system is divided into two non-overlapping subsystems. The first system includes factors determined by the nature of the innovation process and is directly related to innovation activity. The other subsystem consists of the factors generated by the framework conditions of the innovation activity. At the second stage, to identify factors hampering the innovation activity, data from enterprises innovation surveys is applied. The approach of the study is of a subjective nature. Taking as a whole all the innovation projects of a firm allows one to consider bottlenecks associated with the typical behaviour of enterprises. At the third stage, the data of the innovation survey is completed by additional information to obtain indirect estimates of missing factors. To determine the relative scope and magnitude of the risk factors, their ranking takes place at the fourth stage. In addition, the mapping of risks and risk factors is the subject of the fifth stage. This stage leads to the construction of relevant problem spaces for innovation management and regulation. Under the conditions of adjustment of feedbacks between enterprises and the state, the map obtained provides opportunities for offering policy measures (at both state and enterprise levels) to mitigate, and compensate for, risks of innovation activity.

Keywords: risk factors, innovation activity, enterprises, hampering innovation, map

1. Introduction

The importance of risk attitudes in enterprises is attested by great attention to this subject in economic literature.

In decision theory, choice is based on a trade-off between risk and expected return. The theory assumes that decision makers deal with risks by first calculating and then choosing among the alternative risk-return combinations that are available (Pratt 1964; Arrow 1965).

The risk management approach is often associated with the concept of identifying risk causes. These causes could be in the fields of economy, policy, technology, etc. Corresponding studies might be grouped according to two topics: disaster (Perrow 1984; Roberts 1990; Weick and Roberts 1993) and risk analysis (Cooper and Chapman 1987; Short and Rosa 1998; Evans et al. 2002, Chapman and Ward 2003). The processes of hazard origin and incubation are a subject of the former studies. The topic of the latter group of studies is measurement of the risk associated with each variant to choose the least risky one.

Managers see risk in ways that are different from risk as it appears in decision theory and the above mentioned literature (Shapira 1995). Studies by Shapira (1986) and MacCrimmon and Wehrung (1986) provide some observations on managers' attitudes toward risk, and how they deal with risk. According to the studies, among managers there is little inclination to equate the risk with the variance of the probability distribution of possible outcomes that might follow the choice of the alternative. For most managers, risk is not primarily a probability concept and risks are possible to deal with, while uncertainty is an event or a situation that was not expected to happen. They take into account uncertainty as a factor of risk, but the magnitudes of possible bad outcomes seem more important for them. A risk, as a majority think, could better be considered in terms of amount to lose (or expected to be lost) than in terms of moments of the outcome distribution. The managers interviewed by MacCrimmon and Wehrung (1986) and by Shapira (1986) believe that risk is manageable (see also Sarasvathy et al., 1998). They construct relevant problem spaces and look for alternatives that can be managed to meet targets, rather than assess or accept risks.

As the topic of innovation, risk is closely associated with innovation, which entails the pursuit of perceived opportunities under conditions of uncertainty. In the study, the neo-Schumpeterian approach has been chosen as a basis to consider such a phenomenon as innovation. According to this approach, innovation is at the heart of economy driven by knowledge (Schumpeter 1934; Drucker 1974). It is considered as a result of interplay and integration of market opportunities with a firm's knowledge base and its capacity. In other words, the innovation is a market implementation of a new idea. More precisely, "an innovation is an economic implementation of new, or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relation" (OSLO Manual 2005, p.46).

According to OSLO Manual (2005, pp. 18), "innovation activities include all scientific, technological, organisational, financial and commercial steps which actually lead, or are intended to lead, to the implementation of innovations". The innovation activity can also be divided into the following processes: targets setting, action design, action implementation (innovation process), results analysis and comparison with the targets. Innovation process, in its turn, consists of three overlapping subprocesses. They are the production of knowledge; the transformation of knowledge into products, systems, processes, and services; and their continuous matching to market needs and demands (Pavitt 2006, p.86). The modern model of innovation process emphasizes feedback loops between the subprocesses and highlights interaction with external factors (see, for example, Kline and Rosenberg 1986).

A number of factors can hamper innovation activities. Some of them may slow such activities and corresponding innovation processes or affect them negatively, e.g. such factors as high costs or lack and uncertainty of demand, insufficient innovative potential, lack of skilled personnel or knowledge, and legal factors, etc. These factors are associated with ones that provide the emergence of increased risk of unsuccessful innovation activity, i.e. they are its risk factors. High risks create a powerful disincentive for innovation activity. The risks arise to a large extent from a complex nature of innovation activity, but part of the risks can be offset, and compensated for, by impacts of public policy (Hilpert 1991, Edquist 2008, OECD 2009, European Union 2010) and the policy making by enterprises themselves (Tushman and O'Reilly 1997, Berglund 2010). To mitigate and compensate for risks, there is a need to find the bottlenecks in innovation processes and apply policy measures to them. This affords an effective way to diminish the extent of uncertainty of risk management and increase the perceptibility of risk by company management (MacCrimmon and Wehrung 1986, March and Shapira 1987). As a result, the enterprise's risk tolerance that affects risk taking in innovation may be increased (Center for Tomorrow's Company, 2009).

To be of assistance with the development of management and regulatory responses, the paper's approach leads to the construction of relevant problem spaces for innovation management and regulation. But, the approach of the study has, contrary to the managerial one, a subjective nature. In contrast to the standard approaches, the proposed procedure is targeted not to find the least hazardous variant but the places of risk emergence, i.e. innovation activity risk factors.

The process of the identification and analysis of risk factors innovation activity, i.e. innovation bottlenecks and obstacles, is organized as a five-stage procedure. At the first stage, the system of innovation activity factors is determined. The second stage identifies the factors that have a negative impact on innovation activity. During this stage, the surveys of enterprises are used. At the third stage, the data of innovative survey is completed by additional information to obtain indirect estimates of missing factors. To give information about the relative scope and magnitude of the factors, the ranking (fourth) stage is introduced. Mapping is a subject-matter of the fifth stage.

2. The classification of factors of innovation activity

The separarion of the factor system takes place as a result of the first stage. The system is divided into two subsystems (Figure 1). One of the subsystems includes factors that are directly related to innovation activity. These factors determine the levels of the firm's innovation capacity, technology transfer and demand for innovative products. The other subsystem encompasses the events arising from framework conditions of innovation activity. The latter is related to the impact of competition, macro-economic conditions, business environment, financial and tax systems, investment environment, international trade and investment, education etc. It is worth noting that such a factor as legislation in many respects accounts for the effect of the most part of innovation activity factors. Each of these subsystems factors is identified according to its impact on inputs and outputs of innovation

activity, incentives to innovate, innovation process performance, timing and pace of the innovation process. The inputs are resources necessary for innovation activity. The outputs are considered as a result of demand and supply interactions. Therefore, the factors being divided in accordance with the nature of framework and innovation-specific determinants are attached to the components of innovation process.

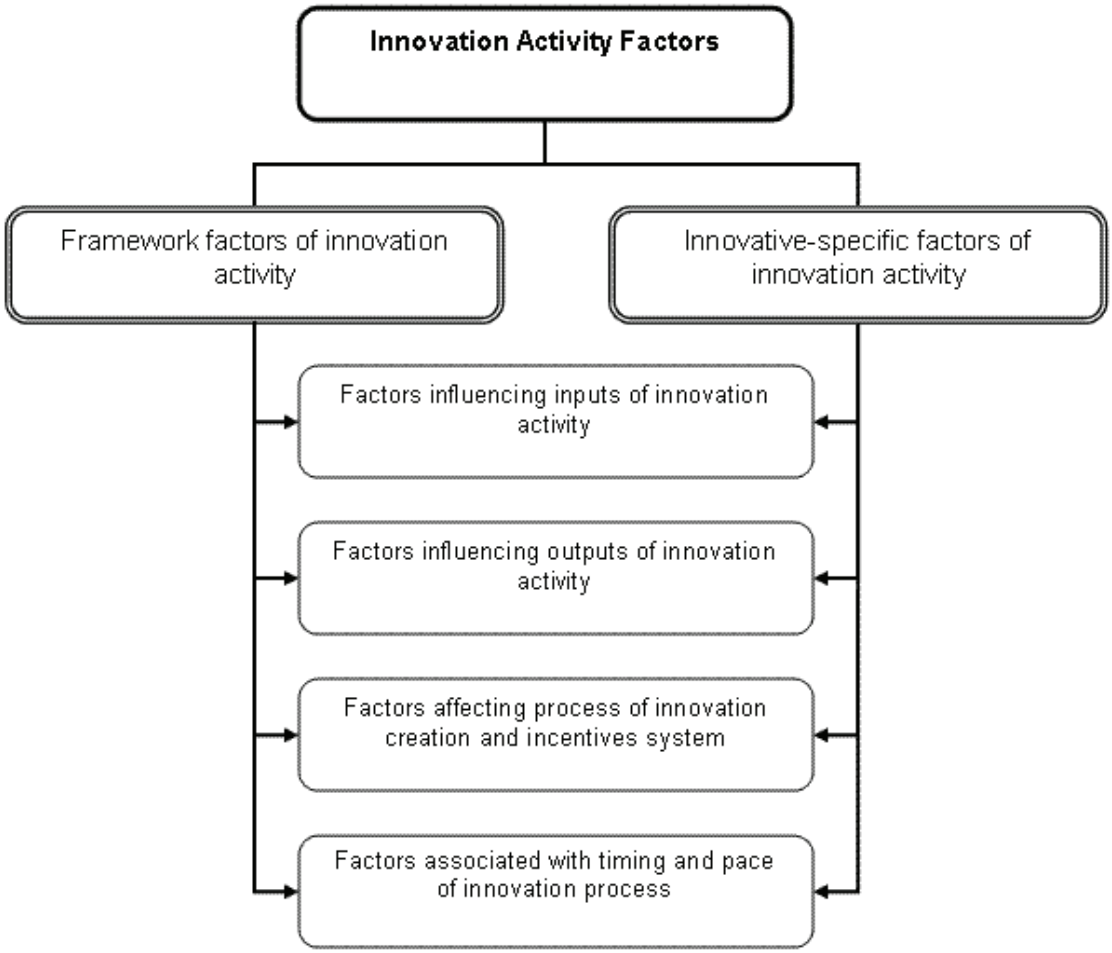


Figure 1: The system of innovation activity factors

It is worth noting that this approach differs significantly from approaches in which the categorization is made according to the types of risks, i.e. commercial, institutional ones, etc. (Balabanov 1996, Merna and Smith 1996, OECD 2008). The suggested classification of this study is based on the idea of binding risk factors with components of innovation activity.

3. Risk factors of innovation activity

In the paper, a risk is understood as the potential failure to achieve objectives and commonly seen as "the possible loss of something of value" (Blomkvist, 1987: 89) and risk factor is defined below as a fact or situation which influences the emergence of risk. In this section the risk factors are considered in relation to components of innovation activity highlighted above.

In the study, innovation surveys are used to find risk factors. The surveys provide qualitative and quantitative data on innovation activities. Much of the data is of a subjective nature, being largely based on the personal appreciation and judgment of the respondents. The surveys are extensively taken into consideration by statisticians and policy observers to benchmark and monitor innovation performance (Mairesse and Mohnen 2010). The detailed overviews of studies based on innovation survey data is presented by Baldwin and Hanel (2003), Kleinknecht and Mohnen (2002) and Van Beers et al. (2008). There have been various issues of Community Innovation Surveys (CIS) including CIS 1, CIS 2, CIS 3, CIS 4, CIS 2006, CIS 2008 and CIS 2010. The CIS are now conducted in all European Union (EU) member states and sometimes even at a regional level. Innovation surveys

exist under different acronyms in many other OECD countries, but also in emerging economies, transition countries and developing countries (Mairesse and Mohnen 2010).

3.1 Factors influencing inputs for innovation activity

Financial resources, knowledge and human capital constitute a triad of key resources of innovation process. The shortage of finance resources is one of the most significant obstacles to involve enterprises in innovation processes (Spielkamp and Vopel 1997, OECD 2010, Golichehko 2011). Innovation surveys usually show the factor as the following combination of subfactors: "lack of funds within the enterprise", "lack of public sources of funding, high innovation cost" (CISt 2006). There is also emerging evidence that imbalance of demand of, and supply for, quality and quantity of human capital means that firms become locked into a "low-spec" trap (Porter and Ketels 2003). The imbalance, usually generated by environment defects, hampers the development of sources of this resource, the access to these sources and processes of knowledge transfer.

This framework factor denoted on the map (Figure 3) as *mismatch between the environment providing resource sources* and *the enterprise's needs* is worth including in the cause-effect chain called "factors-risks". Because of data limitations, the factor impact can be estimated by the value of such a subfactor as "lack of qualified personnel" (CIS 2010, CISt 2006) which is usually presented in the standard innovation surveys.

The problem of resources availability and their transfer can be solved in many respects if firms manage to intensify and facilitate processes of cooperation and fill the gap in knowledge by transfer of embodied and disembodied technologies. Accordingly, such factors as "difficulty in finding co-operation" and "technology transfer difficulties" (CISt 2006) are considered as key factors that firms face when trying to solve the problem of the resources availability. The latter factor is present in Russian innovation surveys and absent in European ones.

3.2 Factors influencing outputs for innovation activity

The factors of demand for innovative products are of the greatest interest among ones influencing outputs for innovation activity. On one hand, the demand is driven by traditional factors such as needs of consumers, prices of products and product substitutes and so on. But, on the other hand, the innovative specificity of the demand is largely associated with a novelty of the innovative product and risks of its consumption, i.e. with readiness and absorption capacity of consumers to adopt the product.

Challenges on the demand side are linked to the diffusion of innovations and their take-up by consumers (Bower and Christensen 1995). As regards absorbing capacity of enterprises, it depends largely on technology level, availability of sufficiently skilled personnel, management skills and so on. To introduce a radical innovation successfully into the consumer market, it must be commercially viable but also accepted by households. For households as consumers of innovative products, the distinguishing features are innovativeness, technological modernism and the ability to absorb new technology knowledge. The levels of education and age structure of the population have a considerable influence on the features. The accessibility of education and level of households' income are important too. Besides, it is also worth taking into account that innovations spread through a market in phases (Rogers 1962, 2003). The majority of users usually join in demand for an innovation product if it becomes more incremental, but also if price competition between suppliers starts and prices fall. Therefore, the negative impact of the factors discussed above can be recorded in innovation surveys as "uncertain demand for innovative goods or services" (CIS 2010, CISt 2006).

3.3 Risk factors affecting process of innovation creation and incentives system

The process of innovation creation depends on both the internal and external environment characteristics of a firm. Among the former there are learning capacity of staff, availability of effective in-house training systems geared to meet a checklist of competencies within the firm, paradigm of innovation activity that the firm uses when trying to become more innovative. As for the external environment characteristics, they include, among other things, a mature market of skilled labour, availability of human resources in science and technology and education systems being able to meet current and future needs of innovation development. In the study the *insufficient innovation potential* is taken as one of the key aggregate risk factors including components mentioned above.

Among the factors affecting the incentives for innovation activity are ones associated with competition. They should be, first of all, taken into account (Schumpeter 1934, Drucker 1974). If a firm does not experience competitive pressure, it does not have stimuli for innovation, and vice versa. If the competitive pressure is too high, the firm's resources are not enough to take part in high-risk innovation processes. *The discrepancy between the level of competition and the incentive function* is presented as a risk factor on the map (Figure 3). Because innovation is a part of business, *factors generating barriers to entrepreneurial activity* result in a strong adverse impact on the motivation for innovation. They serve as a source of taking risk out of innovation.

The defects and incompleteness of legal framework being considered as an aggregate factor give rise to many of the above discussed factors. This aggregate factor in many respects hampers the implementation of economic processes and may lead to a loss of incentives for their realization. It is not represented on the map since the factor contributes to the occurrence of all types of risks shown on the map.

3.4 Factors associated with timing and pace of innovation process

And, finally, it is worth considering the timing and pace of the innovation process. Therefore, there is a need to take into account the uncertainty of results and pay-off period of innovation (OECD 1997, Mann 2006).

4. Statistic data completeness providing factors measurement

A frequent obstacle to the development of a procedure for finding and mapping the risk factors is missing data. Unfortunately, national and international innovation statistics do not usually take into account the whole set of the factors outlined above and do not often reflect the impact of framework conditions on innovation activities (including competition, entrepreneurship). The influence of these factors can be evaluated by using additional statistical information. At the same time, it is fair to say that the Fourth Community Innovation Survey incorporated a factor such as "market dominance of established enterprises" (CIS 2010, CISt 2006).

This study uses an aggregate index of barriers to entrepreneurship (OECD 2011), which is composed of indices of barriers to competition (legal barriers, antitrust exemptions, barriers in network sectors and in retail and professional services), regulatory and administrative opacity (licences, permits, simplicity of procedures) and administrative burdens for creating new firms. The index of barriers to competition is considered as a separate indicator. To estimate the value of this index, the legal barriers, antitrust exemptions, barriers in network sectors and in retail and professional services are taken into account. It is worth noticing that there are also other approaches to building indices of this type (World Bank 2010, 2011). Inasmuch as the available statistics give no opportunity to evaluate the characteristics in detail, in the study the aggregated characteristics are put in for consideration in certain cases. This applies to factors such as the lack of innovation capacity and "the uncertain demand for innovative goods or services" (CIS 2010, CISt 2006). Besides, the innovation surveys do not include the evaluation of such a component as a firm's stock of knowledge. This component can be estimated indirectly by the quality of the firm's human capital as a holder of tacit knowledge. The "lack of qualified personnel" (CIS 2010, CISt 2006) is taken as a factor of scarcity of a firm's stock of knowledge. Unfortunately, the factors relating to long pay back periods of innovation, uncertainty of innovation process, and timing have been excluded from the recently published Russian ratings (Higher School of Economics 2009, 2011).

5. Ranking risk factors of innovation activity

To be of assistance with the development of regulatory responses, risk factor assessment must inform about the relative scope and magnitude of the factors. To do this, it is worth ordering the importance of obstacles, i.e. ranking them. The ranking is based on the rating of the following European countries: Austria, Belgium, Germany, Greece, Iceland, Spain, Italy, Luxembourg, Netherlands, Norway, Portugal, Finland and Sweden (Higher School of Economics 2009). The lack of own funds is among the most significant innovation factors for more than 40% of Russian companies. In European countries such as Greece, Iceland and the Netherlands, this factor takes also the first place in the ranking of the reasons for preventing enterprises from being innovative. In Russia, although its rating decreased from 2.6 points in 1993-1995 to 2.3 points in 2005-2007, it is still very high now (Figure 2). This means that the risks of refusal of innovation activity have still taken the lead

for Russian enterprises. The insufficient financial public support increases these risks. This factor ranks third in the ratings and it reached 2.1 points in 2005-2007.

According to ranking innovation surveys, the second and fifth places are taken by risk factors related to the "high cost of innovation" and "the uncertainty of demand for innovative goods or services" (CIS 2010, CISt 2006), respectively. It should be noted that in Russia, the rating value of the factors just mentioned diminished from 2.2 points in 1993-1995 to 1.6 points in 2005-2007. The high cost of innovation is a major risk factor for many European countries including Austria, Belgium, Germany, Greece, Italy, Finland and Sweden. They are expected effects. On the one hand, finance opens the door to employing resources for innovation and, on the other hand, it provides a "safety cushion" to allow compensation for the risks of the innovation process.

At the same time, the risk factors being generated by high barriers to competition and entrepreneurship have a much stronger adverse influence in some countries. For these countries, the factors certainly have higher ratings. Therefore, they may be put in the first two places and the financial factor should be the third one. In accordance with OECD (2011), the highest barriers to competition are inherent in such countries as China, Mexico, Iceland, Japan and the United States. They are significant for Russia too. The barriers to entrepreneurship are the highest in China and India. Russia is the closest to countries like Brazil and Greece with regard to the magnitude of these barriers. It is one of ten countries in Europe and Asia with the highest rating of the barriers. In most OECD countries, the height of the barriers is regarded as low.

Among the most significant obstacles to the introduction of technological innovations is a *lack of innovative capacity* which ultimately affects the high cost of innovation. In 2005-2007, the factor of lack of innovation capacity scored 1.8 points and was the fourth in the ranking (see Figure 2). Previously, it was not in such a high ranking position and took only the sixth place. Obviously, such an estimate stems from the fact that most Russian companies were founded in the former Soviet Union and their technological capacities are largely exhausted now. The weakness of the innovation potential of the Russian companies is confirmed by a steady decline of firms' share of researchers in the total number in the country (Golichenko and Malkova 2009). The low value of the share dropped from 9% to 5.6% over the ten years from 1997 to 2007. As a result, due to the lack of qualified human resources in science and technology, Russian companies often fall into the incompetence trap. These trends mean that human resources in science and technology may not be enough for large scale innovations in Russia. Accordingly, this risk applies to companies that find themselves in a "low spec" trap being unable to find a skilled labour force and perform innovation activity. The factors associated with lack of qualified staff were given the fifth place in the ranking. However, one can assume that the factors are still undervalued by Russian enterprises. It follows from the fact that the companies of most European countries show a lack of skilled personnel as one of the key obstacles to innovation. Their evaluation of the factor is at least 2 points.

Other factors influencing the development of innovative capacity are less significant for Russian enterprises. This group of factors relates to underdevelopment of innovation infrastructure, cooperation links and the lack of information about new technologies. The factors scored less than 1.5 points (see Figure 2). Besides, it is worth singling out such factors as a lack of development of the technology market. In 2003-2005, it also scored only 1.5 points. The factor is associated with a technology transfer level having a direct impact on innovation activity.

The influence of institutional factors of innovation activity has a relatively low position in the ranking. The inadequacy of a legal framework gained 1.6 points. However, it must be stipulated that the questionnaires for surveys do not take into account both the direct relationship and feedbacks of innovation activity. At the same time, it is obvious that those factors are often the cause of the existence of the previously mentioned obstacles.

Obviously, the insufficient level of competition, the shortage of financial resources and the uncertain demand for innovative products lead to the risk aversion of enterprises to innovate. The shortage of financial resources may result in failure to obtain the result of R&D activity (if, particularly, the resources are not enough to complete the R&D) or risk of locking business in the "low-spec" trap (if the cost of hiring highly qualified personnel is high). Being in the "low-spec" trap, the company cannot obtain the necessary result of R&D or gets it with a significant delay (timing risk). As a result, the company is not able to commercialize the R&D results and produce goods and service of high quality.

The large scale phenomenon of the "low-spec" trap ensures that enterprises and organizations cannot deliver to each other innovation resources of required quantity and quality.

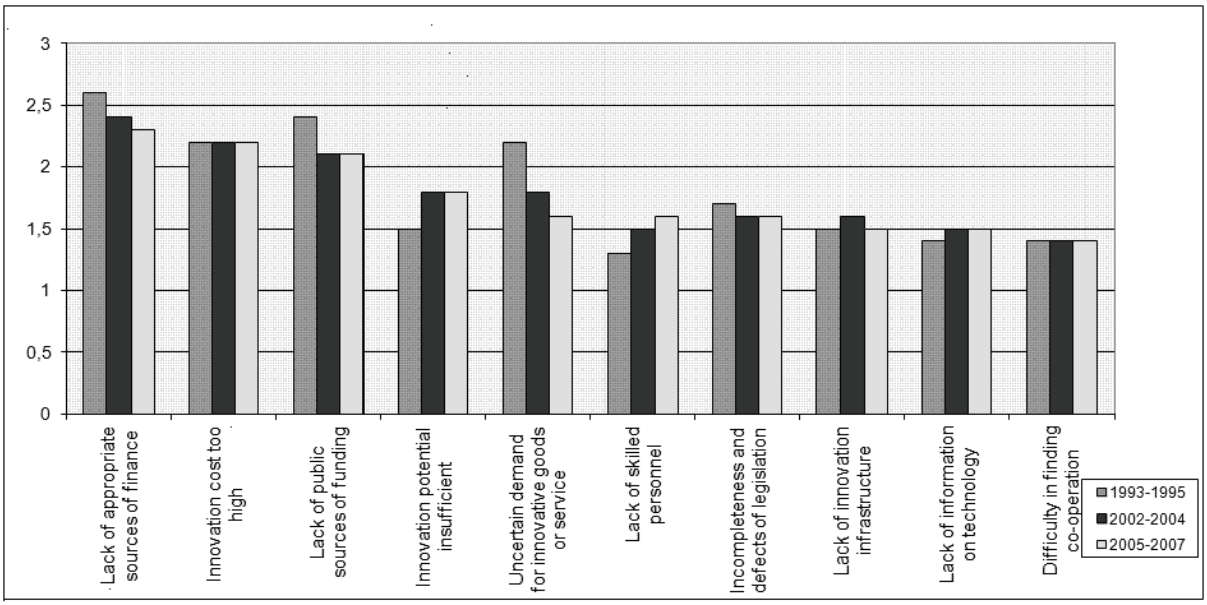


Figure 2: The rating of factors hampering innovation of Russian enterprises

The shortage of skilled staff arises as a consequence of non-compliance of the environment as a source of these resources with the needs of innovation development of enterprises. The non-compliance requires the organization of processes of both knowledge generation and advanced knowledge acquisition. The difficulty in finding co-operation means that a company cannot reduce the risk of innovation by involving in its activity the complementary skills and resources of other organizations. This situation provides in many ways the entrance to the trap of incompetence for the company. It leads to the production of innovative goods and services of low quality and also contributes to decreased knowledge absorption capacity of the company.

6. Map of innovation activity risk and risk factors

There is a distinction between risks as the results of failures or misjudgments and those, which are the results of uncontrollable events (Kogan and Tapiero, 2007, p. 378). The map of risks and risk factors is needed to control the latter and predict the former. The map is a key tool that helps conceive risks in terms of innovation activity factors and illustrate the consequences of inaction. It can help governments and private parties to anticipate and evaluate emerging risks of innovation activity and provide possible responses and incentives to invest in measures to mitigate risks.

The disclosure of the factors hampering innovation activity and their analysis on the basis of statistical information allows one to find out the innovation activity risks generated by action of the factors. On the map the risks linked with certain factors are presented. The risks often arise as a result of factors of different types. Though the key interest of the study is the innovative-specific factors, the most important framework factors are taken into account on the map, as well. On the map, the innovative-specific and framework factors are separated. Taking into account the comments made above and the ratings shown in Figure 2, the map of innovation risks and risk factors is constructed for Russian companies (Figure 3). Therefore, the framework and innovative specific factors which are sources of the risks are displayed on the same plane of the map. The former are marked with a dotted line on the map.

On this map, factors hampering innovation activity are arranged in descending order of their relative importance (Figure 3). The significance of these factors can be established either by the enterprises themselves (as a result of innovation interviews) or a researcher (taking benchmarking indicators). This raises the problem of a consistent ranking of the factors whose evaluation (value) has been obtained by different procedures. Determining the order of the factors in accordance with results of these procedures, the researcher should adhere to the principles of transitivity and antisymmetry of preferences. The former means that if the value of factor A is higher than that of factor B and value of factor B is higher than that of factor C, then the factor A is the highest ranking one. The latter principle

means that if it is found, because of different evaluations, that the value of factor A is higher than that of factor B, and vice versa, then the significance of such factors is the same. The significance of factors in the system is determined on the basis of peer review.

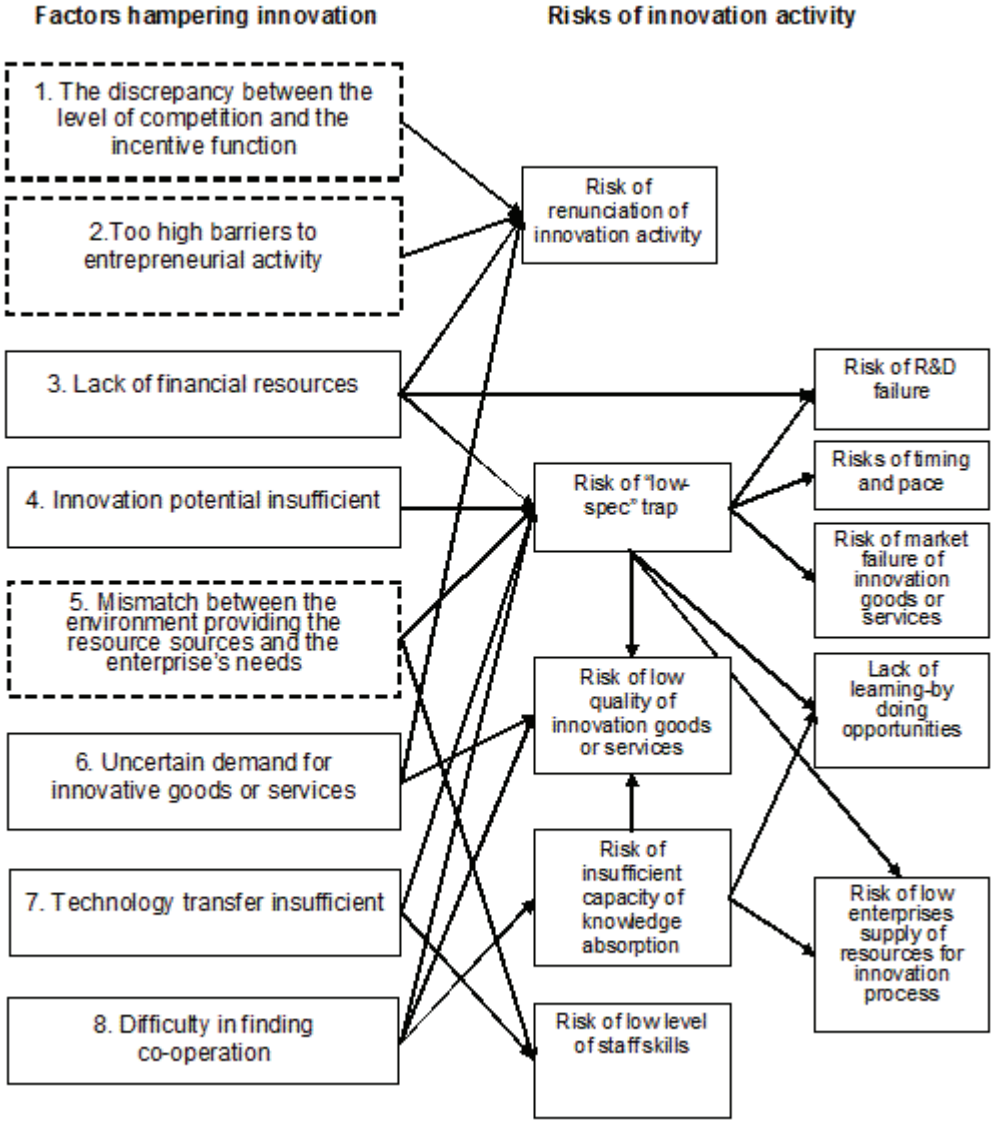


Figure 3: The map of risks and risk factors of innovation activity

7. Conclusions

Thus, the study proposes the approach that allows one to take into account a sufficiently complete set of factors and risks of innovation activity and to obtain their componentwise evaluation based on available statistical data. The system of innovation activity factors suggests that its elements are attached to the components of the innovation process. The subsets of the factors impeding innovation activity are distinguished according to their specificity.

The factors impeding the innovation activity are considered as risk factors for the implementation of this activity. The risk factors are ranked. For this purpose the results of innovation surveys as well as additional statistical information are used. The ranking is made by applying consistent ranking procedures for ordering factors in accordance with principles of transitivity and antisymmetry. It thereby becomes possible to reduce the degree of subjectivity of the interviews conducted in the framework of innovation surveys. The approach allows us to add missing elements to the list of innovation activity factors presented in Oslo Manual (OECD 2005).

As a result of the ranking of risk factors belonging to the above-mentioned system, the map has been constructed. The map contains risks and risk factors and gives an opportunity to determine the links between the factors and the risks posed by them. It also enables us to identify the bottlenecks in the innovation that are associated with the highest risk.

The revealed bottlenecks enable one to define the composition and direction of the required policies of both the state and enterprises and to mitigate innovation risks and increase enterprises tolerance to them. In other words, the map facilitates the formation of policies of the state and enterprises and allows decision makers to put policy measures into a complex system in accordance with emerging risks of innovation activities.

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References

Arrow, K.J. (1965) *Aspects of the Theory of Risk Bearing,* Helsinki: Yrjo Jahnssonis Saatio.

Balabanov, I. (1996) *Risk-Management*, Finances and Statistics, Moscow.

Baldwin, J.R., Hanel, P. (2003) "Innovation and Knowledge Creation" *in an Open Economy,* Cambridge University Press, Cambridge, UK.

Berglund, H. (2007) "Risk Conception and Risk Management in Corporate Innovation: Lessons From Two Swedish Cases International", *Journal of Innovation Management,* Vol. 11, No. 4, pp. 497–513.

Blomkvist, A. (1987) "Psychological aspects of values and risks", *In Risk and Society*, L. Sjöberg (ed.), pp. 89–112. Allen & Unwin, London.

Bower, J. and Clayton, M. C. (1995) "Disruptive Technologies: Catching the Wave", *Harvard Business Review*, January-February, 73 (1), pp 43-53.

Centre Tomorrow's Company (2009) "Tomorrow's Innovation, Risks and Governance", [online], The Department of Business Innovation and Skills, http://www.kpmg.com/RU/ru/WhatWeDo/Special-Interests/Audit-Committee-Institute/Publications/Documents/surveys/Tomorrows-Innovation-Risk-and-Governance.pdf

Chapman, C. and Ward, S. (2003) Project risk management: Processes, techniques and insights. John Wiley & Sons. 2nd edition.

Cooper, D. and Chapman, C. (1987) *Risk analysis for large projects: Models, methods and cases*, Chichester: John Wiley & Sons.

CISt (2006) Community Innovation Statistics, http://www.oecd.org/dataoecd/37/39/37489901.pdf

CIS (2010) Community Innovation Survey, http://innovacion.ricyt.org/files/CIS%202010.pdf

Drucker, Peter F. (1974) *Management. Tasks, Responsibilities, Practices*, Harper & Row, New York.

Edquist, Ch. (2008) "Identification of Policy Problems in Systems of Innovation through Diagnostic Analysis", [online], Centre for Innovation, Research and competence in the Learning Economy, http://www.cas.uio.no/research/0708innovation/Edquist_100608.pdf

European Union, (2010) *Risk Management in the Procurement of Innovation Concepts and Empirical Evidence in the European Union*, Publications Office of the European Union, Luxembourg.

Evans, J.S., Hofstetter, P., Mckone, T.E., Hammitt, J.K. and Lofstedt, R. (2002) "Introduction to special issue on life cycle assessment and risk analysis", *Risk Analysis: An International Journal,* 22.

Golichenko, O.G. (2011) *The Basic Factors for Development of the National Innovation System,* Division of Social Science of Russian Academy of Science, Central Economics and Mathematics Institute of Russian Academy of Science, Nauka, Moscow.

Golichenko, O. and Malkova, A. (2009) "Intensity of Relations Between Business Sector and Major Sectors of Research and Development", *Proceedings of the 9th Russian Symposium Strategic planning and evolution of enterprises,* CEMI RAS, Moscow, Vol.3, pp 52-54.

Higher School of Economics (2009) *Indicators of Innovation Activity 2009*, Statistical Review, Higher School of Economics, National Research University, Moscow.

Higher School of Economics (2011) *Indicators of Innovation Activity 2011*, Statistical Review, Higher School of Economics, National Research University, Moscow.

Hilpert, U. (ed.) (1991) *State Policy and Techno-industrial Innovation*, Routledge, London.

Kleinknecht, A., Mohnen, P. (2002), *Innovation and Firm Performance: Econometric Explorations of Survey Data,* Palgrave, New York, NY.

Kline, S.J. and Rosenberg, N. (1986)*, "An Overview of Innovation", in The Positive Sum Strategy: Harnessing Technology for Economic Growth eds. R. Landau and N. Rosenberg,* National Academies Press, Washington D.C.

Knight, F (1971) *Risk, Uncertainty, and Profit*, University of Chicago Press, Chicago.

MacCrimmon, K. and Wehrung, D. (1986) *Taking Risks: The Management of Uncertainty,* The Free Press, New York.

Kogan, K. and Tapiero, C.S. (2007) *Supply Chain Games: Operations Management and Risk Valuation*, International Series in Operations Research & Management Science, Vol. 113, XII. Springer-Verlag New York, LLC

Mairesse J. and P. Mohnen (2010) “Using Innovation Surveys for Econometric Analysis” In the *Handbook of the Economics of Innovation* Ed. by Bronwyn H. Hall and Nathan Rosenberg Elsevier, pp 1130-1155.
Mann, D. (2006) “On Innovation Timing”, [online], ETRIA TRIZ Future Conference, http://www.triz-journal.com/archives/2006/01/10.pdf
March, J. and Shapira, Z. (1987) “Managerial Perspectives on Risk and Risk Taking”. *Management Science*, 33(11), pp 1404–1418.
Merna, T. and Smith, N. (1996), “Projects Procured by Privately Financed Concession Contracts”, *Asia Law and Practice,* Vols. 1, 2*,* Hong Kong, China.
OECD and Eurostat (2005) *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, 3rd edition, OECD, Paris.
OECD (2008) *Public-Private Partnerships In Pursuit of Risk Sharing and Value for Money*, OECD, Paris.
OECD (2009) *Policy Responses to the Economic Crisis: Investing in Innovation for Long-Term Growth*, OECD, Paris.
OECD (2010) *Ministerial Report On The OECD Innovation Strategy: Fostering Innovation To Strengthen Growth And Address Global And Social Challenges - Key Findings*. OECD, Paris.
OECD (2011) *Science, Technology and Industry Scoreboard.* OECD, Paris.
Pavitt, K. (2006) *“Innovation Processes”*, *in The Oxford Handbook of Innovation* eds. R. R. Nelson, D. C. Mowery and J. Fagerberg, Oxford University Press, Oxford.
Perrow, C. (1984) *Normal accidents: Living with high risk technologies,* Basic Books, New York.
Pratt, J. W. (1964) "Risk Aversion in the Small and in the Large," *Econometrica*, 32, pp 122-136.
Porter, M.E. and Ketels, C.H.M. (2003) *UK Competitiveness: Moving to the Next* Stage, DTI. Economics Paper, No.3.
Roberts, K.H. (1990) “Some characteristics of one type of high reliability organization*”, Organization Science* 1, no. 2: 160-76.
Rogers, E.M. (1962) *Diffusion of Innovations*, Free Press, Glencoe, IL.
Rogers, E.M. (2003) *Diffusion of Innovations*, 5th ed., Free Press, New York.
Sarasvathy, S, H Simon and L Lave (1998) “Perceiving and Managing Business risks: Differences Between Entrepreneurs and Bankers”, *Journal of Economic Behavior and Organisation*, 33(2), pp 207–226.
Shapira, Z. (1986) *Risk in Managerial Decision Making*, Hebrew University.
Shapira, Z. (1995*) Risk Taking: A Managerial Perspective,* Russell Sage, New York.
Short, J.F. and Rosa, E.A. (1998) *“*Organizations, disasters, risk analysis and risk: Historical and contemporary contexts*”*, *Journal of Contingencies and Crisis Managemen*t, 6(2): 93-96.
Spielkamp, A. and Vopel, K. “National Innovation System and Mapping Innovative Clusters at the Firm Level”, [online], Boosting Innovation: The Cluster Approach – OECD Proceedings. http://www.eklaster.org/old/_files/stale/BOOSTINGINNOVATION.PDF
Tushman, M.L. and O’Reilly, Ch.A. (2002) *Winning Through Innovation: A Practical Guide to Leading Organizational Change and Renewal*, Harvard Business School Press. Boston.
Van Beers, C., Kleinknecht, A., Ortt, R., Verburg, R. (2008) *Determinants of Innovative Behaviour. A firm’s Internal Practices and its External Environment*. Palgrave, New York, NY.
Weick, K.E. and Roberts, K.H. (1993) “Collective mind in organizations: Heedful interrelating on flight decks”, *Administrative Science Quarterly* 38, no. 3: 357-81.
World Bank (2010, 2011). “World Development Indicators”, [online], World Bank, http://data.worldbank.org/data-catalog/world-development-indicators

Entrepreneurship and Innovation in Creative and Cultural Industries

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Abstract: Many studies highlight the impact of cultural and creative industries (CCI) on growth and employment, and their great economic, social, cultural and innovative potential. Therefore, CCI' promotion has been included into industrial and economic policies of several countries. Such policies, directed towards the development of regions or cities, have contributed to job creation and growth, and have assisted the local economies. CCI include sub-sectors with different size of enterprises, funding sources and business models. Many CCI enterprises need targeted support for their development and growth, however, innovation policies focus mainly on technology and research intensive ones, and do not consider opportunities for innovation broadly in economy. The paper provides an insight into entrepreneurship and innovation in CCI, and considers some policy challenges in Europe and in Bulgaria towards CCI' support. The main emphasis is on the need to strengthen CCI' entrepreneurship, as this could help enterprises to efficiently carry out their activities and act as a driver of innovation. In addition, the paper considers how entrepreneurship and innovation processes in CCI could be supported, if traditional innovation support mechanisms could facilitate CCI for launching or sustaining businesses and for growth. A special focus is put on funding mechanisms in CCI and the possible role of public financial sources. Generally, appropriate support policies are considered to be necessary to establish an environment that will encourage CCI' development.

Keywords: cultural and creative industries, creativity, innovation, entrepreneurship, policy support

1. Introduction

A systematic overview of the civilization development of Western European countries shows that the economic progress and the wealth of citizens are closely linked to the modern city culture. Cultural and educational institutions like universities, theatres, operas, cinemas, quality television (TV) and film productions were initially developed for prestige, worldly pleasure and influence, however, in the years they succeeded to consolidate around them knowledgeable people and have contributed to the local economy growth – crafts, trade, manufacturing and services (Draganov, 2011).

The European cultural and creative industries represent a significant set of industries. They are the heart of European identity and cultural diversity. The wide impact on public life of audiovisual productions, for example, is considered as a factor for well-functioning of the democratic society. Europe has enormous cultural and creative assets, a wealth of ideas, artists and creative people. However, Europe does not harness this huge potential to the full in order to better serve the economy and society as a whole (EC, 2010b).

Culture, previously seen as a marginal and mainly decorative or prestige expenditure, began to move recently much closer to the centre of policy-making (O'Connor, 2010). Despite the economic down-turn, there are evidences about CCI' growth and impact on local development. In most OECD countries, CCI are one of the most rapidly-developing economic sectors, often several times ahead of the average rates of economic growth (WIPO, 2007). Recent studies highlight the impact of CCI on growth and employment, and their great economic, social, cultural and innovative potential (HKU, 2010). KEA (2009) considers the concept of culture-based creativity and illustrates the potential impact of culture in the development of new products and services, driving technological innovation, stimulating research, communicating values, inspiring people to learn, etc. Subsequently, in many countries the promotion of CCI has been included in industrial and economic policies. Such policies, directed towards the development of regions or cities, have contributed to job creation and growth, and have assisted the local economies. There are evidences that regions with high concentrations of CCI have Europe's highest prosperity levels (Power et al., 2010).

This paper provides an insight in entrepreneurship and innovation potential of CCI, and their complex structure. Looking into European and Bulgarian trends, it considers how to facilitate CCI growth in Bulgaria, as this could help the industry to efficiently carry its activities and act as non-technological

driver of economic growth. The paper considers how entrepreneurship and innovation processes in CCI could be supported, if traditional innovation tools could facilitate CCI for launching or sustaining businesses and for growth. A special focus is put on funding mechanisms in CCI and the possible role of public financial instruments. Generally, appropriate policies are considered to be necessary to establish an environment that will encourage CCI' growth.

2. Understanding cultural and creative industries

2.1 CCI as economic sector

The concept on 'creative industries' has more then 20 years history. The classic understanding of creative industries includes film industry, publishing of books, radio and television, sound-recording, and multimedia. However, presently the concept comprises also architecture, theatre and design (Tomova et al. 2011). In the heart of creative industries are 'cultural industries', e.g. those industries that combine the creation, production and commercialization of creative contents and products which are intangible and cultural in their nature (UIS, 2009). A significant characteristic of CCI is that they are generators of intellectual property (IP), in particular copyrights. Therefore, some studies refer to CCI as 'copyright-based industries' (WIPO, 2007). In research literature and national mappings undertaken to study CCI, different sub-sectors are considered. For example, WIPO (2007) classifies most CCI sub-sectors as 'core industries' protected by copyright (Table 1). The value of this classification is that it shows some links between CCI and other economic activities over the whole value chain - creation, formation, distribution and consumption of the CCI products and services.

Table 1: Types of IP protected industries in Bulgaria, adapted (WIPO, 2007)

Type industry	Definition	Industrial sub-sector
Core industries	those with the highest copyright contribution to the created value added	• press and literature • visual and graphic arts • music • theatre and opera • photography • motion picture and video • radio and television • advertising • software and databases
Interdependent industries	manufacturing and trade of equipment, instruments and products used entirely or mainly in core copyright industries	• Computers • photographic and cinematographic equipment • radio and television devices • paper • blank recording materials
Partial industries	those in which only a part of their activities are related to copyright and neighbouring rights	• apparel, textiles and footwear, furniture • jewellery, artistic arts • toys and games • domestic and home appliances and goods • architecture • activities of museums
Non-dedicated support industries	facilitate distribution and sales of copyright-protected goods and services	• telecommunications, including Internet • transportation • general wholesale and retail

The CCI sector is characterized by a large segmentation and comprises many non-homogenous sub-sectors with different motivations and goals, ways of realising exchange value, ways of managing demand and creativity, and levels of investments and company management. The sector as a whole is dominated by small businesses; however, large enterprises (around 1% of all CCI) make more then 40% of the annual turnover (HKU, 2010). For example, the majority in the crafts sector are micro firms and small and medium enterprises (SMEs), while in the media sector – cinema, radio, and television – high levels of capitalisation and technology are involved. Many areas of CCI still operate on an artisan basis, whereas the creators are self-employed or micro-businesses (O'Connor, 2010). The labour involved in CCI is other specificity: It comprises a large number of self-employed and people working on short-term contracts, whereas full-time employment is mainly in film production, radio and

television. Free-lancers and independent businesses persist at the heart of CCI, and represent a significant part of its overall employment growth.

Many creative industries operate individually as SMEs, but others cooperate in small groups. Some of them are characterised by small-scale production and direct contacts with clients, while by others the production takes place in networks of intermediaries with reproducible, mass products. Grabher (2001) considers that CCI are organised in two types of networks - within the global corporation and within localities. A mapping of CCI undertaken in the UK shows that some sub-sectors (e.g. music, performance, visual art, TV, etc.) are highly networked at local level and are centred on the larger metropolitan areas (Cunningham et al., 2008). These networks (clusters) are considered as an important mode of operation, helping smaller businesses to obtain higher levels of growth. Networking provide several economic benefits to the enterprises involved – pools of common knowledge and skills, flexible human resources, relations of trust and a sense of common goals. In many places, SMEs within CCI are embedded in local economy and take advantage of the shared local tacit knowledge (O'Connor, 2010).

With the uptake of the digital economy, and especially the web opportunities, the traditional production chain has changed, and many CCI enterprises bypass intermediaries and establish direct user-producer linkages (HKU, 2010). They need a direct contact to consumers in order to better monitor market trends, demand, and consumers' feedback, as well as to react faster to changing needs and market volatility.

In most CCI many authors are engaged in the development of the final product. For example, the film industry has a number of entities within the value chain – production, distribution, promotion and film-show, including also the storage for future use. The very complex products of the film industry, and the involvement in the consumption process of other industries such as theatre, TV, advertisement, music industry, etc. require heavy investments and a number of creative resources (Tomova et al., 2011).

The models of realising exchange value in CCI comprise (O'Connor, 2010):

- Selling to individuals cultural content– books, records, videos, games, etc.
- broadcasting television and radio programmes to mass audiences – free of charge, or under some taxes, but generally using advertising and sponsorship as main funding sources
- Restricted viewing at public performances (music, theatre, cinema) - depended on admission fees.

2.2 Entrepreneurship and innovation in CCI

The concepts of cultural entrepreneurship and innovation have gained attention in last decade. Creativity has been promoted recently as a tool for innovation and economic growth, thus, some researchers doubt if entrepreneurship means in CCI 'to have creative ideas and pursue them in a commercial way in order to make profit' and if 'the human capital is the defining factor in the growth of the creative sector' (HKU, 2010, KEA, 2009, O'Connor, 2010). Actually, the main productivity factors in CCI are the individual creativity, skills and talent, in the context of possible reproduction and IP protection of the unique cultural contribution. There are evidences that in addition to creativity, human capital in CCI requires entrepreneurial attitude, ingenuity and motivation (UNIDO, 2010). In order to be successful, a creative entrepreneur must not only understand and apply the arts, but also possess technology and business skills as CCI operate like normal businesses - planning, organizing, operating, and assuming the risk of a business venture.

The entrepreneurship dimension could be seen also in CCI growth trends. Many CCI started as small business and have been growing into large and successful businesses. Similarly to other enterprises, CCI aim at profits, explore market opportunities, undertake risk, face the uncertainties of the market and the users' demand. However, they have a specific public and cultural mission. CCI need to balance between creative and management values, and often this is behind a tension between individual creators aiming at cultural value and entrepreneurs aiming at economic exploitation of creativity outputs (HKU, 2010). Actually, high-quality cultural products often are not well understood

and appreciated by mass audience, which aims at entertainment and pays less attention to the cultural value and content. Thus, large CCI often focus on higher profits and target mass audience demands rather then those of a cultural elite. In fact, the market for cultural products is characterized by a high volatility and unpredictability of demand and audience response. The limited European markets (due to language diversity) raise other challenges for CCI, especially for those in smaller countries. They face with a difficult business model due to the higher investment risks and lack of national funding and support. At the same time, the dependency of CCI on intangible assets, which are difficult to measure and are not included in companies' balance sheets, creates great difficulties to access finance, especially for small businesses, as banks often do not recognise the economic value of intangibles (HKU, 2010).

Looking at the innovation dimensions of CCI, they create and propose to the market specific goods – new cultural products or services, which are considered as non-technical innovation. Potts (2009) considers that 'the creative industries are by definition involved in the process of new value creation, because their business opportunities and value-added derives from the very existence of novelty and innovation in other sectors – to which they provide various innovation services – many of which are business-to-business, rather than direct to consumer markets'. Since CCI operate in fast moving and often fashion oriented markets, continual innovation and creativity is core to their competitive advantage. Therefore, these industries are significant generators of IP, in particular copyrights. However, many of the types of knowledge, goods and services produced by CCI cannot be protected by patents, and do not fall under the standard innovation metrics (Power, 2010).

In fact, CCI follow all phases of innovation considered in literature – knowledge (idea) generation, technology (product) development and market exploitation. For example, Potts (2009) considers a model of CCI over the whole innovation trajectory: starting by origination, going through adoption and retention phases. The specificity is that most CCI are not research and technology intensive firms, except some larger ones. Their major contributions are to 'service innovations' and 'soft innovations'. The intellectual capital-based model of Galabova et al. (2011) fully coincides with the way CCI use creativity and intangibles, deploy human capital (HC), structural capital (SC) and relationship capital (RC) for realising cultural and market values (Figure 1).

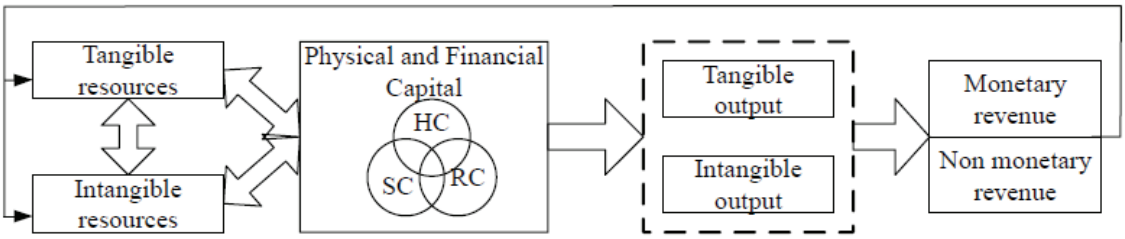


Figure 1: IC-based value-creation model (Galabova et al., 2011)

New technologies changed the perception for CCI, giving opportunities for mass production and distribution of art goods and services over the converging media, preservation of cultural heritage and fostering culture. As main technology enablers could be pointed out (Zwass, 2010):

- broadly accessible means of production;
- means of coordination of effort provided by the Web;
- broadly dispersed means of aggregation of digital products;
- Global means of distribution of digital products, encompassing sourcing and mass access.

Looking at historical trends in CCI, it could be seen how they adopted step-by-step technological innovations and changed their products. For example, the delivery of books, audio and video products changed significantly with the development of new digital devices and the Internet. Today, books traditionally delivered on paper could be accessed on a computer or a mobile device. Similarly, video products are webcasted, distributed on different digital media, not just shown on TV or in cinemas. Another example is architecture which adopts new materials and construction elements for designing energy-efficient buildings, whereas designers are meeting the demands for quality, comfortable healthy-built environments.

Finally, it could be stressed that there is a continuous 'knowledge spiral' in CCI – they are learning and taking advantage of changes in economy, technology and society for generating new ideas and knowledge and turning them into new products or services offered on the market.

2.3 Taking advantage of new technologies in CCI

New technologies provide many opportunities for using not only the creativity of the CCI participants, but also to take advantage of the creativity of the 'crowd'. Presently, the collective intelligence is applied in new products development, and in forecasting and decision-making processes taking advantage of the variety of mind models, knowledge and ideas (Gourova wt al., 2011). Creative expressions are the heart of the digital economy in which millions of people exchange digital files, invent new forms of social relations and modes of expression that are interactive and participative. The Internet has become a new place for 'creators' to share their visions and ideas, and seek social recognition, independently of traditional production and distribution channels. Co-creation facilitated by new technologies could help CCI to overcome market unpredictability and take advantage of 'the wisdom of the crowd' at all innovation phases, e.g. idea generation, content/product development, validation/testing, exploitation/promotion. A number of CCI' activities could be completed in autonomous and sponsored co-creation communities facilitated by social media (Table 2).

Table 2: Co-creation activities, adapted (Zwass, 2010)

Autonomous Co-Creation	
Production of Procedural Content	development of open source software
Production of Declarative Content	• Knowledge compendia (Wikipedia) • Consumer reviews • Multimedia content (YouTube) • Blogs • Mashups • Virtual worlds (Second Life)
Development of Social Capital / Relationship Value	using the relationships among social networks' members of (e.g. Facebook, MySpace, LinkedIn, etc.)
Word-of-Mouth Promotion (WOM)	using all informal communications directed at other consumers about characteristics of particular good and services and their sellers
Collective Sense-Making	Annotation by consumers and the bottom-up taxonomy emerging from the labelling of items
Collective Sentiment Expression	interpersonal expression on the Web (using social networks, blogs, consumer feedback, etc.)
Sponsored Co-Creation	
Ideation and Idea Evaluation	involvement of consumers to generate new product ideas, and help to assess new products
Product Co-Design	involvement of users in product design
Product Testing	testing of products by potential users
Product Promotion	organizing eWOM marketing programs
Consumer Self-Revelation	uploading self-description, lifestyle documents, and photos to corporate websites
Consumer-Side Customer Service	responding to questions and resolving use-oriented issues for other users

CCI are still not ready to take advantage of web technologies. A recent study (CULTUREMAP, 2010) analyzed existing websites in Europe used for exchange of information and debate on culture, artistic expression, etc. The results show that 'Information provision' (news, events, documents, downloads etc.) is dominating, and interactive features are only offered by few websites. Web 2.0 tools (e.g. 'Forum', 'Blog', 'Chat' and 'Wiki') allowing users to interact with each other exist only in few websites. 'Online media', followed by 'Film' and 'Music' are among the sectors providing such functionalities, whereas 'Museums/archives', 'Cultural policy' and 'Cultural science' are lagging behind. More then half of the cultural websites studied do not yet provide sophisticated forms of interactivity or options for users to actively contribute to the information on a website.

3. Challenges for CCI environment in Europe

3.1 Facilitating CCI growth in Europe

Despite their specificity, CCI encompass enterprises which need targeted support for their development and growth like other enterprises from high-tech industries. It is acknowledged that the entrepreneurial performance could be fostered by targeted measures linked to: access to capital, technology and R&D, entrepreneurial capabilities, market conditions, regulatory framework and an entrepreneurial culture (HKU, 2010). Generally, appropriate support policies and coherent industrial, cultural and trade policies are necessary to establish an environment that will encourage the development of CCI.

In fact, many European countries already considered CCI as a priority of their economic policy. Several policies and strategies on CCI have been recently developed (e.g. UK, Germany, Denmark, Estonia, Finland, etc.). This has contributed to economic growth not only in countries with traditions in the sector, but also in countries with much smaller national markets, however, with targeted programmes for CCI development (Tomova et al. 2011; UNESCO, 2010).

It is generally accepted that the economic development of CCI depends on the availability of funding and support systems that respond to their needs. Synergy between financial and creative inputs along the value chain (development, production to distribution and marketing) determines success or failure in creative industries (Cunningham et al., 2008). The lack of financing is impeding the growth of the sector, even in developed economies. The capital required for the development and implementation of promising ideas is frequently lacking. Creative businesses get sometimes funding from sources like personal investments, grants for promoting creativity or for business start ups, private R&D spending, tax deductions, loans, etc (UNIDO, 2010).

- In the UK, for example, creative services industries (design, architecture, advertisement) are mostly self-financed, whereas creative experience providers (art, visual arts, music) are subsidised. A medium position takes the audiovisual sector where public subsidies are mixed with self-funding opportunities.

- An Austrian report considers the promotion of creative clusters and observes that their future depends on: the supply of ‘creative products’; marketing, together with tourism; regional development; innovative inspiration and transfer of know-how (IKM, 2003).

- In London, a ten-year action plan supports CCI, including funding to facilitate business growth and provide venture capital. Ten creative hubs in London provide flexible workspace, training, mentoring, exhibition, showcasing, marketing and networking facilities, and services like creative property advice; legal support for IPR; marketing for the attraction of investment; etc.

Structural Funds have a particular role for CCI – for preserving national heritage, building cultural infrastructure (theatres, museums), increasing the visibility of culture and the attractiveness of local centres or regions. The main priorities set by the European Commission (EC) in Operational Programmes focus on raising the regional competitiveness, employment and social cohesion, and balanced territorial development. CCI activities are funded if linked to protection and preservation of national cultural heritage or raising the regional attractiveness, rural and cultural tourism development. There are evidences that many EU countries (Greece, Portugal, Italy, France, etc.) have explored the funding opportunities for cultural infrastructure and preserving national heritage, as well as developing cultural sites attractive for tourism. Except the revitalisation of the cultural sector, the funding contributed also to higher employment and in some places to higher growth of many creative companies (CSES, 2010).

In last decades the development and stimulation of CCI in Europe became one of the EU priorities. Following the recent Europe 2020 strategy, the European Commission (EC) faces a challenge how to promote CCI and how to harness culture and creativity for innovation and growth. In order to move forward, there is a need first to understand creativity as a driver of innovation and then to look for the contribution of innovation in CCI to smart growth, entrepreneurship, employment and wellbeing.

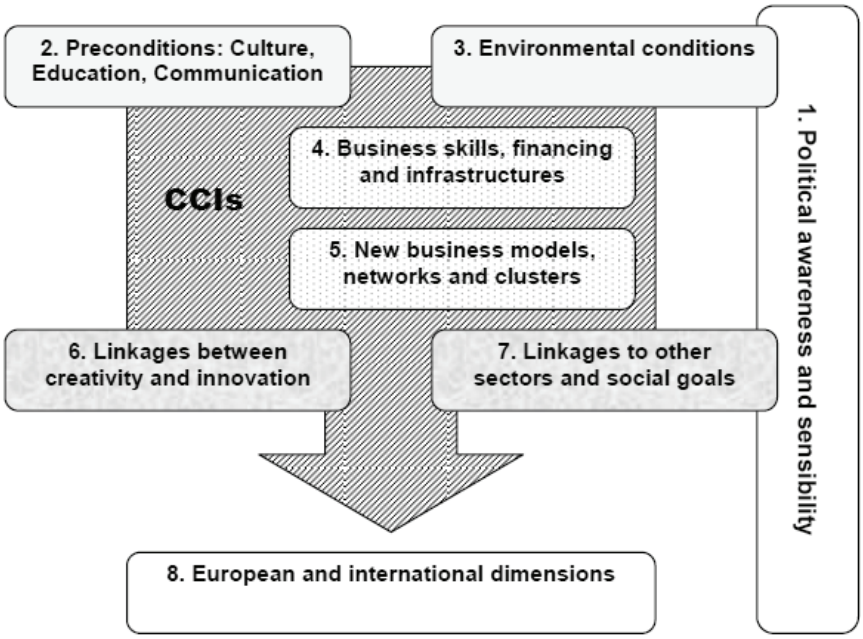


Figure 2: Basic framework for policy actions at EU level (EC, 2010a)

An EC working group considered specific action areas (Figure 2) in which the EU can play a key role, and examined some good practices at national level related to them (EC, 2010a). On this base, EC stressed the need 'to help CCI develop in their local and regional environment', and 'to move towards a creative economy by catalyzing the spill-over effects of CCI on a wide range of economic and social contexts', and considered some enablers for CCI uptake (EC, 2010b):

- New spaces for experimentation, innovation and entrepreneurship in the cultural and creative sector;
- Better matching the skills needs of CCI;
- Access to funding.

Most EU funding programmes, unfortunately, do not consider culture as an important economic sector with potential for growth. Culture is not linked to innovation, and not integrated under the heading improving knowledge and innovation for growth. The Competitiveness and Innovation Framework Programme focus generally on facilitating SMEs competitiveness and growth, however, similar to the Seventh Framework programme for RTD, does not explicitly consider CCI as priority. There is obvious a need to reassess the position of CCI not only in economic policy, but also in research and innovation policy and funding mechanisms.

4. CCI in Bulgaria

4.1 CCI growth potential in Bulgaria

The CCI industry in Bulgaria comprises state and private organizations, the latter dominated by micro enterprises. The state organizations are mainly in the area of theatre, opera, and museums, whereas the sub-sectors of advertisement, art, design, and architecture are characterized by private enterprises. The audiovisual sector is dominated by private organizations, among them state-owned National Television and National Radio. An important characteristic of the CCI in Bulgaria (similar to other countries) is the prevalence of highly-qualified employees (more then 50% with university degrees).

The first comprehensive survey of the contribution of Bulgarian IP protected industries to the national economy provides a short overview of the CCI in Bulgaria (WIPO, 2007). It is interesting to note that the CCI sector is rapidly developing and in the period 2003-2005 has achieved much higher growth rate of its gross value added (derived from the current price index) exceeding the growth rates of the economy as a whole. The highest growth (almost triple) was experienced by motion picture and video.

In addition, the sector was characterized by higher employment growth for that period (12.3%) compared to the country average (3.5%). The highest employment growth, however, is achieved by software and databases, followed by advertisement services (WIPO, 2007).

Some important trends in Bulgaria, shown in WIPO (2007), are the constant growth since 1997 of TV and radio stations and programming hours, of film productions and book titles published. The state subsidies provided after 2003 by the National Film Centre Executive Agency have essentially contributed to the film production increase. A serious problem is the constant decrease of cinemas, and thus, the distribution opportunities for film productions (Draganov, 2011). Another interesting fact is that the survey shows a big concentration of CCI in the capital city – Sofia. Actually, 77% of the companies and 81,15% of all employees in Bulgarian film industry are concentrated in Sofia, and their numbers continue to grow (Tomova et al., 2011).

Taking into account the significance of the CCI sector in Europe, and its big concentration in Sofia, the Economic and Cultural Observatory in Bulgaria in collaboration with the municipality launched a mapping of CCI in Sofia. The objective was to analyze the available cultural resources and stimulate their more effective management, and to estimate the impact of CCI on city development and growth (Tomova et al. 2011). For the purposes of the mapping, the CCI sector was divided into 3 sub-sectors and 13 fields:

- Art and heritage – including Visual art, Scenic art, Art and crafts, Cultural heritage;
- Cultural industries – comprising Music, Publishing, Printed media, Film industry, Radio, TV and new media, Software and games;
- Creative industries - Design, Architecture, Advertisement.

Despite the recent financial crises, the CCI in Bulgaria continue to grow, both in terms of jobs creation, number of enterprises and economic outputs. For example, the film and TV production employees growth in 2009 accounts for 37,49%, and almost 200 new enterprises were established (Tomova et al. 2011). It is important to note that the film industry provides not only a cultural impact, but has also an economic one – it has shown a potential to multiply the state subsidy received – by generating higher employment and increasing added-value.

4.2 Challenges for CCI in Bulgaria

During the transition to a market economy in Bulgaria the CCI have developed in an environment of uncertainty, lack of sufficient regulation and rules enforcement. The lack of long-term policy vision and strategy in the last 20 years had a negative impact on public sectors like education, science and culture, surviving without finance and policy support. These sectors were abandoned and left in the periphery of public life without taking into account their impact on economy, democracy, building ethical and cultural values and facilitating civilised social relations. The negative consequences reflected on building a new generation of young people with not sufficient educational and cultural level, and wrong value system based on striving for money and luxury, and lack of ethics (Draganov, 2011). An important challenge for further uptake of CCI in Bulgaria is building an audience demanding for high-quality cultural products. However, this requires a targeted education from an early age, as well as changes in the social environment.

The privatisation of film production bases and cinemas resulted in decreasing of Bulgarian film production, and especially, its dissemination to the mass audience. In fact, the monopoly in ownership of cinemas and film distribution channels created a gap for viewing Bulgarian own film production. On the contrary, the mass products offered included movie with doubtfully cultural and educational quality, targeted at mass audience for entertainment. The audiovisual legislation could correct this problem setting specific requirements for broadcasting of a certain quota of national film production (Draganov, 2011; Tomova et al. 2011).

While a lot of legislative acts are in place (regulating broadcasting, copyright and trademarks protection, etc.) providing a legal environment for CCI, the funding and support mechanisms are not sufficiently developed. The share of GDP for CCI is very small compared to other EU countries, and does not support the development of the sector. At the same time, the public funds available under the Structural Funds or other national programmes focused on innovation and SMEs are not targeted at CCI. Another opportunity, not sufficiently explored, is linked to facilitating public private partnership

(PPP) in CCI, networking and collaboration between the CCI sub-sectors. PPP could be explored to harness CCI potential to contribute to regional development – taking advantage of national heritage, history and traditions and the opportunities for cultural tourism.

The good practices in other European countries for CCI need to be explored in order to overcome the gaps in legislation, funding mechanisms and seed capital availability, support for building start-ups, lack of management skills in SMEs and microenterprises limiting their growth potential, etc.

5. Conclusion

A lot of research is still needed to understand better CCI – their knowledge requirements, working methods, business and organisational models and consumer interfaces that define competitiveness. It is essential to look also at the micro-level, in order to understand how knowledge is created and used in CCI, how different players are related in the innovation ecosystem, which are the knowledge flows and innovation (creativity) patterns, business processes and models, and environmental factors like organizational culture and management style, technology usage, skills shortages, etc.

In order to provide the necessary background for strategic planning and to monitor and control future CCI strategies, it is important to integrate in the process suitable key performance indicators. The development of innovation indicators for CCI should look at different levels – national, sectoral and micro-level. Recently, several indicators were developed for monitoring national performances in CCI – by UNESCO (UIS, 2009), INNO-Metrics (Hollanders et al., 2009), Eurobarometer, European audiovisual observatory, etc. At national level the focus on CCI has also lead to development of frameworks for monitoring industrial performance (e.g. in UK, Australia, New Zealand, Hong Kong, etc.), and several mapping exercises were undertaken in order to understand better CCI composition, model of work and contribution to local, regional or national economy (O'Connor, 2010). On this base, the informed policy-makers could consider possible intervention and support for CCI.

Last, but not least, an important challenge is to consider how entrepreneurship and innovation processes in CCI could be supported, and if traditional innovation support mechanisms could facilitate CCI for launching or sustaining businesses and for growth. A special focus is needed on funding mechanisms in CCI in order to facilitate their growth potential.

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References

CSES (2010), *Study on the Contribution of Culture to Local and Regional Development - Evidence from the Structural Funds*, [online], Centre for Strategy & Evaluation Services http://ec.europa.eu/culture/documents/final_report_sf_en.pdf.

CULTUREMAP (2010), *Mapping and evaluating existing platforms (websites) within the cultural sectoraimed at stimulating debate and cross-border exchange of matters concerning European culture*, [online], http://culturemap.net/documents/CULTUREMAP_summary_brochure_FINAL_2010_03_23.pdf

Cunningham, S., Higgs, P. (2008) Creative industries mapping: where have we come from and where are we going?, *Creative Industries Journal*, Viol.1, No.1, pp.7-30.

Draganov, I. (2011) 'Not only a point of view', *Journal Kino*, No.3, [online], http://www.filmmakersbg.org/kino-issue3-2011-Draganov-bg.htm (in Bulgarian).

EC (2010a) *Final Report,* [online], European Commission, OMC – Expert Working Group on maximising the potential of Cultural and Creative Industries, in particular that of SMEs, http://ec.europa.eu/culture/our-policy-development/doc/library/EU_OMC_WG_CCI_Final_Report_June_2010.pdf.

EC (2010b), *Green Paper Unlocking the potential of cultural and creative industries*, COM(2010) 183 final.

Galabova, L., G.Ahonen, Is intellectual capital-based strategy market-based or resource-based?, *Journal of Human Resource Costing & Accounting*, Vol. 15 No. 4, 2011, pp. 313-327

Gourova, E., Toteva, K. (2011) Raising creativity and participation in innovation and knowledge management activities, *17th International conference on Concurent Enterprising ICE 2011*, 20-22 June, Aachen, pp.221-234.

Grabher, G. (2001) 'Ecologies of creativity: the Village, the Group, and the heterarchic organisation of the British advertising industry', *Environment and Planning A*, Vol.33, No.2, pp.351-374.

HKU (2010), *The Entrepreneurial Dimension of the Cultural and Creative Industries*, Hogeschool vor de Kunsten Utrecht, Utrecht. ISBN/EAN: 978-90-817243-1-9.

Hollanders, H., van Cruysen, A. (2009) *Design, Creativity and Innovation: A Scoreboard Approach,* [online], http://ec.europa.eu/education/lifelong-learning-policy/doc/creativity/report/design.pdf

IKM (2003) *Erster Österreichischer Kreativwirtschafts-bericht*, [online], KMU Forschung Austria (Austrian Institute for SME Research), http://www.cis.at/de/service-und-forderungen/studien/kws1.
KEA (2009) The impact of culture on creativity, [online], European Commission, http://ec.europa.eu/culture/key-documents/doc/study_impact_cult_creativity_06_09.pdf.
O'Connor, J. (2010) The cultural and creative industries : a literature review, 2nd Edition*, Creativity, Culture and Education Series*, pp.1-105.
Potts, J. (2009) Introduction Creative industries & Innovation policy, *Innovation: management, policy & practice* No.11. pp.138–147.
Power, D., Nielsén, T. (2010), Priority Sector Report: Creative and Cultural Industries, [online], Europe Innova, http://www.europe-innova.eu/c/document_library/get_file?folderId=18090&name=DLFE-7407.pdf.
Tomova, B., Andreeva, D. (2011) Bulgarian film industry – economic growth engine, *Journal Kino*, No.4/5, [online], http://www.filmmakersbg.org/kino-issue4-5-2011-Observatory-bg.htm (in Bulgarian).
UIS (2009), *The 2009 UNESCO framework for cultural statistics*, [online], UNESCO, http://unesdoc.unesco.org/images/0019/001910/191061e.pdf
UNESCO (2010), *Towards a UNESCO Suite of indicators on Culture and Development (2009-2010), Literature review*.
UNIDO (2010), *Creative Industries and Micro & Small Scale Enterprise Development*, [online], http://www.unido.org/fileadmin/user_media/Publications/Pub_free/69264_creative_industries.pdf.
WIPO (2007), The Economic Contribution of Copyright-Based Industries in Bulgaria, [online], http://ec.europa.eu/culture/our-policy-development/doc/bg_econo_contribution_industries.pdf.
Zwass, V. (2010) Co-Creation: Toward a Taxonomy and an Integrated Research Perspective, *International Journal of Electronic Commerce*, Vol. 15, No. 1, 2010, pp. 11–48.

Could the Leadership Range of the Entrepreneur Help the Small Firm's Innovation Performance Through the Employees' Organizational Commitment?: Empirical Evidence and Gaps From the Literature

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Abstract: In an effort to bring the innovation capabilities of the firm from the individual innovativeness of the entrepreneur to the collective knowledge synergy of the organization, this research aims at understanding how the leadership range of the entrepreneur may foster the employees' commitment and their contribution in knowledge to the innovation process. Most of the time, entrepreneurs are involved in small firms where they rely on their own abilities to innovate. Although, research has shown that the involvement of non-managerial employees contributed to the innovation performance of the firm, such involvement remains underused in most small firms. Indeed, small firms seldom use human resource practices that can contribute to organizational innovativeness for they are small in size and limited in resources. In general, their human resource practices are informal and strongly tied to the entrepreneur's leadership. Past research has shown that leadership influenced the organizational commitment of employees, which in turn, influenced the innovation performance of the organisation. Some suggest that transformational leadership informally sustain human resource practices such as psychological empowerment and managerial coaching that are known to support the organizational commitment of the employees. Such co-location of right and knowledge at the employees' site could then contribute to their participation in the innovation process. Because of the lack of formal human resources practices in small firms, it becomes pertinent to look at the entrepreneur's leadership in order to foster the involvement of employees in the process of innovation. Based on the review of empirical evidence and the identification of knowledge gaps, a model is proposed on the role of transformational leadership to sustain psychological empowerment and managerial coaching in order to foster employees' affective commitment in the innovation performance of the firm. Future research is intended, based on structural equation modelling of the theoretical propositions.

Keywords: innovation performance, organizational commitment, leadership, psychological empowerment, managerial coaching, small firm

1. Challenges for the small firms' innovation performance

Entrepreneurs innovate as they create and bring new value to the market. However, it becomes important for those involved in continuously changing environments, typical of the knowledge economy, to maintain their innovation performance. Innovation, defined asthe recombining of knowledge (Callon 1995), allows for the renewal of the firm's offer and contributes to their distinction in a turbulent environment. In other words, the ability to innovate determines in large part the competitiveness of the firm for this dynamic capability becomes a valuable intangible advantage within the knowledge economy (Eisenhardt and Martin 2000).

Most of the time, however, entrepreneurs are involved in small firms where they rely on their own abilities to innovate (Andries and Czarnitzki 2011). In fact, Industry Canada (2008) reports that 98% of the Canadian businesses employ less than 100 employees. A similar landscape is observed in Europe as well as in Australia (Barrett and Mayson 2007). Still, scholars have questioned such dependence on one's sole ideas because it may jeopardize the organization's innovation performance if the entrepreneur lacks ideas or when these are not confronted to others to evaluate their fitness to the market needs (Klaas*et al.* 2010). It would thus be of interest for the entrepreneur to explore and exploit ideas beyond oneself and to enable the contribution of the organization's members to the collective pool of ideas at the basis of the innovation process. Indeed, research has shown that the involvement of non-managerial employees contributed to the innovation performance of the firm, during process innovation especially (Andries and Czarnitzki 2011).

Yet, the involvement of non-managerial employees in the innovation process remains underused in most small firms (De Winne and Sels 2005). Some entrepreneurs may overlook the potential of their employees' ideas while being focused on their own personal ideas to seize opportunities. But the main problem resides in that small firms seldom use human resource practices that can contribute to

organizational performance such as innovativeness (Andries and Czarnitzki 2011). Small firms find it difficult to adopt human capital programs since they are small in size and limited in resources. In general, a formal function of human resource gets set only when the firm reaches a hundred of employees (St-Onge*et al.* 2009).As a result, small firms depend on the entrepreneur's knowledge and personal skills to manage the activities and the competences of their employees (Paradas 2007). Human resource practices in small firms tend to remain informal and strongly tied to the entrepreneur's leadership.

Past research has shown that leadership influenced the organizational commitment of the employees (Korek*et al.* 2010), which in turn, has been positively linked to innovative behaviours on the part of the employees (Ng *et al.* 2010) and to innovation performance of the organization (Andries and Czarnitzki 2011). More specifically, it appears that transformational leadership plays an important role in the development of an affective commitment towards the organization (Saint-Michel and Wielhorski 2011) while it is such an affective commitment that mainly stimulates employees in adopting innovation-related behaviours (Ng *et al.* 2010).

Because of the lack of formal human resource practices in small firms and because of the central role of the entrepreneur's leadership, this research aims at understanding how the leadership range of the entrepreneur may foster the employees' commitment and the contribution of their knowledge to the innovation process. This better understanding could help in bringing the innovation capabilities of the firm from the individual innovativeness of the entrepreneur to the collective knowledge synergy of the organization. Leadership as a means to encourage the employees' participation in the innovation process could also be of major importance for small firms where more formal human resource practices seldom exist.

The following sections present the conceptual stage of this research. The concepts of leadership and of organizational commitment are explained. Informal human resource practices relating to leadership are examined for they could support organizational commitment. A model is then proposed that suggests the use of transformational leadership and related informal human resource practices to foster employees' organizational commitment, and to support the innovation performance of the firm. This conceptual paper concludes on future research that could validate the model based on stuctural equation modelling of the theoretical propositions.

2. Leadership of the entrepreneur

Leadership refers to the ability of an individual to influence, motivate and mobilize others in a lasting manner for them to contribute to the group or to the organization efficacy (Bass and Avolio 1994). Hence a leader is here defined as someone who is capable of guiding, influencing and inspiring others.

Bass (1985) suggested that a same leader could adopt behaviours of transactional and transformational leadership along a continuum described as the range of leadership. Transactional leadership is characterized by daily exchanges being necessary between the leader and the followers in order to reach the desired results, The transactional leader provides his followers with contingent rewards in exchange for the objectives being set through role clarification (Bass and Avolio 1994). As a result, transactional leadership applies to exchanges of economic nature, trying to achieve accrued performances (Bass 1985). Indeed, Tremblay *et al.* (2005) report a positive relationship between transactional leadership (through its contingent reward dimension), and in-role performance. According to Bass and Avolio (1994), however, transactional leadership may be better suited for stable environments but not as efficient in managing organizations confronted to dynamic environments.

Transformational leadership, on the other hand, reaches beyond the daily performance since the leader tries to transform a vision into reality (Bass and Avolio 1994). The transformational leader enables the members of the organization to become more conscious of their important contribution. Such a leader helps the followers in expanding their horizon beyond their personal interests in order to achieve the mission of the organization. Four characteristics refer to the transformational leader: a) the leader has an idealized influence causing employees to emotionally identify to their leader, to see him as a model able to concretise a captivating vision that surpasses the actual reality; b) the leader is a source of inspirational motivation as he brings employees to adhere to the organizational objectives as being a meaningful cause; c) the leader stimulates intellectually his collaborators in

order to develop their conceptualization competences, with praises for being creative, innovative, and for questioning their own practices; d) the leader cultivates an individualized consideration of each employee as he offers individual support and advice through coaching or mentoring (Bass and Avolio 1994). As a result, transformational leadership may become a powerful tool for the leader to augment the employees' satisfaction, commitment, trust, and to motivate them in out-of-role performance such as innovation (Koreke*t al*. 2010).

3. Organizational commitment of the employees

As introduced previously, organizational commitment refers to strengths that link an individual to a specific line of conduct in order to achieve an objective (Vandenberghe*et al.* 2009). Because of a certain set of attitudes, the person develops a psychological state that may orient his behaviours in a positive manner towards his organization (Meyer *et al.*, 2002), his group and immediate superior (Ben Mansour *et al.*2009), or the customer service (Elmadag*et al.* 2008). For the purpose of this paper, only the organizational commitment of the employees is being examined for it encompasses beneficial effects on the personnel retention, the productivity and the organizational performance (Fabi*et al*. 2010; Paul and Anantharaman 2003).

According to Meyer *et al.* (2002), organizational commitment includes three main forms. First, the affective commitment concerns an unconditional commitment of the individual for the organization's business. The employee responds positively to the organization's requests and deploys all the required efforts for he gains great satisfaction in fulfilling the objectives of an organization to which he is emotionally attached. The individual bears the interests of the organization in his decisions and actions (Vandenberghe, *et al.* 2009). Second, the normative commitment refers to the moral obligation that an individual feels towards his organization. Once again, the employee responds positively to the organization's request, but in this case, it is because he may feel a heavy moral dissatisfaction if he does not do so. Normative commitment is based on a set of normative pressures that are interiorized by the individual, and that bring him to commit to the organization's business because of moral duties (Vandenberghe*et al.* 2009). Third, the calculated commitment of an individual is based on his evaluation of the relative risks or costs related to not committing to the organization's business. The employee prefers to remain in the organization to avoid greater perceived losses or risks if he were to leave. Organizational commitment becomes instrumental as the individual will responds to the organization's request with the minimum effort required (Vandenberghe *et al.*2009).

Affective commitment is regarded as the preferred kind of organizational commitment for it exerts the most impact on the organizational functioning compared to the normative and the calculated commitments and may better explain the improvement in the employees' performance and that of the organizations (Fabi*et al*., 2010; Paul et Anantharaman, 2003). In fact, the affective commitment refers to a subjective attachment of the employee for the organization, to his identification with the organization, to the sharing of its values. Affective commitment represents a strong prediction of several behaviours (on the part of the employee) that are favourable to the organization. It corresponds to an accrued will from the employees to achieve their prescribed tasks but also to do more and beyond their tasks (Meyer et al. 2002).

3.1 Mobilizing levers: Competence development and empowerment

According to Fabi*et al.* (2010), human resource practices related to the development of the employees' competences and their empowerment represent important levers to mobilize the personnel, to build up their satisfaction and their commitment. Indeed, both competence development and empowerment augment the autonomy of the employees, nourish their feeling of being supported by their organization, and enhance their feeling of an equitable treatment. As a result, competence development and empowerment raise the employees' will to actively commit towards their organization (Malhotra*et al*. 2007).

The development of competences corresponds to learning activities, formal or informal, that aim at improving the employees' competences (St-Onge *et al.* 2009). Formal activities include the training of the employees, generally targeting technical and interpersonal skills required to accomplish their tasks (Paul and Anantharaman 2003). Informal activities, on the other hand, involve coaching activities, at the executive or at the managerial levels (Agarwal*et al.* 2009). At the executive level, coaching aims at developing specific skills of a manager with the help of an external consultant or that

of a higher-ranking manager. Managerial coaching, otherwise, focuses on the improvement of the employee's performance and takes place during the daily relationships between a manager and his employee. Even though this second form of coaching has received scant attention from research compared to executive coaching (Ellinger*et al.* 2010), Elmadag*et al.* (2008) indicate that managerial coaching is highly appreciated by the employees as it puts forward the support from the direction and their consideration of the employees as fundamental resources for the success of the business. According to Ellinger *et al*. (2010), the superior becomes a learning facilitator who actively listens to his employees. The employees then benefit from direct feedback set to be helpful in their work, and in the development of their self-awareness regarding performance.

Then, empowerment refers to a relational process through which the superior shares a zone of power with his subordinates. Empowerment thus implies the implementation of practices aiming for a greater autonomy of the subordinates and their possession of sufficient skills to make suggestions to their superior and to make decisions especially (Forrester 2000). Empowerment practices relatedto the consultation of the employees (Simard *et al.*2005), to their autonomy at work and participation in decision-making (Malhotra *et al.* 2007) have been well documented. However, such practices cannot contribute to favourable behaviours unless their implementation is accompanied with the social adherence from the employees (Ueno 2008). The psychological empowerment perspective thus allows for more significative effects in reaching positive modification of the employees' behaviours. Psychological empowerment refers to the way the employees perceive human resource practices aiming at their empowerment (Spreitzer, 1996). It consists of four fundamental dimensions: a) personal influence of the employee who feels he can influence the organization's results and feels he plays an important role in the success of the organization; b) self-efficacy of the employee who feels he has the skills required to accomplish his work with efficacy; c) meaning, or significance, given by the employee to his work; d) auto-determination of the employee who feels he has the autonomy necessary to make decisions during his work. According to Bonias *et al*. (2010), employees can be greatly motivated when they feel empowered through these four dimensions. The delegation of power engages them, which may generate greater organizational commitment, productivity and organizational performance.

4. A conceptual model: Proposing the mediating role of affective commitment between transformational leadership and innovation performance

Based on findings from past empirical studies and building on the concepts of leadership, organizational commitment, and informal practices of managerial coaching and psychological empowerment, this part provides a series of propositions on the role of the entrepreneur's leadership to foster employees' commitment and to support their contribution to the innovation process. A conceptual model is then suggested to articulate these propositions and guide future research.

Rosing, Frese and Bausch (2011) show that the two complementary sets of transformational and transactional leadership might be required,at the individual or team level, to foster exploration and exploitation of knowledge in the complete process of innovation. An ambidextrous leadership would be required for the changing requirements of innovation during opening and closing times of its process. At the organizational level, however, transformational leadership was found to have the strongest correlation with innovation, based on its capability to foster unconventional thinking and solutions, as well as exploratory behaviours in high climate for excellence.Similarly, Matzler*et al.* (2008) find that transformational leadership of the top management has a positive and direct impact on innovation, growth and profitability in small and medium firms (SMEs). Despite the growing body of knowledge linking transformational leadership to innovation, the few studies that were identified bring to interest a better understanding of their relationship.

Proposition 1: In small firms, there is a positive relationship between transformational leadership of the entrepreneur and innovation performance of the firm.

Bono and Judge (2003) have shown a positive relationship between transformational leadership and organizational commitment. Emery and Barker (2007) have demonstrated that the specific dimensions related to transformational leadership are more significantly associated to the employees' satisfaction and organizational commitment than are the dimensions related to transactional leadership.More specifically, Korek*et al.* (2010) explain that transformational leadership would foster an affective commitment from the employees through supporting a positive organizational climate. Saint-Michel and Wielhorski (2011) recently showed that charisma related to transformational

leadership could exert a positive impact on the employees' affective commitment. Other studies also suggest that dimensions related to transformational leadership are positively related to the affective commitment of the employees (Kent andChelladurai, 2001). As mentioned earlier, transformational leadership favours practices such as communication of the vision, group decision-making, and mentoring (Bass et Avolio, 1994). These practices help increase the employees' zone of autonomy and creativity. Employees feel more supported by the organization and hence trust that the organization counts on their skills to outperform the competitors Thus, it appears that transformational leadership engages the employees, which favours their affective commitment towards the organization (Korek*et al. 2010*).

Proposition 2: Transformational leadership is positively related to the employee's affective commitment.

Through the perspective of psychological contract breaches, Ng *et al.* (2010) show that the employees' affective commitment affects innovation-related behaviours on the part of employees. The more their affective commitments is decreased due to psychological contract breaches, the less they contribute ideas and the less they work to implement innovations in the organization. On the positively related dynamics, Andries and Czarnitzki (2011)indicate that non-managerial employees' ideas significantly contribute to small firm innovation performance, especially when process innovation is involved. Based on these results, it appears that the emplyees' affective commitment of affects the innovation performance of the small firm.

Proposition 3: In small firms, the employees' affective commitment is positively related to the innovation performance of the organization.

As mentioned earlier, some human resource practices represent important mobilizing levers for the employees. Indeed, Tremblay *et al.* (2005) report that training practices are positively related to the organizational commitment of the employees. However, these studies have not compared the impact of formal and informal training practices on commitment. And although some research link coaching activities to supportive leadership towards the employees (Agarwal*et al.* , 2009; Ellinger*et al*., 2010), we have not been able to identify studies that establish a clear and significative relationship between transformational leadership, managerial coaching and employees' organizational commitment. Nevertheless, Elmadag*et al.* (2008) report that informal competence development pratices, such as managerial coaching, were positively related to employees' commitment towards service quality. It would certainly be justified to assessthe influence of managerial coaching on organizational commitment in the context of transformational leadership.

Proposition 4: In a context of transformational leadership, informal training through managerial coaching is positively related to the employees' affective commitment.

On the other hand, Simard*et al.*(2005) have shown that empowerment practices, like consulting employees within a decentralized perspective, had a positive influence on organizational commitment. Fabi*et al*. (2010) alsofind that increases in employees' autonomywere positively related to organizational commitment. More specifically, Malhotra*et al.* (2007) indicate that employees' autonomy and participation to decision-making had positive effects on their affective organizational commitment.Also, more recent studies have shown a positive relationship between psychological empowerment and organizational commitment, within a transformational leadership context (Avolio*et al*. 2004; Ismail *et al*. 2011). Transformational leadership promotes the use of feedback, bringing a feeling of support and trust on the part of the employees, and encouraging them to be creative and to contribute to the success of their organization (Ismail *et al*. 2011).

Proposition 5: In a context of transformational leadership, psychological empowerment is positively related to the employees' affective commitment.

Mobilizing human resource practices, like training and empowerment, appear to have a positive influence on organizational performance in terms of profitability and social climate in SMEs (AïtRazouk and Bayad 2011), profitability (Guerrero and Barraud-Didier 2004), and productivity (Appelbaum*et al*. 2000). Raquib*et al.* (2010) concludethat empowerment practices, psychological empowerment incuded,could contribute to better organizational performance.Despite the growing interest for the influence of mobilizing human pratices on the organizational performance, no study

was found on the relationship between informal human resource practices, and innovation performance of the firm. This brings to interest the following propositions.

Proposition 7: In small firms, managerial coaching of the employees is positively related to the innovation performance of the organization.

Proposition 8: In small firms, psychological empowerment of the employees is positively related to the innovation performance of the organization.

Overall, Eisenberger*et al.* (1990) report that theemployees's perception of being valued and supported by their organization is positively related to their organizational commitment and to their innovation on behalf of the organization. These findings support the mediating role of organizational commitment that is presented inthe following conceptual model (figure 1). Based on thepreceding propositions, the model suggests that the transformational leadership of the entrepreneur may foster the employees' affective commitment, engaging them to innovate and to contribute to the innovation performance of the firm. Mobilizing human resource practices of managerial coaching and psychological empowerment could be sustained in the presence of transformational leadership, and in turn, actively support the affective commitment of the employees in the process of innovation.

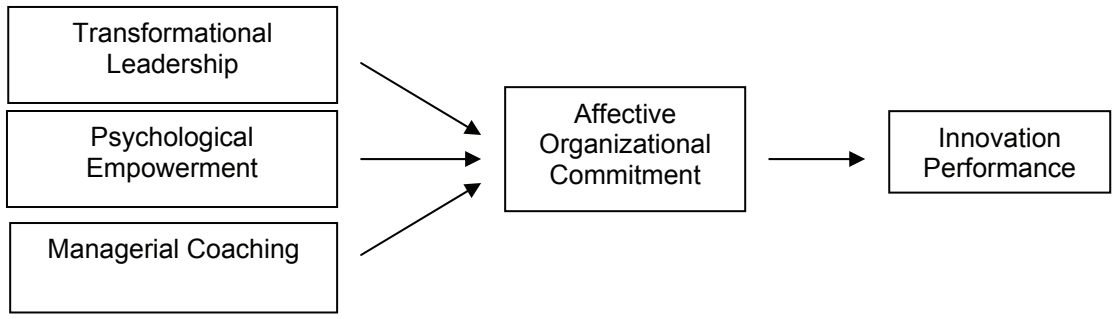


Figure 1: Conceptual model of transformational leadership and related informal RH practices to support innovation performance through employee's affective commitment

5. Conclusion

In sum, entrepreneurs should not rely on their sole ideas to maintain the innovation performance of their firm. Instead, they should profit from the knowledge of their employees as it can contribute significantly to the organizational innovation performance (Andries and Czarnitzki, 2011).

Because small firms often lack formal human resources practices to involve their employees, and because of the entrepreneur's central role and influence in small firms, the entrepreneur's leadership could be looked at as a means to foster employees' contribution to the innovation process through their affective organizational commitment. Indeed, transformational leadership engages employees and builds their trust, motivating them to go beyond their role. Transformational leadership also sustains mobilizing practices of psychological empowerment and managerial coaching, which build co-location of right and knowledge at the employees' site. The employees may then feel drawn to contribute their knowledge and skills to the innovation process of their organization.

The suggested model is part of future research based on stuctural equation modelling of its propositions. The scant research on the relationship between leadership and innovation performance of the firm, and especially on the possible mediating effect of organizational commitment, suggest that this model could bring interesting research avenues, contribute to knowledge, and identify practical managerial recommandationsin the future.

References

Agarwal, R., Angst, C.M. and Magni, M. (2009). "The performance effects of coaching: a multilevel analysis using hierarchical linear modelling". *The International Journal of Human Resource Management*, Vol 20, No 10, pp 2110-2134.

AïtRazouk, A. and Bayad, M. (2011). "GRH mobilisatriceet performance des PME". *Revue de gestion des ressourceshumaines*, Oct-Noc-Dec, No 8, pp 3-18.

Andries, P. and Czarnitzki, D. (2011). *Small Firm Innovation Performance and Employee Involvement,* ZEW – Centre for European Economic Research, Discussion Paper No. 12-013.

Appelbaum, E., Bailey, T., Berg, P. and Kalleberg, A.L. (2000).*Manufacturing Advantage: Why High-Performance Work Systems Pay Off.* Ithaca, NY: Cornell University Press.

Avolio, B.J., Zhu, W., Koh, W. and Bhatia, P. (2004). "Transformational leadership and organizational commitment: mediating role of psychological empowerment and moderating role of structural distance". *Journal of Organizational Behavior,* Vol 25, pp 951-968.

Barrett, R. and Mayson, S. (2007). "Human resource management in growing small firms".*Journal of Small Business and Enterprise Development*, Vol 14, No 2, pp 307-320.

Bass, B.M. (1985). *Leadership and Performance Beyond Expectations*. Collier MacMillan.

Bass, B.M. and Avolio, B.J. (1994). "Shatter the glass ceiling: women may make better managers". *Human Resources Management*, Vol 33, No 4, pp 549-560.

Ben Mansour, J., Chiniara, M. and Bentein, K. (2009). "L'engagementenvers le groupe de travail et le supérieur", *In*Rojot, J., Roussel, P., Vandenberghe, C. (dir.), *Comportementorganisationnel. Théorie des organisations, motivation au travail, engagement organisationnel* (pp 307-335).Bruxelles: Éditions De Boeck.

Bonias, D., Bartram, T., Leggat, S.G. and Stanton, P. (2010). "Does psychological empowerment mediate the relationship between high performance work systems and patient care quality in hospitals?" *Asia Pacific Journal of Human Resources*, Vol 48, No 3, pp 319-337.

Bono, J. and Judge, T. (2003). "Self-concordance at work: toward understanding the motivational effects of transformational leadership". *Academy of Management Journal,* Vol 46, pp 554-571.

Callon, M. (1995). "L'innovationtechnologiqueetsesmythes", In *La recherchesurl'innovation, uneboîte de Pandore?* (pp 5-29). Rechercheet Innovation conference of Acfas, Montreal, Canada, May.

De Winnie, S. and Sels, L. (2010). "Interrelationships between human capital, HRM and innovation in Belgian start-ups aiming at an innovation strategy".*The International Journal of Human Resource Management*, Vol 21, No 11, pp 1863-1883.

Eisenhardt, K.M. and Martin, J.A. (2000). "Dynamic capabilities: What are they?" *Strategic Management Journal*, Vol 21, No10/11, pp 1105-1122.

Ellinger, A.D., Ellinger, A., Bachrach, D.G., Wang, Y.-L., Elmadag, A.B. (2010). "Organizational investments in social capital, managerial coaching, and employee work-related performance".*Managerial Learning*, Vol 42, No 1, pp 67-85.

Elmadag, A.D., Ellinger, A.E., Franke, G.R. (2008). "Antecedents and consequences of frontline service employee commitment to service quality". *Journal of Marketing Theory and Practice,* Vol 16, No 2, pp 95-110.

Emery, C.R. and Barker, K.J. (2007). "The effect of transactional and transformational leadership styles on the organizational commitment and job satisfaction of customer contact personnel".*Journal of Organizational Culture, Communication and Conflict,* Vol 11, No 1, pp 77-90.

Fabi, B., Lacoursière, R., Morin, M. and Raymond, L. (2010). "Pratiques de gestion des ressourceshumaineset engagement enversl'organisation". *Gestion,* Vol 34, No 4, pp 21-29.

Forrester, R. (2000). "Empowerment: rejuvenating a potent idea". *Academy of Management Executive,* Vol 14, No 3, pp67-80.

Guerrero, S. and Barraud-Didier, V. (2004)."High-involvement practices and performance of French firms".*International Journal of Human Resource Management,* Vol 15, No 8, pp 1408-1423.

Industrie Canada (2008).*Principalesstatistiquesrelatives aux petites entreprises.* Direction générale de la politique de la petite entreprise, July 2008.

Ismail, A., Mohamed, H.A.-B., Sulaiman, A.Z., Mohamad, M.H. and Yusuf, M.H. (2011). "An empirical study of the relationship between transformational leadership, empowerment and organizational commitment".*Business and Economics Research Journal,* Vol 2, No 1, pp 89-107.

Kent, A. and Chelladurai, P. (2001). "Perceived transformational leadership, organizational commitment, and citizenship behaviour: a case study in intercollegiate athletics". *Journal of sports management,* Vol 15, No 2, pp 135-159.

Klaas, B.S., Klimchak, M., Semadeni, M. and Holmes, J.J. (2010). " The adoption of human capital services by small and medium enterprises: A diffusion of innovation perspective". *Journal of Business Venturing*, Vol 25, No 4, pp 349-360.

Korek. S., Felfe, J. and Zarpernick-Rothe, U. (2010). "Transformational leadership and commitment: A multilevel analysis of group-level influences and mediating processes". *European Journal*, Vol 19, No 3, pp 364-387.

Malhotra, N., Budhwar, P. and Prowse, P. (2007). "Linking rewards to commitment: An empirical investigation of four UK call centres". *International Journal of Human Resource Management,* Vol 18, No 12, pp 2095-2127.

Matzler, K., Schwarz, E., Deutinger, N. and Harms, R. (2008). " The relationship between transformational leadership, product innovation and performance in SMEs. *Journal of Small Business and Entrepreneurship*, Vol 21, No 2, pp 139-152.

Meyer, J.P., Stanley, D.J., Herscovitch, L. and Topolnytsky, L. (2002). "Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences". *Journal of Vocational Behavior*, Vol 61, pp 20-52.

Ng, T.W.H., Lam, S.S.K. and Feldman, D.C. (2010). " Psychological contract breaches, organizational commitment, and innovation-related behaviors: A latent growth modelling approach". *Journal of Applied Psychology*, Vol 95, No 4, pp 744-751.

Paradas, A. (2007). “Mutualiser la formation et le recrutementdans les PME: Unevariété de réponses”. *La Revue des Sciences de Gestion,* Vol 42, No 226/227, pp147-155.

Paul, A.K. and Anantharaman, R.N. (2003). “Impact of people management practices on organizational performance: Analysis of a causal model”. *International Journal of Human Resource Management,* Vol 14, No 7, pp 1246-1266.

Raquib, M.A, Anantharaman, R.N., Eze, U.C. and Murad, M.W. (2010). “Empowerment pratices and performance in Malaysia – An empirical study”.*International Journal of Business and Management,*Vol 5, No 1, pp 123-149.

Rosing, K., Frese, M. and Bausch A. (2011). “Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership”. *The Leadership Quarterly*, Vol 22, 956-974.

Saint-Michel, S. and Wielhorski, N. (2011). “Style de leadership, LMX et engagement organisationnel des salaries: le genre du leader a-t-il un impact?”,*@GRH*, Vol 1, No 1, pp 13-38.

Simard, G., Doucet, O. and Bernard, S. (2005). “Pratiques en GRH et engagement des employés”. *Relations Industrielles,* Vol 60, No 2, pp 296-319.

Spreitzer, G.M. (1996). “Social structural characteristics of psychological empowerment”.*Academy of Management Journal,* Vol39, pp 483-504.

St-Onge, S., Guerrero, S., Haines, V. and Audet, M. (2009) *Relever les défis de la gestion des ressourceshumaines*.Montréal :Gaëtan Morin éditeur.

Tremblay, M., Chênevert, D., Simard, G., Lapalme, M.-E., and Doucet, O. (2005). *“*Agirsur les leviers organisationnels pour mobiliser le personnel : le rôle de la vision, du leadership, des pratiques de GRH et de l’organisation du travail”.*Gestion*, Vol 30, No 2, pp 69-78.

Ueno, A. (2008). “Is empowerment really a contributory factor to service quality?”,*The Service Industries Journal*. Vol 28, No 9, pp 1321-1335.

Vandenberghe, C., Landry, G., Panaccio, A. (2009). “L’engagementorganisationnel”, *In*Rojot, J., Roussel, P., Vandenberghe, C. (dir.), *Comportementorganisationnel. Théorie des organisations, motivation au travail, engagement organisationnel* (pp 275-306).Bruxelles: Éditions De Boeck.

University-Industry Collaboration: Do the Characteristics of Academic Staff Matter?

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Abstract: It is widely recognised that a country's development, in terms of innovation and productivity, is greatly influenced by the character and intensity of interaction between the science and business communities. Despite this importance, there is still a lack of understanding regarding the underlying factors that drive the transfer of knowledge and technology. In particular, only a few empirical studies have addressed the issue of exploring the attitudes and behaviours of academic staff in this process. This paper aims to fill this research caveat. Its main objective is to investigate the influence of academic staff's socio-demographic and educational characteristics on university-industry collaboration. According to our objectives and to test these hypotheses, we decided on a mixed method. At a first stage, we performed a quantitative study, based on data gathered from a questionnaire applied to the overall population of academic staff at Bragança Polytechnic Institute in Portugal. The empirical study was carried out in 2011 and covered the total population of academic staff at BPI. We received 123 valid questionnaires, yielding a response rate of 23.7%. For data analysis, we applied descriptive statistics and logistic regression. At a second stage, a qualitative approach was chosen to evaluate university-industry collaboration, consisting of an exploratory semi-structured interview with the owner-manager of a recently created local spin-off from this higher education institution. The results reveal that age and gender are significantly related to the propensity to collaborate with industry. For instance, the probability of male academic staff collaborating with the business community is around 3.5 times higher than it is for females. Furthermore, we found that the level of formal qualification of academic staff and supervision of work placements had no influence, while the school/faculty academic staff belong to is significantly correlated with industry cooperation. Nevertheless, the interviewee considered the existence of curricular work placement as crucial. Overall, from our quantitative and qualitative data, there is a preference for exploitation of knowledge more in academic than in business terms. We present several theoretical and practical implications.

Keywords: universities-industry collaboration; technology transfer; academic staff; spin-off; Portugal

1. Introduction

In the economic literature, it is widely recognised that a country's development, in terms of innovation and productivity, is greatly influenced by the character and intensity of interaction between the science and business communities (Debackere and Veugelers, 2005). In this context, Etzkowitz (2001) stresses that universities have become drivers of regional economic development, creating new organisational mechanisms to this end, as well as for the preservation, increase and spread of knowledge. This impact of universities is found in terms of both economics and knowledge transfer. Scientific knowledge is seen as an important contribution to technological progress (Etzkowitz, 1998; Feldman, 1999; Polt et al., 2001). Policy development in this domain is moving towards universities and other higher education institutions being considered the main sources of up-to-date knowledge to be used in the search for economic growth. Hence, the transfer of knowledge and technology plays an important role in society and the university (Feldman and Desrochers, 2003).

In this regard, the spread of cooperative agreements between private businesses and university departments (Baldini et al., 2007), growing collaboration in publications (Agrawal and Henderson, 2002; Lach and Schankerman, 2008; Stephan et al., 2007; Van Looy et al., 2004), connecting researchers from different organisational contexts, increasing mobility between academia and industry (Dasgupta and David, 1994; Rynes et al., 2001) as well as firms recruiting young people receiving advanced levels of training in universities (Freeman, 2000) are all aspects which have been developed. These are only a few approaches to achieve a common goal: the spread of knowledge (Vallas and Kleinman, 2007), based on the collaboration between industry and universities.

Most recent studies, in various sectors of activity, suggest intensifying interaction between universities and industry over time (Debackere and Veugelers, 2005; D'Este and Fontana, 2007; Giuliani et al., 2010). But as yet, there is still a lack of understanding regarding the underlying factors that drive the transfer of knowledge and technology. In particular, only a few studies have addressed the issue of exploring the attitudes and behaviours of researchers at universities and research institutes in this process (e.g. Lee, 1996; 2000; Blumenthal et al., 1997; Campbell et al., 2000). Additionally, in empirical terms, the question as to how the socio-demographic and educational characteristics of academic staff influence university-industry collaboration remains underexplored. Consequently, our paper aims to fill this research caveat. To attain this objective, we selected, as the context of analysis, a Portuguese institute of higher education and a spin-off created in that region's business community.

The remainder of the paper is organised as follows: Section 2 presents a brief literature review to develop our research hypotheses. Section 3 describes the methodology followed in carrying out this study. Section 4 analyses and discusses the data obtained. Finally, Section 5 presents some conclusions, implications and suggestions for future research.

2. Theory and hypotheses

2.1 Socio-demographic characteristics

The literature has identified a number of factors influencing the probability of interactions between academia and industry, such as academics' socio-demographic characteristics, i.e. age and gender. In fact, some particular variables such as the academic's age can influence university-industry collaboration (Giuliani et al., 2010). However, the results in this regard are rather mixed and far from conclusive. Some scholars say that the need to publish is lower among older academic staff, allowing them to dedicate more time to working with industry (Levin and Stephan, 1991; Boardman and Ponomariov, 2009). Others argue that younger academic staff are more likely to be involved in university-industry collaboration, as they were already trained under the premises of interaction between the spheres and because such collaboration enhances reputation (D'Este and Patel, 2007; Bercovitz and Feldman, 2008). In this vein, we think that younger academic staff are more inclined to collaborate with the private sector.

Furthermore, the influence of academic staff's gender on the propensity to collaborate with industry is likewise ambiguous, and according to Giuliani et al. (2010), few studies have addressed this issue. For example, Buttel and Goldberger (2002) and Boardman and Ponomariov (2009) found that in certain types of collaboration, male researchers have significantly more links with industry. Kyvik and Teigen (1996) detected that women collaborate less with collaborators outside their organisation and tend to have lower collaboration rates in general. On the other hand, Gulbrandsen and Smeby (2005) and Van Rijnsoever et al. (2008) did not reveal noteworthy gender differences in their studies. For the purposes of our study, we believe that women will have less collaboration with industry and their interaction will be less intensive.

In light of these considerations, we formulate our first set of hypotheses:

H1. The propensity to collaborate with industry is related to the socio-demographic characteristics of academic staff.

H1a. The propensity to collaborate with industry is negatively related to the age of academic staff.

H1b. The propensity to collaborate with industry is higher among male than among female academic staff.

2.2 Educational characteristics

Besides the socio-demographic dimension which might influence the likelihood of academic staff collaborating with industry, certain indications were found by previous research that educational characteristics also play an essential role in this process. Klofsten and Jones-Evans (2000) stated that the level of formal education determines academic staff's cognitive background and, at the same time, attitude and propensity to work with industry. In entrepreneurship research, Clercq and Arenius (2006) found a positive effect of individual educational level on the likelihood of perceiving entrepreneurial opportunities. We also believe that a higher level of education enhances the

probability of academic staff embarking on the 'entrepreneurial path'. Due to better analytical and methodological skills, it appears more likely that academics will raise research funding from industry, and in this way, collaborate more intensively with industry (Giuliani et al., 2010).

Nonetheless, it may also be possible that the level of academics' formal education leads to more engagement in 'pure research' and interest in publishing research outcomes in scientific journals. This, we believe, is also strongly marked by the strategy, culture and idiosyncrasies of the school or faculty academic staff belong to. In cases where there is more entrepreneurial orientation in the higher education institution, interaction between academia and industry is often based on work placement. Such involvement of academics in the business process was found to be extremely valuable in transforming research results into commercial applications and value (Wright et al., 2008; Lam, 2010).

However, the empirical evidence in the literature concerning these aspects is weak. Based on the reflections above, we propose our second set of hypotheses:

H2. The propensity to collaborate with industry is related to the educational characteristics of academic staff.

H2a. The propensity to collaborate with industry is positively related to the level of formal qualification of academic staff.

H2b. The propensity to collaborate with industry is related to the school/faculty of the academic staff.

H2c. The propensity to collaborate with industry is related to the supervision of work placements by academic staff.

3. Methodology

3.1 Sample and data collection

The empirical study covered the total population of teaching staff (n=519) at Bragança Polytechnic Institute (BPI) in Portugal, which is distributed over five schools: (1) Bragança School of Technology and Management – ESTIG; (2) Bragança School of Agriculture – ESA; (3) Bragança School of Education – ESSE; (4) Bragança School of Health – ESSA; and (5) Mirandela School of Communication, Administration and Tourism - ESACT.

According to our objectives and to test these hypotheses, we decided on a mixed method. At a first stage, we performed a quantitative study, based on data gathered from a questionnaire applied to the overall population of academic staff at BPI. This survey was designed to include items about the dimensions to be analysed, i.e., detailed questions regarding the socio-demographic and educational factors likely to influence the university-industry collaboration decision. Moreover, we used the following independent variables: gender, age, academic qualifications, the school taught in and supervision of work placements in the business sector. For the dependent (or explanatory) variable, we followed Musio's (2010) procedure and employed a binary (or dichotomous) scale to determine academics' engagement in university-industry collaboration, which is *1* if the member of staff participates in different collaborations or *0* if he or she does not. The questionnaire was distributed between April and June 2011, with one reminder. We received 123 valid questionnaires, yielding a response rate of 23.7%.

At a second stage, we decided on a qualitative approach seeking to evaluate the advantages of cooperation between BPI and a recently created spin-off in the region. It consisted of an exploratory semi-structured interview with the owner-manager of this firm. As noted by Lockett et al. (2005), the formation of university-based spin-off firms constitutes a potentially important, but as yet underexploited option.

3.2 Data analyses

Different statistical analyses were applied to the data obtained. Firstly, a descriptive statistical analysis was made for the variables about academic staff from BPI. At the second stage, to validate our research hypotheses, the variables were subjected to a logistic regression model. This estimation

process was developed in order to assess the relative weights of the significant estimators influencing the probability of the university-industry collaboration decision. Finally, content analysis (Weber, 1985) was also used to evaluate the outcomes of the interview with the spin-off owner-manager.

4. Results and discussion

4.1 Descriptive analyses

Table 1 illustrates the characteristics of the final sample, in particular the socio-demographic and educational characteristics as well as the collaborative links with industry. Interestingly, the majority of academic staff participating in our survey seem to value the academic path more than the business or entrepreneurial one. However, we found a huge disparity among the different schools in this regard.

Table 1: Descriptive statistics

	ESTIG Management (n=48)	ESA Agriculture (n=29)	ESSE Education (n=21)	ESSA Health (n=12)	ESACT Tourism (n=13)	Total (n=123)
Gender:						
Male	33 (54.1)	16 (26.2)	3 (4.9)	2 (3.3)	7 (11.5)	61 (49.6)
Female	15 (24.2)	13 (21.0)	18 (29.0)	10 (16.1)	6 (9.7)	62 (50.4)
Age:						
<25 years	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)
26-35	8 (21.6)	4 (10.8)	11 (29.8)	7 (18.9)	7 (18.9)	37 (30.1)
36-45	32 (55.2)	11 (19.0)	6 (10.3)	3 (5.2)	6 (10.3)	58 (47.2)
46-55	5 (22.7)	13 (59.1)	2 (9.1)	2 (9.1)	0 (0.0)	22 (17.9)
>56	3 (60.0)	0 (0.0)	2 (40.0)	0 (0.0)	0 (0.0)	5. (4.0)
Academic qualifications:						
Graduate	0 (0.0)	0 (0.0)	4 (44.5)	3 (33.3)	2 (22.2)	9 (0.6)
Post-graduate	1 (33.3)	0 (0.0)	1 (33.3)	0 (0.0)	1 (33.3)	3 (0.2)
Master	23 (40.4)	6 (10.5)	11 (19.3)	7 (12.3)	10 (17.5)	57 (46.3)
PhD	24 (44.4)	23 (42.6)	5 (9.3)	2 (3.7)	0 (0.0)	54 (43.9)
Collaboration with industry:						
Yes	15 (27.3)	21 (38.2)	9 (16.4)	8 (14.5)	2 (3.6)	55 (44.7)
No	33 (48.5)	8 (11.8)	12 (17.6)	4 (5.9)	11 (11.2)	68 (55.3)

4.2 Explorative analyses

To analyse how academic staff's socio-demographic and educational characteristics influence the university-industry collaboration decision, the logistic linear regression model was used. Table 2 shows the respective outcomes. This model is appropriate because the response variable (integration or not in any collaboration with industry) is qualitative and dichotomic, i.e. with two possible results, *1* – yes or *0* – no. This model allows good approximation obtained with the logistic regression, which allows use of a regression model to calculate or predict the probability of the previously mentioned response variable. The following variables were taken out of the model: Academic Qualifications – Doctorate, and School taught in – ESTIG, since this did not influence adjustment of the model.

The model is statistically significant, for a level of significance under 1%, according to χ^2 distribution with 11 degrees of freedom, indicating that the model adjusts appropriately to the data. The pseudo R^2 of the model is 0.2185. For the linear model, the R^2 is interpreted as the proportion of variation in the response that can be explained by the repressor. However, there is no clear interpretation for the pseudo R^2 in terms of variance of the result from the logistic regression (Hu et al., 2006).

Our Hypotheses H1a and H1b associate the age and gender of academic staff with the university-industry collaboration decision. The results of the model show that the probability of a male member of academic staff having a link with the business sector is around 3.5 times greater than it is for a female member, being statistically significant for a level of significance under 5%. In addition, age was included in Table 2 (age^2) because there may be a point of inflexion in age, in this way improving the model in mathematical terms. The probability of a member of staff's age being related to industry collaboration is around 1.8 times greater than the probability of the average age in the model, being statistically significant for a level of significance under 10%, the value being close to 1 for age^2, for a level of significance under 5%. Therefore, our Hypothesis H1 cannot be rejected.

However, concerning these aspects, the owner-manager of the spin-off firm mentioned that:

> *"My age (26) and the fact of being male did not influence my cooperation between the university and the business sector, but it might influence other academics to cooperate with firms. In my opinion, neither age nor sex influenced the creation of the spin-off. In fact, my class at BPI was formed mostly of women and all of them older than me. However, I recognise that the fact of being single is a point in my favour, since I can devote more time to my company".*

Table 2: Outcomes of the logistic regression

Variable	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Socio-demographic characteristics:						
Gender	3.475	1.824	2.37	0.018**	1.242	9.724
Age	1.839	0.575	1.95	0.051*	0.997	3.394
Age^2	0.993	0,004	-2.02	0.044**	0.985	0.999
Educational characteristics:						
Degree	0.529	0.543	-0.62	0.535	0.071	3.957
Master	0.365	0.194	-1.89	0.058*	0.128	1.037
Other qualifications	0.758	1.068	0.000	0.844	0.048	12.013
ESSA	23.441	21.544	3.430	0.001***	3.869	142.004
ESA	9.814	6.239	3.590	0.000***	2.823	34.119
ESSE	7.399	5.734	2.580	0.000***	1.620	33.790
ESACT	0.684	0.636	-0.410	0.683	0.110	4.236
Supervision of work placement	1.674	0.791	1.090	0.275	0.663	4.227

*** p ≤ 1%; ** p ≤ 5%; * p ≤ 10%

Concerning our hypotheses H2a, H2b and H2c, the empirical evidence shows that academic qualifications (degree and other qualifications) are not statistically significant, except the Master degree for a level of significance of 10%. Therefore, it is surprising that academics holding a doctorate do not have a significant connection with the private business sector. This situation reinforces the idea that vast scientific knowledge is not much of a stimulus for university-industry collaboration.

On the subject of education, the spin-off owner-manager stressed that:

> *"My education/training, that is, the degree in Gerontology at BPI, a post-graduate course in Health Service Management and the fact of finishing the Master in the same area at the University of Trás-os-Montes and Alto Douro influenced me and could influence other academics in cooperating with firms".*

This entrepreneur agreed with the opinion of Vallas and Kleinman (2007) who considered the growth of small start-up companies reflects the academic origins of their founders. Throughout the interview, the entrepreneur's enthusiasm, dedication and knowledge regarding the company was obvious, something which is reflected in its success so far.

It is also of note that 'the school where the lecturer teaches' is the variable with the greatest statistical significance, the probability of academic staff at ESSA (health school) having a connection with business being 23 times greater than the average for the other schools. This figure may be influenced by the fact that all the courses taught at this school have work placement included in the curriculum, something which is not found in the other schools. About the matter of the area/school where lecturers teach, the entrepreneur interviewed stated that:

> *"The type of school I attended at BPI and being invited to lecture at ESSA in the same institution influenced me and influences other academics in cooperation with companies".*

However, from the qualitative analysis, in ESSA there is a certain lack of knowledge transmission to the business sector. On this subject, the interviewee considers fundamental the consultancy he continuously receives from BPI, without which the continuity of his firm could be in doubt. This type of knowledge transfer is fundamental inasmuch as both work consultancy and functioning relationships with producers are decisions that provide academic researchers with the opportunity to better understand the contexts in which decisions on policy and practice are made and implemented (Huggins et al., 2008; Jacobson et al., 2005).

Still related to this second hypothesis, where supervision of work placement in firms is associated with the decision to collaborate with industry, the results suggest that academics supervising work placement in businesses and having a link with them is not a statistically significant factor. From this empirical evidence, the influence of the education factor is rather mixed, so that Hypothesis H2 is only partially supported.

Nevertheless, the interviewee considers the existence of curricular work placement as crucial for consolidating the subjects taught, as well as the opportunity it gives students to demonstrate their qualities in the business world. The entrepreneur stated:

> *"Carrying out curricular work placement lets the business world see the level of knowledge students bring from universities".*

Again on the importance of curricular work placement, the spin-off owner-manager stresses:

> *"I cooperate with ESSA in the field of curricular work placement. I claim these work placements are a bonus for ESSA (BPI), for the student and also for my company. My company will use those work placements to develop new projects, since work placements allow people's creativity to be developed".*

In this vein, various scholars share the same opinion, namely, Etzkowitz et al. (2000), Freeman (2000) and Wright et al. (2008), who consider the mobility of academics as very important for both industry and universities to know what the other is doing.

5. Conclusions and implications

The objective of this study was to analyse the influences of academic staff's socio-demographic and educational characteristics on the university-industry collaboration decision. For this purpose, we selected a Portuguese higher education institution and a spin-off firm created from this university. Based on the logistic regression model we developed, the results revealed also that variables such as gender, age and the school taught in influence academic staff's capacity to collaborate with the private business sector. In particular, the probability of a male academic staff member cooperating with private businesses is significantly higher than it is for a female member.

However, the cooperation entered into by the academic staff at this institution is confined to the transmission of knowledge in a rather unbusinesslike way, i.e. there is not involvement by a substantial number of academics. This limitation is linked to the very legislation of the academic career, where the lecturer is not well thought of, or duly assessed, for having a business career (Kenney and Goe, 2004). From the quantitative and qualitative data analyses, the academic staff are found to value the academic career more than the business one.

To sum up, the empirical evidence obtained does not show a clear positive effect of academic staff's socio-demographic and educational characteristics on the university-industry collaboration decision. We accept, however, that the results should be interpreted with some reservation, since for an unequivocal reading of the cooperation between the university and the private business sector, it would be necessary to determine exactly the opinion of the whole academic community.

Furthermore, not only the characteristics of the academic staff members, but also and in particular the institutional culture, reputation, strategic positioning, research foci etc. are supposed to all have an impact on the behaviour of its academic staff towards knowledge and technology transfer activities. In the absence of these data, interpretation of our results can only be an approximation.Further analysis should focus on how the joint effect of academic staff's characteristics and their working environments impact on their motivations for university-industry collaboration.

Another limitation of our study is that this study focuses on a single country and may reflect some peculiarities of the Portuguese context. The findings are taken from one higher education institution in Portugal, with its idiosyncratic structure and academic culture. While this is quite common in examining the university-industry cooperation, it limits the significance of our data for generalisation. Inter-university and inter-country studies are needed to introduce direct comparison of different institutional settings, particularly in geographical areas such as the European Union, where country-level educational policies and approaches are still very heterogeneous.

Despite all these limitations, we believe the results of this exploratory study make important contributions to considering and designing public policy and to finding new streams for future investigations. In fact, our results provide insights in support of university-industry collaboration based on the perceptions and expectations of academic staff. Consequently, we contribute to better understanding of what drives academic staff to collaborate with industry. Knowledge of the impact of academic staff's socio-demographic and educational characteristics is relevant insofar as it allows universities to create effective mechanisms to enhance collaborative activities with the private business sector.

References

Agrawal, A. and Henderson, R. (2002) Putting patents in context: Exploring knowledge transfer from MIT, *Management Science,* Vol. 48, No. 1, pp. 44-60.

Baldini, N., Grimaldi, R. and Sobrero, M. (2007) To patent or not patent? A Survey of Italian inventor motivations, incentives, and obstacles to university patenting, *Scientometrics,* Vol. 70, No. 2, pp. 333-354.

Boardman, P.G. and Ponomariov, B.L. (2009) University researchers working with private companies, *Technovation,* Vol. 29, No. 2, pp. 142-153.

Blumenthal, D., Campbell, E.G., Causino, N. and Louis, K.S. (1997) Withholding research results in academic life science. Evidence from a national survey of faculty, *Journal of the American Medical Association,* Vol. 277, No. 15, pp. 1224-1228.

Buttel, F.H. and Goldberger, J.R. (2002) Gender and agricultural science: evidence from two surveys of land-grant scientists, *Rural Sociology,* Vol. 67, No. 1, pp. 24-45.

Campbell, E.G., Weismann, J.S., Causino, N. and Blumenthal, D. (2000) Data withholding in academic medicine: Characteristics of faculty denied access to research results and biomaterials, *Research Policy,* Vol. 29, No. 2, pp. 303-312.

Clercq, D. and Arenius, P. (2006) The role of knowledge in business start-up activity, *International Small Business Journal,* Vol. 24, No. 4, pp. 339-358.

Dasgupta, P. and David, A.J. (1994) Toward a new economics of science, *Research Policy,* Vol. 23, No. 5, pp. 487-521.

Debackere, K. and Veugelers, R. (2005) The role of academic technology transfer organizations in improving industry science links, *Research Policy,* Vol. 34, No. 3, pp. 321-342.

D'Este, P. and Fontana, R. (2007) What drives the emergence of entrepreneurial academics? A study on collaborative research partnerships in the UK, *Research Evaluation,* Vol. 16, No. 4, pp. 257-270.

D'Este, P. and Patel, P. (2007) University–Industry linkages in the UK: what are the factors underlying the variety of interactions with industry?,*Research Policy,* Vol. 36, No.9, pp. 1295-1313.

Etzkowitz, H., Webster, A., Gebhardt, C. and Terra, B.R. (2000) The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm, *Research Policy,* Vol. 29, No. 2, pp. 313-330.

Etzkowitz, H. (1998) The norms of entrepreneurial science: cognitive effects of the new university–industry linkages, *Research Policy,* Vol. 27, No. 8, pp. 823-833.

Etzkowitz, H. (2001) The second academic revolution and the rise of entrepreneurial science, *IEEE Technology and Society Magazine,* Vol. 20, No. 2, pp. 18-29.

Feldman, M. (1999) The New Economics of Innovation, Spillovers And Agglomeration: A review of Empirical Studies, *Economics of Innovation and New Technology,* Vol. 8, No. 1, pp. 5-25.

Feldman, M. and Desrochers, P. (2003) Research universities and local economic development: Lessons from the history of the Johns Hopkins University, *Industry & Innovation,* Vol. 10, No. 1, pp. 5-24.

Freeman, R., Weinstein, E., Marincola, E., Rosenbaum, J. and Solomon, F. (2001) Competition and careers in biosciences, *Science,* Vol. 294, No. 5550, pp. 2293-2299.

Freeman, S. (2000) Partnerships between small and medium enterprises and universities that add value, *Education + Training,* Vol. 42, No. 6, pp. 372-377.

Giuliani, E, Morrison, A., Pietrobelli, C. and Rabellotti, R. (2010) Who are the researchers that are collaborating with industry? An analysis of the wine sector in Chile, South Africa and Italy, *Research Policy,* Vol. 39, No. 6, pp. 748-761.

Gulbrandsen, M. and Smeby, J.-C. (2005) Industry funding and university professors' research performance, *Research Policy,* Vol. 34, No. 6, pp. 932-950.

Hu, B., Shao, J. and Palta, M. (2006) Pseudo-R^2 in logistic regression model, *StatisticaSinica,* Vol. 16, No. 3, pp. 847-860.

Huggins, R., Johnston, A. and Steffenson, R. (2008) Universities, knowledge networks and regional policy, *Cambridge Journal of Regions, Economy and Society,* Vol. 1, No. 2, pp. 321-340.
Jacobson, N., Butterill, D. and Goering, P. (2005) Consulting as a strategy for knowledge transfer, *The Milbank Quarterly,* Vol. 83, No. 2, pp. 299-321.
Kenney, M. and Goe, W.R. (2004) The role of social embeddedness in professorial entrepreneurship: a comparison of electrical engineering and computer science at UC Berkeley and Stanford, *Research Policy,* Vol. 33, No. 5, pp. 691-707.
Klofsten, M. and Jones-Evans, D. (2000) Comparing academic entrepreneurship in Europe – the case of Sweden and Ireland, *Small Business Economics,* Vol. 14, No.4, pp. 299-310.
Kyvik, S. and Teigen, M. (1996) Child care, research collaboration, and gender differences in scientific productivity, *Science Technology & Human Values,* Vol. 21, No. 1, pp. 54-71.
Lach, S. and Schankerman, M. (2008) Incentives and invention in universities, *The RAND Journal of Economics,* Vol. 39, No. 2, pp. 403-433.
Lam, A. (2010) From "Ivory tower traditionalists" to "Entrepreneurial scientists"?: Academic scientists in fuzzy university-industry boundaries, *Social Studies of Science,* Vol. 40, No. 2, pp. 307-340.
Lee, Y.S. (1996) Technology transfer and the research university: A search for the boundaries of university-industry collaboration, *Research Policy,* Vol. 25, No. 6, pp. 843-863.
Lee, Y.S. (2000) The sustainability of university-industry research collaboration: An empirical assessment, *Journal of Technology Transfer,* Vol. 25, No. 2, pp. 111-133.
Lockett, A., Siegel, D., Wright, M. and Ensley, M.D. (2005) The creation of spin-off firms at public research institutions: Managerial and policy implications, *Research Policy,* Vol. 34, No. 7, pp. 981-993.
Musio, A. (2010) What drives the university use of technology transfer offices? Evidence from Italy, *Journal of Technology Transfer,* Vol. 35, No. 2, pp. 181-202.
Polt, W., Rammer, C., Gassler, H. and Schartinger, D. (2001) Role of framework conditions, *Science and Public Policy,* Vol. 28, No. 4, pp. 247-258.
Rynes, S.L., Bartunek, J.M. and Daft, R.L. (2001) Across the great divide: Knowledge creation and transfer between practitioners and academics, *Academy of Management Journal,* Vol. 44, No. 2, pp. 340-355.
Stephan, P.E., Gurmu, S., Sumell, A.J. and Black, G. (2007) Who's patenting in the university? Evidence from the survey of doctorate recipients, *Economics of Innovation and New Technology,* Vol. 16, No. 2, pp. 71-99.
Vallas, S.P. and Kleinman, D.L. (2007) Contradiction, convergence and the knowledge economy: the confluence of academic and commercial biotechnology, *Socio-Economic Review,* Vol. 6, No. 2, pp. 283-311.
Van Looy, B., Ranga, M., Callaert, J., Debackere, K. and Zimmermann, E. (2004) Combining entrepreneurial and scientific performance in academia: Towards a compounded and reciprocal Matthew effect?,*Research Policy,* Vol. 33, No. 3, pp. 425-441.
Van Rijnsoever, F.J., Hessels, L.K. and Vandeberg, R.L. (2008) A resource-based view on the interactions of university researchers, *Research Policy,* Vol. 37, No. 8, pp. 1255-1266.
Weber, R. (1985) *Basic Content Analysis,* Thousand Oaks: Sage Publications.
Wright, M., Clarysse, B., Lockett, A. and Knockaert, M. (2008) Mid-range universities' linkages with industry: Knowledge types and the role of intermediaries, *Research Policy,* Vol. 37, No. 8, pp. 1205-1223.

Competition Between Business Ecosystems: A Case Study of the Mobile Phone Industry

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Abstract: This study investigates why the Japanese mobile phone industry fell into the Galapagos syndrome. It focuses on competition between business ecosystems in the global mobile phone industry from 2001 to 2007, when third-generation mobile phones were released. More concretely, by exploring the relationships between mobile phone manufacturers, network operators, distributors, content providers, and users, this study examines how structural differences in business ecosystems formed in the GSM (Global System for Mobile Communications) group and the Japanese mobile phone industry, and how they influenced the subsequent disparate technological trajectories through competition between business ecosystems.

Keywords: business ecosystem, platform leader, entry barrier, technological trajectory, first-mover advantage

1. Introduction

Most technology-based industries are currently faced with agile competition in the global economy. As such competition entails rapid responses to a variety of markets as well as shortening lead times in each particular market, the role of various collaborations such as business networking, open innovation, open platforms, and business ecosystems becomes increasingly significant in promoting innovation (Goldman, Nagel and Preiss, 1995; Larson, 1992; Moore, 1997; Teece, 2007; Chesbrough, 2003; Gawer and Cusmano, 2002; Iansiti and Levien, 2004). Thus, firms that utilize external resources can gain competitive advantages in rapidly achieving technological innovations.

There are many studies that discuss the relationship between networking and outcomes in research communities (i.e., Constant, 1980, 1987; Dietz and Bozeman, 2005). Much of the literature has argued that actors who play a central role in the networks have an advantage. Galaskiewicz (1979) argued that higher centrality leads to higher volume and speed of information, as well as knowledge flow, because a central actor has greater access to external assets. Iansiti and Levien (2004) also posit that it is important for keystone players to co-create business ecosystems with niche players. In particular, they pointed out that it is necessary for keystone players to allow niche players to keep and explore channels of communication that may be open with other ecosystems. These studies suggest that the structure of a network influences its outcomes (Shimizu, 2011; Dittrich and Duysters, 2007).

This study focuses on the structure of a business ecosystem as a network of the supply chain, which includes various complementary products and services (Tatsumoto, 2011) because it is difficult to explain a value network in industrial structure terms beyond the boundaries of industry. Therefore, this study examines the industrial structure of the mobile phone industry as a business ecosystem involving actors (complementors) that supply complementary assets (Adner and Kapoor, 2010). However, differences in each country, as prerequisites, influence the evolutionary process of business ecosystems. Because every country has unique economic and social institutions, their innovation systems are distinct (Nelson, 1993). Therefore, this study examines different patterns of network formation and technological innovation in the business ecosystems of different countries.

By exploring the process of business ecosystems in the global mobile phone industry in the period 2001–2007, we aim to discover the different types of relationships that exist between networking and outcomes in business ecosystems. More concretely, exploring the relationships between mobile phone manufacturers, network operators, distributors, and content providers, this study examines how the structural differences in business ecosystems could form in GSM and the Japanese mobile phone industry, and how they influenced the disparate technological trajectories of the evolutionary process under competition between business ecosystems. We focus on the business ecosystems of GSM, which spread widely over the global mobile phone market, and NTT DoCoMo, which has contributed greatly to the growth of the Japanese mobile phone industry, especially in terms of research and development (R&D) in the field of 3G technologies.

We investigated published materials in annual reports, newsletters, trade magazines, and newspapers in order to understand several factors that have influenced the structure of business ecosystems in the global mobile phone industry. Based on a wide variety of data, we can come to understand the relationship between the various actors who have participated in these business ecosystems.

This study offers several contributions. First, it clarifies what the Galapagos syndrome means in the Japanese mobile phone industry, which developed under the leadership of NTT DoCoMo, the biggest Japanese network operator. Here, the Galapagos syndrome is used to denote a product or service that becomes isolated from globalization despite its continued domination of a domestic market with advanced technology (NRI, 2008). Second, this study shows that networks form differently in different business ecosystems. Exploring the formation of the business ecosystems of GSM and NTT DoCoMo, we discover that the different patterns of platform leaders and networking influence the structures of the business ecosystems. Third, it shows how different types of technological trajectories have come about as the result of competition between business ecosystems. We find that competition between business ecosystems with different structures led the Japanese mobile phone industry to develop the Galapagos syndrome. In particular, we have interest in exploring the mechanisms that bring about each of the different types of technological trajectories.

2. Galapagos syndrome in the Japanese mobile phone industry

In 1996, NTT DoCoMo, a Japanese network operator and one of the biggest network operators in the global mobile phone industry, was the first in the world to pass its examination of W-CDMA (Wideband Code Division Multiple Access), which had been expected to be the next generation communication standard for mobile phones. Then in 2001, NTT DoCoMo was again first in the world to launch handsets in the domestic market that were classified as third-generation mobile phones (3G). These were equipped with W-CDMA and were dubbed FOMA (Freedom of Mobile Multimedia Access) phones. From a resource-based viewpoint, Japanese mobile phone manufacturers should have gotten a first-mover advantage over foreign competitors, acquiring and applying their bundle of valuable resources to advanced technologies supported by 3G, such as cameras, videos, and the mobile internet, as the 3G standard diffused into the global mobile phone industry (see Table 1).

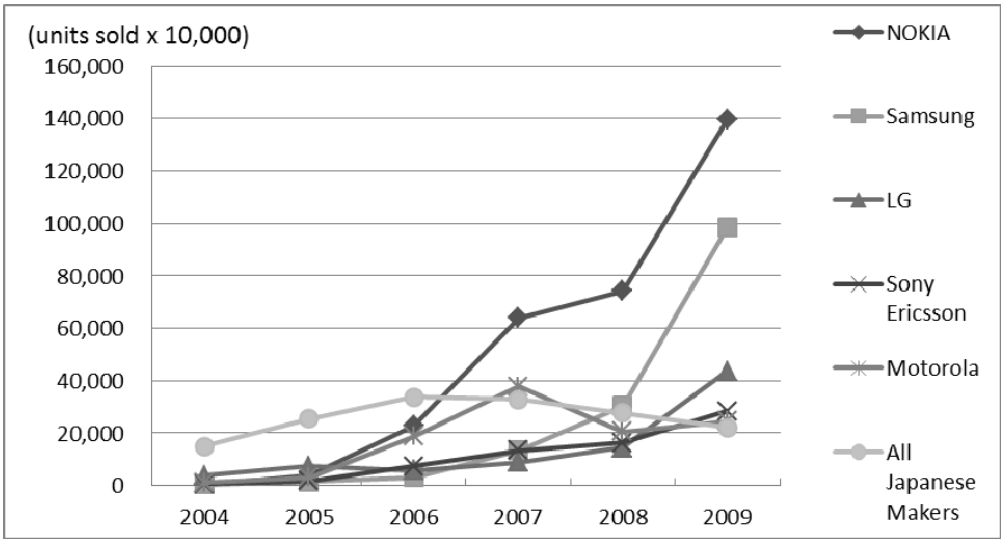
Table1. 3G technologies of the Japanese mobile phone industry

3G technologies	Released Year
Mobile communication technology	
Wideband Code Division Multiple Access (W-CDMA)	2001
Mobile internet technology	
Mobile internet (i-mode)	1999
E-mail	1999
Photocam	2000
Videocam	2002
Music download	2002
E-commerce	2004

At the end of 2005, however, second-generation (2G) mobile phones used by GSM still held the dominant share in the global market. There are several reasons why the brand image of Japanese handset manufacturers weakened, why mobile phone users in the overseas market were not prepared to use most of the technological features and functionalities, and why their product innovations were imitated by foreign rivals in the late 2000s (Giachetti and Marchi, 2011). In addition, as figure 1 shows, the market share of Japanese handset makers was very low even in the world 3G market.

In fact, as Table 2 shows, most of the Japanese mobile phone manufacturers have been compelled to pull out of the global market since the mid-2000s.

However, as figure 2 shows, most Japanese handset makers continue to dominate the domestic market. Motorola, which was the second largest handset maker in the world in 1998–2006 also left the Japanese market in 2006. Even Nokia, which held a dominant 39% of the global mobile phone market in 2008, decided to leave the Japanese market.

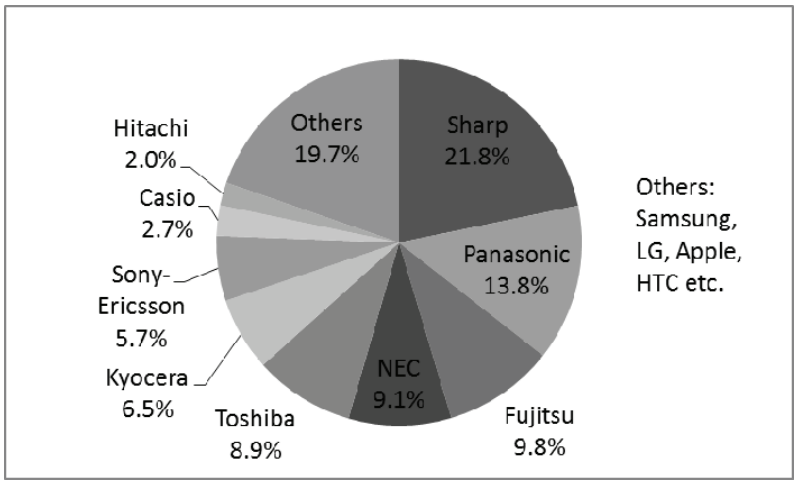


Source: Chunichi-sha (yearly) Year Book of the Electronic Equipment

Figure 1: Market share in the world 3G market

Table 2: Japanese mobile phone makers in overseas markets Source: Osaki (2008), pp. 68, 89, and 107

	EU Market	**US Market**	**Chinese Market**
NEC	temporarily suspended in 2006	temporarily suspended in 2005	temporarily suspended in 2006
Panasonic	temporarily suspended in 2006	temporarily suspended in 2004	temporarily suspended in 2006
Sharp	supplying the whole EU	suspended in 2005	re-entered in 2007
Toshiba	supplying the EU	suspended in 2004	suspended in 2005
Sanyo	supplying the EU	supplying	supplying as OEM
Fujitsu	supplying 3G handsets in cooperation with Alcatel	n/a	n/a
Mitsubishi Electric	withdrew in 2005	n/a	temporarily suspended in 2006
Kyocera	n/a	supplying	supplying
Casio	n/a	n/a	n/a
Hitachi	n/a	n/a	n/a



Source: Yano Research Institute (2008) *Mobile Phone Market in Japan*

Figure 2: Japan's mobile phone market in 2007

As a result, Japanese handset makers have fell into the Galapagos syndrome, where they became lost in the global market despite continuing to dominate in the domestic market with their advanced technologies.

3. Differences in the business ecosystems of the mobile phone industry

3.1 Different entry barriers

NTT DoCoMo is a spin-off of Nippon Telegraph and Telephone Corporation (NTT), which was privatized in 1985. NTT DoCoMo took over NTT's mobile phone technologies in 1992 when it started up. As a result, NTT DoCoMo retained advanced technologies for mobile phones, and it was able to launch its Personal Digital Cellular (PDC) mobile phones, classified as second generation (2G). It has maintained about 50% of the domestic market since the mid-1990s. Another important inheritance came from NTT: its business connections with Japanese mobile phone makers, who have accumulated various technologies for mobile phones. Therefore, the commercial practice-based network formed under NTT DoCoMo's leadership functioned as a high entry barrier to outsiders that had not done business with NTT DoCoMo (Anchordoguy, 2005). In fact, NTT DoCoMo's influence extended far and wide. In its commercial practices, NTT DoCoMo decided every transaction with its partner firms, such as the purchase and sales of mobile phones. For example, handsets made at the request of NTT DoCoMo, subject to NTT DoCoMo's Specification Approval, were all purchased by NTT DoCoMo and were all allotted to distributors, with their prices controlled by NTT DoCoMo.

The GSM group's network formed in a significantly different manner. Mobile phones in GSM markets have been selected and sold from a list of approved types, led by the GSM Association (GSMA), since 1995. Type approval assures that mobile handsets purchased by consumers are already suitable for most of the mobile terminals in GSM markets. Type-approved mobile phones make possible the global roaming that is required in the GSM telecommunication network. Mobile phone makers must meet certain demands for mobile telecommunication quality for particular countries. In other words, if they pass GSM type approval tests, mobile makers can enter GSM markets. Thus, entry into GSM markets is rule based.

GSM handset makers had to settle matters of intellectual property rights (IPR) to actually enter GSM markets. GSM IPR problems have been settled via cross-license contracts between essential IPR holders, such as Nokia, Ericsson and Motorola, because GSMA does not have a patent pool. If they do not have IPRs that make possible cross-license contracts with other essential IPR holders, mobile handset makers must pay licensing fees. For example, licensing fees for cross-license holders were about 10% of the selling price of mobile handsets in 1992, while those for non-cross license holders were about 30–40%. At first, these licensing fees were barriers to entry. However, as GSM mobile phones diffused, the licensing frees for non-cross license holders dropped to about 10% in 1997, and to 3–5% by 2007.

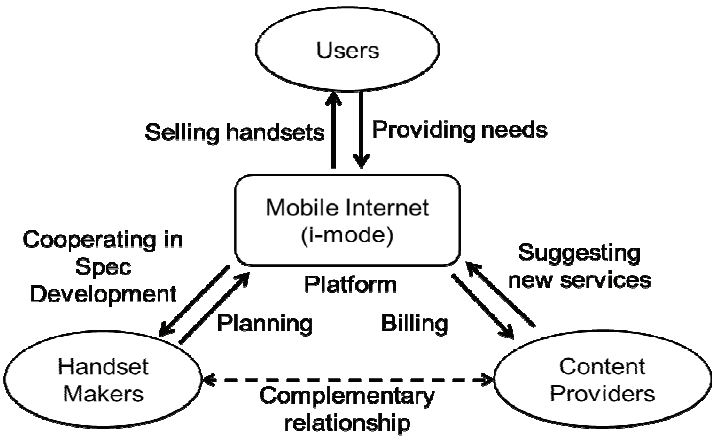
Therefore, because membership in NTT DoCoMo's ecosystem was fixed by business customs created with NTT DoCoMo as the central entity, terms of entry were unclear to outsiders. In contrast, because membership in the GSM ecosystem was fixed by rules, its terms of entry were clear to outsiders. Hence, different barriers to entry influence the openness of the business ecosystem (Iansiti and Levien, 2004).

3.2 Different technological trajectories

The literature points out that the role of platform leader or keystone player affects the sound growth of a business ecosystem (Gawer and Cusumano, 2002; Iansiti and Levine, 2004). By exploring the role played by platform leaders in the GSM and NTT DoCoMo ecosystems, we aimed to examine the mechanisms that brought about their different technological trajectories.

As figure 3 shows, the platform leader in the NTT DoCoMo ecosystem is NTT DoCoMo. It provides a mobile Internet service, called i-mode, with an open interface to official and unofficial content providers (complementors). NTT DoCoMo, as a network operator, carried out service strategies to maximize its mobile communication cash flow by constructing complementary relationships between handsets and additional services. Therefore, NTT DoCoMo strengthened specified handset makers' participation in R&D in order to develop service-specific technology bundling handsets, network services, and additional services. As Tatsumoto (2011) argues, the complementary relationship between actors in the business ecosystem brings about network economics among them. However, this open mobile Internet

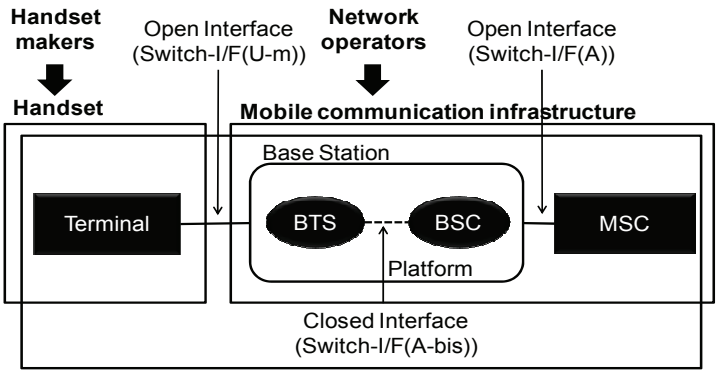
platform depended on service-specific technology bundling handsets, network services, and additional services, as controlled by NTT DoCoMo. Therefore, the network economics of the NTT DoCoMo ecosystem was limited (Iansiti and Levine, 2004).



Source: Natsuno (2000) p. 89.

Figure 3: NTT DoCoMo ecosystem platform

In contrast, the platform leaders in the GSM ecosystem are mobile phone makers, such as Nokia, Ericsson, and Motorola, who have the essential IPRs needed by GSM. Essential IPR holders such as handset makers carried out product strategies, taking advantage of economies of scale (Funk in Aoshima, Takeishi, and Cusumano, Eds., 2010). As figure 4 shows, Nokia and Ericsson, among the essential IPR holders, also implemented vertical integration strategies.



Source: Tatsumoto (2008b)

Figure 4: GSM ecosystem platform

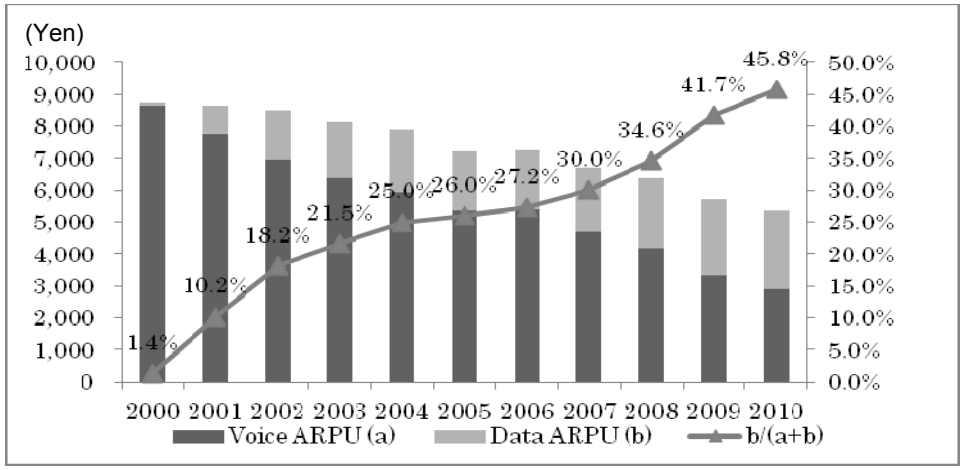
A supplying base station (BS) is composed of a base transceiver station (BTS) and base station controller (BSC) connected by a closed interface, and a Mobile Switching Centre (MSC). With these, Nokia and Ericsson could gain the competitive advantages of platform leadership and maintain essential IPRs in the GSM ecosystem. It was difficult to conduct R&D on handsets because of the lack of detailed GSM specifications. Therefore, in the early stages of GSM, only essential IPR holders with enhanced technology, such as Nokia, Ericsson and Motorola, could meet GSM's technical and safety requirements (Marukawa and Yasumoto, 2010). Although Samsung and LG entered the GSM markets in the late 1990s, they could not conduct R&D on products meeting GSM telecommunication standards.

It was not network operators, but essential IPR holders that led in the R&D efforts dealing with GSM telecommunication standards. As a result, the actors doing R&D into GSM mobile phones were distinct from the network operators. Thus, differences in the roles played by platform leaders affected the technological trajectories throughout the implementation of business strategies, based on their respective economic realities.

4. Competition between business ecosystems

4.1 NTT DoCoMo ecosystem's first-mover advantage

Network operators follow strategies that attempt to maximize mobile communication cash flow. By constructing complementary relationships between handsets and additional services through i-mode, NTT DoCoMo was able to earn the average revenue per user (ARPU), with growing income from data transfer as shown in figure 5 even during fierce competition for network services.

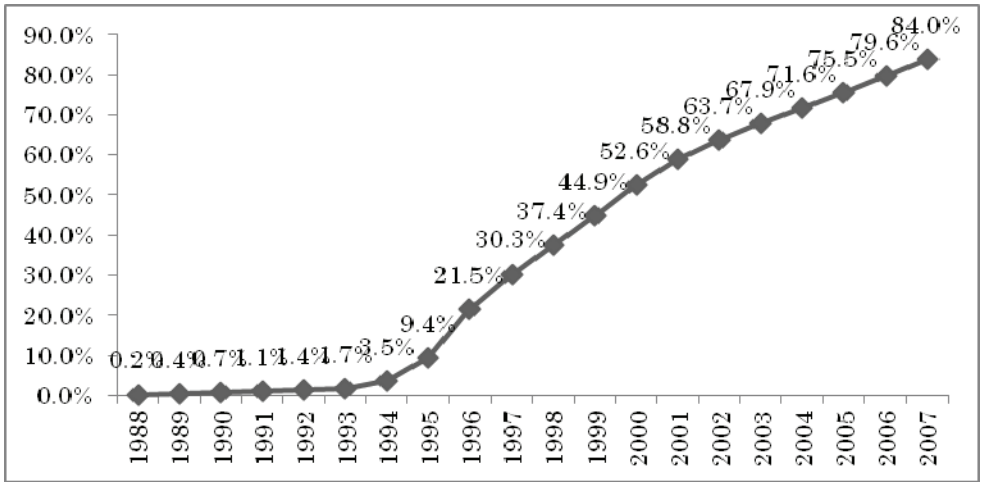


Source: NTT DoCoMo, (yearly) *Annual Report*

Figure 5: NTT DoCoMo ARPU by service

Another of NTT DoCoMo's significant strategies was to expand their mobile communication network area by globally standardizing W-CDMA. Therefore, NTT DoCoMo actively invested in R&D and diffusion of W-CDMA. As a result, the European Telecommunications Standards Institute (ETSI) decided to select W-CDMA as the third-generation European standard in January 1998 (Funk, 2002).

On the other hand, mobile phone manufacturers' strategies basically attempt to achieve economies of scale by selling mobile phones. However, Japan's mobile phone market was already mature in 2001, when 3G service was announced by NTT DoCoMo (see figure 6).



Source: Ministry of Internal Affairs and Communications, Japan

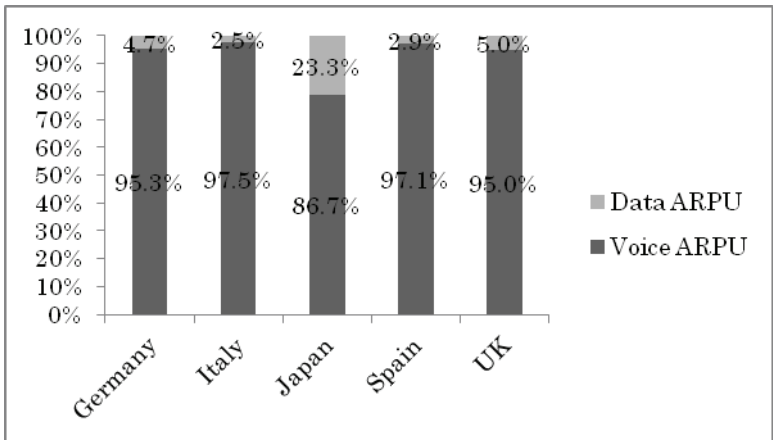
Figure 6: Saturation of mobile phones in the Japanese market

Japanese handset makers needed to reclaim replacement demand in the domestic market because their business in the overseas market was slack. Moreover, enhanced handsets, rather than an extensive product lineup, were effective in urging existing users to replace their old handsets. Thus, handset makers participating in the NTT DoCoMo ecosystem could benefit from the 3G technological knowhow accumulated through NTT DoCoMo's strategies. Hence, the choice of a first-mover

advantage by the Japanese mobile phone manufacturers was rational in the domestic market where W-CDMA had spread under NTT DoCoMo's leadership.

4.2 GSM ecosystem expansion strategy

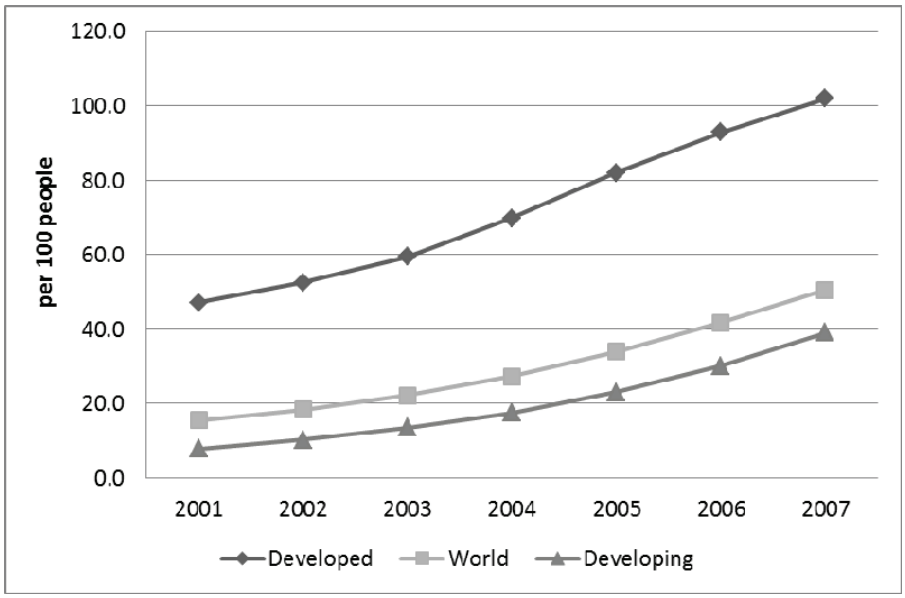
Compared to NTT DoCoMo, network operators in the GSM market did not have a way of creating added value except through voice ARPU, because mobile phone manufacturers that vertically integrated BS (Base Station) and MSC (Mobile Switching Centre) held the GSM ecosystem platform. As figure 7 shows, therefore, GSM network operators could not compensate for dropping voice ARPU with data ARPU.



Source: Vodafone Japan (2006) *Annual Report*

Figure 7: Vodafone ARPU by service and nation

Essential IPR holders, such as Nokia and Ericsson, who vertically integrated the mobile infrastructure, were able to exploit new markets for GSM communication across the world in order to obtain economies of scale in the 1990s. In the mid-2000s, GSM markets in developed countries reached maturity (see Figure 8).



Source: ITU World Telecommunication, ICT Indicators database

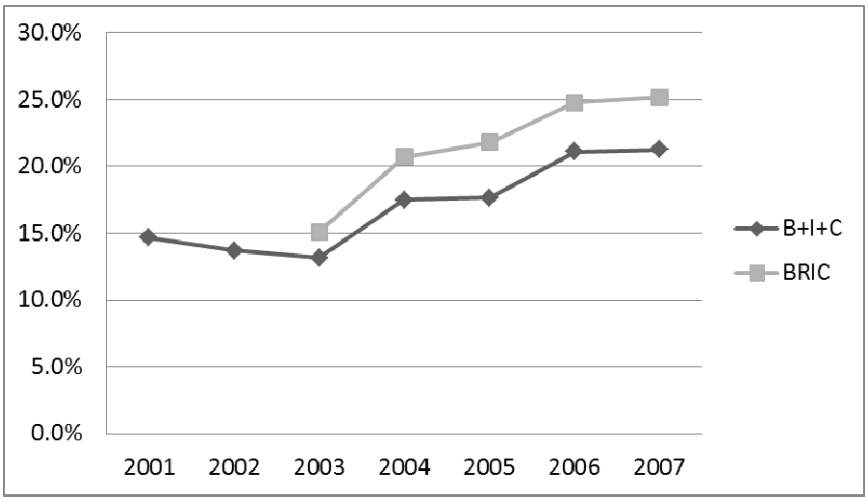
Note: The developed/developing country classifications follow UN M49.

Figure 8: Mobile phone subscriptions per 100 inhabitants 2001–2007

As figure 8 shows, the rate of mobile phone subscriptions had slowed, so essential IPR holders needed to implement new strategies. They had the option of conducting R&D on enhanced mobile phones as NTT DoCoMo did. However, they chose strategies to expand GSM mobile phones and infrastructures because there were no network operators that could conduct R&D on network services in GSM

markets. Therefore, essential IPR holders accelerated overseas expansion, especially in developing countries, rather than focusing on R&D and diffusion of enhanced mobile phones in developed countries. In fact, it was not until August 2007 that Nokia first launched mobile phones equipped with firm-specific services in London.

As figure 9 shows, the BRIC (Brazil, Russia, India, and China) shares of Nokia's mobile phone sales has increased. In 2007, their shares in Brazil, India, and China reached 21.2% and Brazil, Russia, India, and China accounted for 25.2% of Nokia's mobile phone sales.

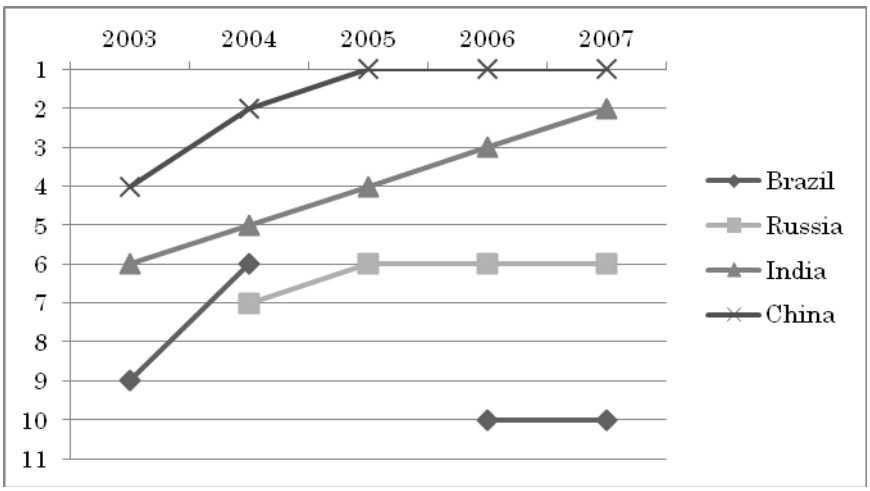


Source: Nokia, *Annual Report*

Note: Data before 2003 does not include Russia.

Figure 9: BRIC share of Nokia sales

Figure 10 shows Nokia's BRIC sales by country. China has held first place in Nokia's sales since 2005, with India and Russia also having strong sales.



Source: Nokia, *Annual Report*

Figure 10: Nokia's BRIC sales rankings

Thus, Nokia placed great importance on developing countries in the early 2000s. Nokia needed to launch mobile phones at lower prices in developing countries than in developed countries. Nokia did this by employing its existing technological platform (Funk in Aoshima, Takeishi, and Cusumano, Eds., 2010). Nokia has prepared production systems to correspond to a wide variety of digital communications and frequency bands since the middle of the 1990s. Employing its global platform allowed Nokia to invest in additional R&D, half done by Motorola and half by Japanese firms (Funk in Aoshima, Takeishi, and Cusumano, Eds., 2010; Funk, 2002). Nokia's production technology side supported this expansion strategy.

5. Habitat isolation as the result of competition between business ecosystems

An advantage for the NTT DoCoMo ecosystem was advanced technology based on technological knowledge accumulated under the leadership of NTT DoCoMo. In the domestic market, this promoted the diffusion of service-specific handsets. However, these mobile phones had too many advanced functions for the GSM market, which had different mobile communication standards.

On the other hand, an advantage for the GSM ecosystem was its greatest common denominator technology, which allowed rapid expansion of global model handsets. Handsets that were usable across GSM's communication area were effectively diffused in the global market and were successful in maintaining international roaming functions. However, the performance of such GSM handsets was inferior in Japan's market, where mobile phones with various advanced functions were entrenched.

Thus, the difference in the business strategies of the GSM and NTT DoCoMo ecosystems led to distinctly different technological innovations. As a result, Japan's habitat isolation was brought through competition between the business ecosystems.

6. Conclusions and implications

This study has investigated why the Japanese mobile phone industry fell into the Galapagos syndrome, focusing on competition between business ecosystems in the global mobile phone industry. First, we presented evidence that the different patterns of platform leadership and network formation led to the different structures of business ecosystems. While the NTT DoCoMo ecosystem was formed based on unclear commercial practices under the leadership of NTT DoCoMo, the GSM ecosystem was constructed based on clear rules under the leadership of mobile phone producers who held essential IPRs. These differences influenced the structure of the business ecosystems, more specifically, the openness of the business ecosystems' structures.

Second, the different structures of the business ecosystems led to differences in the technological trajectories they followed as the GSM and NTT DoCoMo ecosystems followed different business strategies. As a result, we have found that competition between business ecosystems with different structures led the Japanese mobile phone industry to its isolated Galapagos syndrome circumstances.

This case study describes how competition between business ecosystems with different structures may conclude. It has generated some important findings that help us understand recent changes in business strategy. Our research stream next needs to help us understand selection as the result of competition between business ecosystems. This implies that the complementary relationships between the actors in a business ecosystem influence network economics in diverse ways. Therefore, the next step in our study aims to scrutinize how different patterns in the structure of business ecosystems have influenced network economics.

Acknowledgements

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References

Adner, R., and Kapoor, R. (2010) "Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations," Strategic Management Journal, Vol. 31, No. 3, pp. 306–333.

Anchordoguy, M. (2005) *Reprogramming Japan: The High-Tech Crisis under Communitarian Capitalism*, Cornell University Press.

Aoshima, Y., Takeishi, A., and Cusumano, M. A. (Eds.) (2010) *End of "Made in Japan"?*, Toyokeizai Shinposha, Tokyo.

Baldwin, C. Y. and Clark, K. B. (2000) *Design Rules: The Power of Modularity*, MIT Press, Cambridge, MA.

Christensen, C. M. (1997) *The Innovator's Dilemma*, the President and Fellows of Harvard College, Cambridge, MA.

Chesbrough, H. W. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press, Cambridge, MA.

Cohen, W. M., and Levinthal, D. A. (1990) "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administrative Science Quarterly*, Vol. 35, No. 1, pp. 128–152.

Dittrich, K. and Duysters, G. (2007) "Networking as a Means to Strategy Change: The Case of Open Innovation in Mobile Telephony," *The Journal of Product Innovation Management*, Vol. 24, pp. 510–521.

Funk, J. L. (2002) *Global Competition Between and Within Standards: The Case of Mobile Phones*, Palgrave, NY.
Galaskiewicz, J. (1979) *Exchange Networks and Community Politics*. Sage Publications. California.
Gawer, A. and Cusmano, M. A. (2002) *Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*, Harvard Business School Press, Cambridge, MA.
Giachetti, C., and Marchi, G. (2011) "Evolution of Firms' Product Strategy over the Life Cycle of Technology-based Industries: A Case of the Global Mobile Phone Industry, 1980–2009," *Business History*, Vol. 52, No. 7, pp. 1123–1150.
Goldman, S. L., Nagel, R. N., and Preiss, K. (1995) *Agile Competition: Virtual Organization Strategies for Enriching the Customer*, International Thomson Publishing.
Gulati, R. (1999) "Network Location and Learning: The Influence of Network Resources and Firm Capabilities on Alliance Formation," *Strategic Management Journal*, Vol. 20, No. 5, pp. 397–420.
Iansiti, M. and Levien, R. (2004) *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*, Harvard Business School Press, Cambridge MA.
Langlois, R. N. (2007) *The Dynamics of Industrial Capitalism: Schumpeter, Chandler, and the New Economy*, Routledge.
Larson, A. (1992) "Network Dyads in Entrepreneurial Settings: A Study of the Governance of Exchange Relationships," *Administrative Science Quarterly*, Vol. 37, No.1, pp. 76–104.
Marukawa, T., and Yasumoto, M. (2010) *The Evolution of Mobile Phone Industry: Why Japan has Been Isolated in the World*, Yuhikaku, Tokyo.
Moore, J. F. (1996) *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*, Harper Business, NY.
Natsuno, T. (2000) *Ai-modo Sutorateji [i-mode Strategy]*, Nikkei BP, Tokyo.
NRI (Nomura Research Institute), (2008) *Garapagosuka suru Nihon [Japan in Galapagos syndrome]*.
Nelson, R. R. (Ed.). (1993) *National Innovation Systems: a Comparative Analysis*. Oxford University Press, New York; Oxford.
Osaki, T. (2008) *Nihon no Keitai Denwa Tanmatsu to Kokusai Shijo: Dejitaru Jidai no Marketing Senryaku [Japanese Mobile Handsets and Global Market: Marketing Strategy in the Digital Era]*, Sosei-sha, Tokyo.
Shimizu, H. (2011) "Scientific Breakthroughs and Networks in the Case of Semiconductor Laser Technology in the US and Japan, 1960s-2000s," *Australian Economic History Review*, Vol. 51, No.1, pp. 71–96.
Tatsumoto, H. (2008a) "GSM Keitai Denwa-1 Hyojunka Procesu to Sangyo Kyosoryoku: Oshu wa Donoyouni Tsushin Sangyo no Kyosoryoku wo Nobashitaka [GSM Mobile Phone-3 Standardization Process and Competitiveness of Industry: How EU Expanded Competitiveness in the Mobile Phone Industry]," *MMRC Discussion Paper*, No. 191, pp. 1–23.
Tatsumoto, H. (2008b) "GSM Keitai Denwa-3 Akitecucha to Purattofomu: Oshu wa Donoyouni Tsushin Sangyo no Kyosoryoku wo Nobashitaka [GSM Mobile Phone-3 Architecture and Platform: How EU Expanded Competitiveness in the Mobile Phone Industry]," *MMRC Discussion Paper*, No. 204.
Tatsumoto, H. (2011) "Opun Inobeshon to Bijinesu Ekoshisutemu [Open Innovation and Business Ecosystem]," Soshiki Kagaku [Organizational Science], Vol. 45, No. 2, pp. 60–73.
Teece, D. J. (2007) "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal*, Vol. 28, No. 13, pp. 1319–1350.

Networks of Growth: The Case of Young Innovative Companies in Finland

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Abstract: In this paper, we explore a vital part of the Finnish innovation ecosystem: young, innovative companies that are supported for fast international growth. Highlighting the importance of networks, we proceed to analyze the perceived existing relationships these companies have with other companies, financing organizations as well as with individuals taking part in their co-creation. We propose that these existing relationships, or connections, may be used to explain the firm as a resource integrator within a network, contributing to its growth and success. Overall, we propose that network analysis and resulting network visualizations can provide novel insights into the understanding of possibilities for global growth and success.

Keywords: innovation, growth, networks, network analysis, young companies

1. Introduction

Networks (whether you call them innovation networks or business networks) address the notion that value creation, and especially innovation activities, are rarely carried out within a single organization in the flat-world economy (Friedman, 2005). Rather, resources are extracted from multiple sources; see e.g. Triple Helix Model highlighting the university-business-government interactions (Etzkowitz and Leydesdorff 2000); open innovation referring to the idea that ideas could come from both inside or outside of the company (Chesbrough 2003), and co-creation emphasizing collaboration with customers, suppliers and other stakeholders (Ramaswamy and Gouillart 2010). Service-dominant logic takes this even further as it states that all economic and social actors are resource integrators, implying that the context of value creation is in networks (Vargo and Lusch 2004, Vargo 2009). These networks rely on the infrastructure of relationships of people and organizations, and relationships are recognized as channels through which resources flow (Wind and Fung 2008), in forms such as linkages between executives (Ibarra and Hansen 2011). Therefore, in the background of this study is the understanding that innovation takes place in the context of relationships that form a network via the linkages between firms and their human and financial resources (Russell et al. 2011), manifesting between people, in teams, organizations as well as between organisations.

In this study, we explore approaches for understanding the participation of a company in the networked world. We propose that looking at existing relationships of firms as resource integrators according to Vargo provides glimpses of the participation of the company, and can show the channels, or access, to needed resources, or other resource integrators in the network. Flows of knowledge are also recognized as important resources in networks: sharing, acquiring and deploying knowledge is integral in networks (Dhanaraj and Parkhe 2006). On individual level good communication and social skills, and interactions are seen important; on organizational level formal and informal communication channels and knowledge exchange forums are highlighted for creating a strong reputation that enhances operating in networked environments (Ritala et al. 2009).

As network actors are clearly social actors, we propose using social network analysis (SNA, which has been used for several decades to study the sociological relationships of people and organization) to gain insights into the social configurations of the network (Wellman and Berkowitz 1988; Wasserman and Faust 1994). For example, network analysis has been used to study the interdependence of industries and nations (Yim and Kang 2008) as well as the dependence of

innovation networks on knowledge flows (Owen-Smith and Powell 2004) and to explore the investment flows into an innovation ecosystem (Huhtamäki et al. 2011). One of the benefits of network analysis is in enabling investigators of networks to gain insight in the social configurations of the networks and in supporting them in communicating their findings to others (Freeman 2009).

2. Research methodology: Case young innovative companies in Finland

We will be using a case-study methodology into exploring the possibilities of growth and success of SME companies, and the role of networks in it. The explanatory nature of a case study approach, and its applicability to social studies (Yin 1994) guided our selection. In addition, case-study methodology is seen to provide detailed and analysed information about real world environments which can be seen as examples of phenomena under research, allowing the researcher to answer "how" and "why" questions (Benbasat 1987), which are seen relevant for this study.

We will be using an integral part of the Finnish innovation ecosystem called "Program for funding young innovative companies" as our case environment. The case environment is presented as an example of an approach to take in order to gain insight on the people- and investor-based networks surrounding and possibly interconnecting companies.

2.1 Program for young innovative companies in Finland

According to Statistics Finland, "Of all enterprises, 99.1 per cent were small enterprises, that is, employing under 50 persons. They employed 48 per cent of all personnel and accounted for 35 per cent of total turnover (http://www.stat.fi/til/syr/2010/syr_2010_2011-11-25_tie_001_en.html). Overall, the contribution of small companies to Finnish society and its wealth creation as well as employment creation is enormous. Consequently, the Finnish innovation ecosystem and its guiding policies have recently been emphasizing the role of these SMEs, start-ups and growth companies, also due to the changes attributed to restructuring of Nokia Corporation.

The Finnish Funding Agency for technology and development Tekes has a major role in building and sustaining the Finnish innovation ecosystem, through funding and other services that it provides for individual companies as well as clusters of organizations. In 2011 Tekes made funding decisions regarding 1,928 projects, which resulted in total investment of €610 million, of which 58 per cent was targeted at SMEs (Tekes annual review 2011, http://www.tekes.fi/u/Annual_Review_2011.pdf). Tekes new strategy reflects the new emphasis in Finland: it states that it gives priority to growth-seeking, innovative SMEs (http://www.tekes.fi/en/community/Structure/557/Structure/1428).

One example of the Tekes strategy is program for "funding for young innovative companies", supporting young companies for international growth. Through it, Tekes not only provides funding resources, but also other resources, such as expertise and experience of its personnel, access to accelerator environments, and as well as its connections, for the selected companies so that they can grow and succeed in global markets. This program was initiated in 2011. It is intended for a company that (1) has a capacity and willingness to strive for fast international growth, (2) has products or services that can generate considerable business, (3) has a credible growth plan, and a committed and skilled management team, (4) has been in operation for less than 6 years and is small, and (5) invests strongly in innovation activities (http://www.tekes.fi/en/community/Young_innovative_growth_enterprises/1155/Young_innovative_growth_enterprises/2528).

2.2 Using social media data

Our approach to explaining the possibilities for growth and success for young innovative companies is to show how the companies participate in the world, seen through the lense of social media. Towards this goal, we will be using data-driven, network centric methods and two sets of data. First, this study takes and extends the approach of Ecosystem Network Analysis that has been applied e.g. when looking into the co-creator configuration of Finnish Innovation Ecosystem (Huhtamäki et al. 2011). Accordingly, as data source, the IEN dataset (Rubens et al. 2010) will be used: a socially constructed dataset, which is built by crawling the Internet for socially curated information on press-worthy technology-based companies, their executives and board level personnel, and investment organizations as well as transaction flows. It is socially constructed, like Wikipedia, referring to the fact that individuals can add data to it when they want (they can also verify and correct its data), therefore contributing to its availability and timeliness, but also to its potentially erroneous data and public bias.

Therefore, it basically has the power to combine the interesting activities happening in technology-based companies, and can show how different actors are connected. The dataset is a rather large one: in April 2012 it includes over 100,000 people, 80,000 companies and 7,000 financial organizations, and is based on sources in English. We see that when something interesting and newsworthy happens in the company, it wants to share its news and communicates through its web site, press releases, or through its social media activities which also allows for engagement with the surrounding ecosystem resulting in impacting the perception of the company. This interesting information can prompt individuals within the company or outside the company to add its information that then ends to IEN dataset and eventually to network analysis.

> *Our assumption is that at least some of the Young Innovative Companies are included in the IEN dataset. The resulting visualizations of their relationships to other individuals, organizations and investors may provide insights into understanding ways to act as resource integrators for growth.*

The second method of analysis looks at social media presence of Young Innovative Companies from a different perspective. Therefore, it is proposed to provide findings for bringing forth at least some of their activities in attracting resources and using their resources for engaging the innovation ecosystem around them, impacting the perception of the company. This provides an alternative and, at the same time, broader view of social networks surrounding the companies. For example, it allows for bringing forth the activities of users and customers in relation to the individual company. Hence, we reached for Twitter as a social media allowing relatively straightforward data-collection in real-time.

> *Our assumption is that especially using social media the companies want to interact with their environment. By looking at their Twitter activities, we can see the networks of their resource integration interactions, including those with users and customers, within this social media platform.*

3. Findings

Our findings present the two separate, yet interrelated sets of analysis and resulting visualizations that explain how young innovative companies that are part of the Tekes program are seen to participate in the world. For visualization, we used Gephi, an open interactive visualization and exploration platform for networks (Bastian, Heymann and Jacomy, 2009) for graph metrics, visualization and layout. Traversing and other network-creation procedures are implemented as Python-based batch processes. MongoDB, an open source document-oriented NoSQL database system, was used for managing the data.

3.1 Networks based on IEN dataset

In their public website, Tekes provides a list of companies that were included in its Young Innovative companies program by 31.12.2011. In all, 94 companies are listed. As only the name of the company is mentioned, we applied a fuzzy text-matching algorithm Levenshtein to bring up the potential company instances in IEN Dataset. To ensure that we do not include any false positive matches or miss false negatives, we set the match threshold to 0.7 and double-checked the matches manually. A total of 33 (contributing to 35 percent) of the Young Innovative Companies were found in IEN dataset. For these companies, we could proceed with the network analysis. To present the individuals and investors co-creating companies within the Finnish innovation ecosystem, we processed the network layout in two stages: (1) cluster-based stage, (2) relation-based compacting stage. In the cluster-based stage we use OpenOrd layout algorithm (Martin, Brown, Klavans and Boyack 2011) since it produces a layout that allows us to better distinguishing clusters based on the interconnections between the nodes. We then apply the Force Atlas (Bastian, Heymann and Jacomy 2009) to compact the graph (nodes that are connected to each other are pulled closer together) and to make the representation more easy to read and aesthetically pleasing. The network visualizations are embedded in the document by using vector graphics so it is possible to look at network details by zooming in. Modeling of the network is an important part of the visualization process. Here, the resulting network is a directed one with connections pointing from individuals and investors towards companies. Instead of using node outdegree for sizing the nodes (cf. Huhtamäki et al. 2011), we chose to size the nodes proportional to their betweenness centrality, i.e. the amount of times a node is included in the shortest path between any two nodes in the network. Betweenness was select to highlight the individuals, companies and investors that have an important connecting role in the network as a whole instead of solely having a large amount of direct connections. For easier viewing, we used different colors to characterize the three kinds of nodes in the network: light blue nodes

represent Young Innovative Companies, green nodes represent venture capital investors – individual people, companies and financial organizations that have invested to at least one Young Innovative Company, and blue nodes represent people that have a press worthy relationship to a company. The positions of individuals vary from CEO and board membership to positions on research and development activities. However, for this visualization we have removed the names of individuals, as we recognize the limitations of the dataset as well as want to emphasize the patterns instead of particular individuals. Then, for easier storytelling purposes, we split the visualization process into two steps. Both present the networks and relationships of Young Innovative Companies. The first visualization (Figure 1) presents the direct network of Young Innovative Companies, showing the people that are working or have been working in the companies, and the investors (both individuals as well as organizations) that have invested in these companies. Tekes Young Innovative Companies (YIC) program is in the center, as it is the connecting entity through its financing activities (all of the Young Innovative Companies are connected to it). The network visualization also shows the connections between these actors: (a) some individuals are connected with more than one company, and (b) some investors are connected with more than one company. It hence introduces a network of 119 actors and 130 connections. We can see that several companies have clusters of actors around them, indicating the number of their direct connections. The participation of investors in this network, marked by green nodes, is also clear.

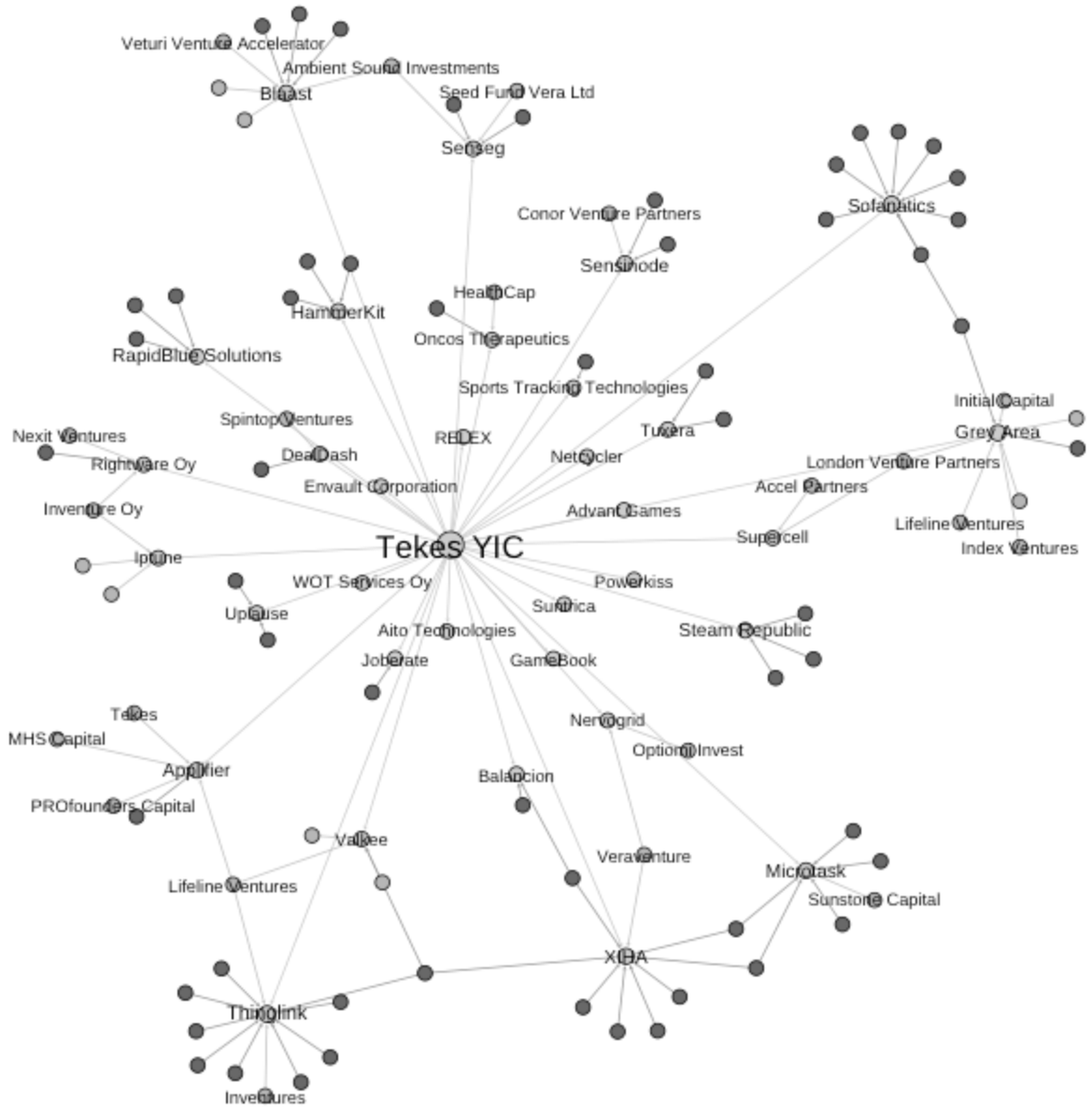


Figure 1: 1-step network visualization of the Tekes Young Innovative Companies and their direct connections

The second visualization (Figure 2) provides a view toward the horizon behind the immediate connections. We traverse through each individual in the first level network to include all companies, represented in red, that the people are connected into but not included in Tekes Young Innovative Companies program. Moreover, people and investors related to the newly added companies are included. The visualization hence adds new actors and connections beyond the direct connections, introducing a network total of 786 actors and 815 connections—a network that could be within reach for Young Innovative Companies in their resource integrating activities. The clusters of individuals and investors around Young Innovative Companies as well as their related companies become evident in the visualization. Due to the visualization technique (node size indicating the betweenness of the actor), one node representing an individual stands out: according to the data, this person is the only individual directly connecting Nokia with Google (the latter with a large number of individuals connected with it), which of course is a significant role. In all, this individual is connected to 12 companies, out of which 3 are included in Tekes Young Innovate Companies program. Further, the presence of Google becomes dominant due to the number of individuals connected. While this may not be truly representative of the Finnish innovation ecosystem, it reflects the global nature of networks as well as Google's key role in the global innovation ecosystem.

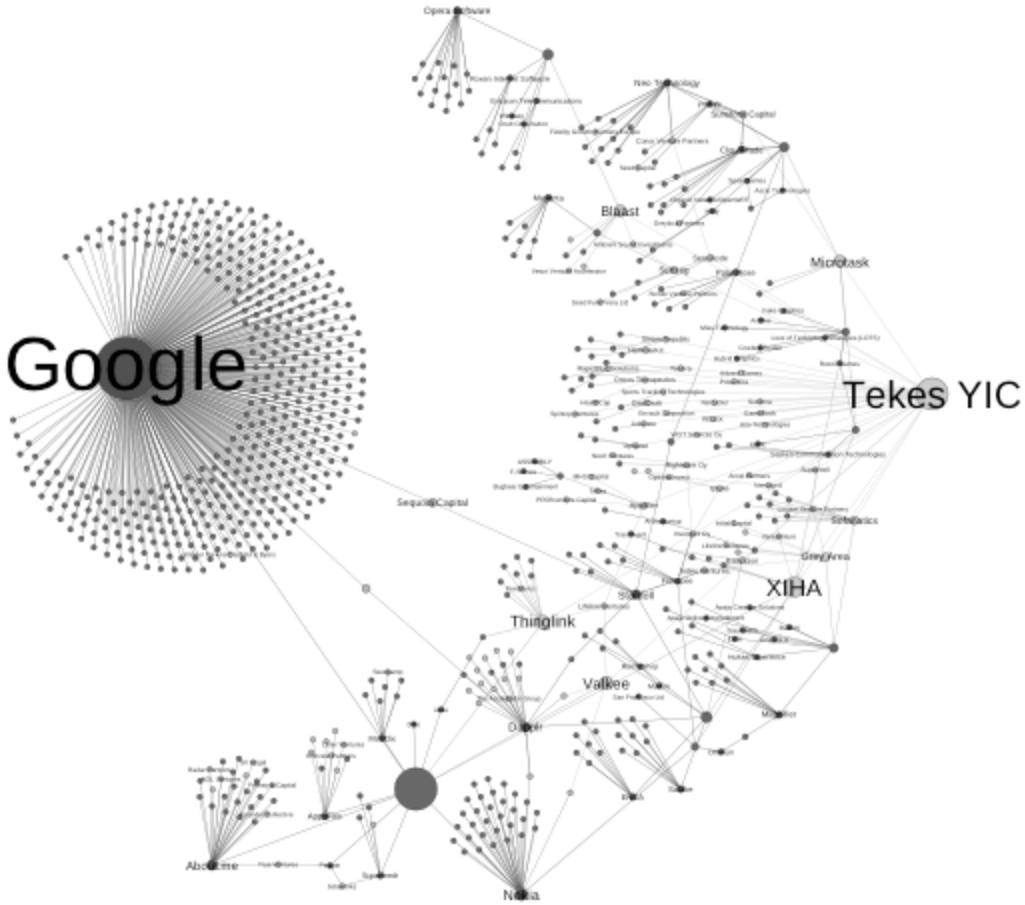


Figure 2: 3-step network visualization of Tekes Young Innovative Companies, their direct connections and the companies, investors and individuals that can be reached through the direct connections

3.2 Networks based on Twitter

For a list of Twitter accounts of Young Innovative companies, we first queried the IEN Dataset and complemented the list by manually adding the missing account information. In all, 46 Twitter accounts were found for the 94 Tekes Young Innovative Companies (49 %). Through a tailor-made batch script, we collected followers for each company through the Twitter API. A total of more than 70 000 followers were found for the companies.

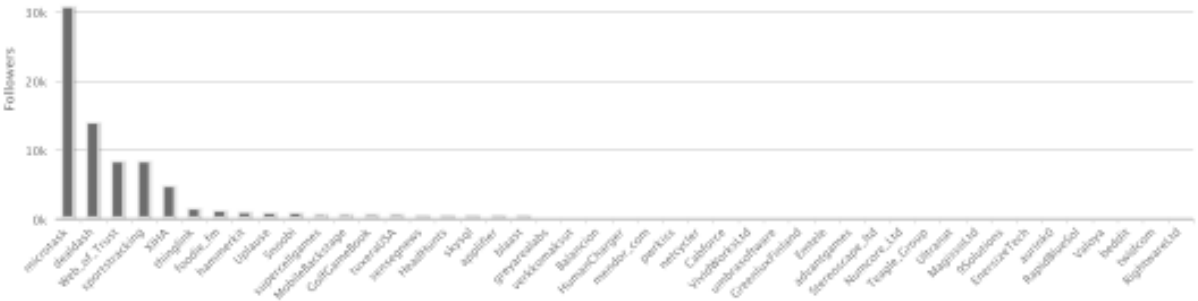


Figure 3: The distribution of Twitter follower count for Tekes Young Innovative Companies

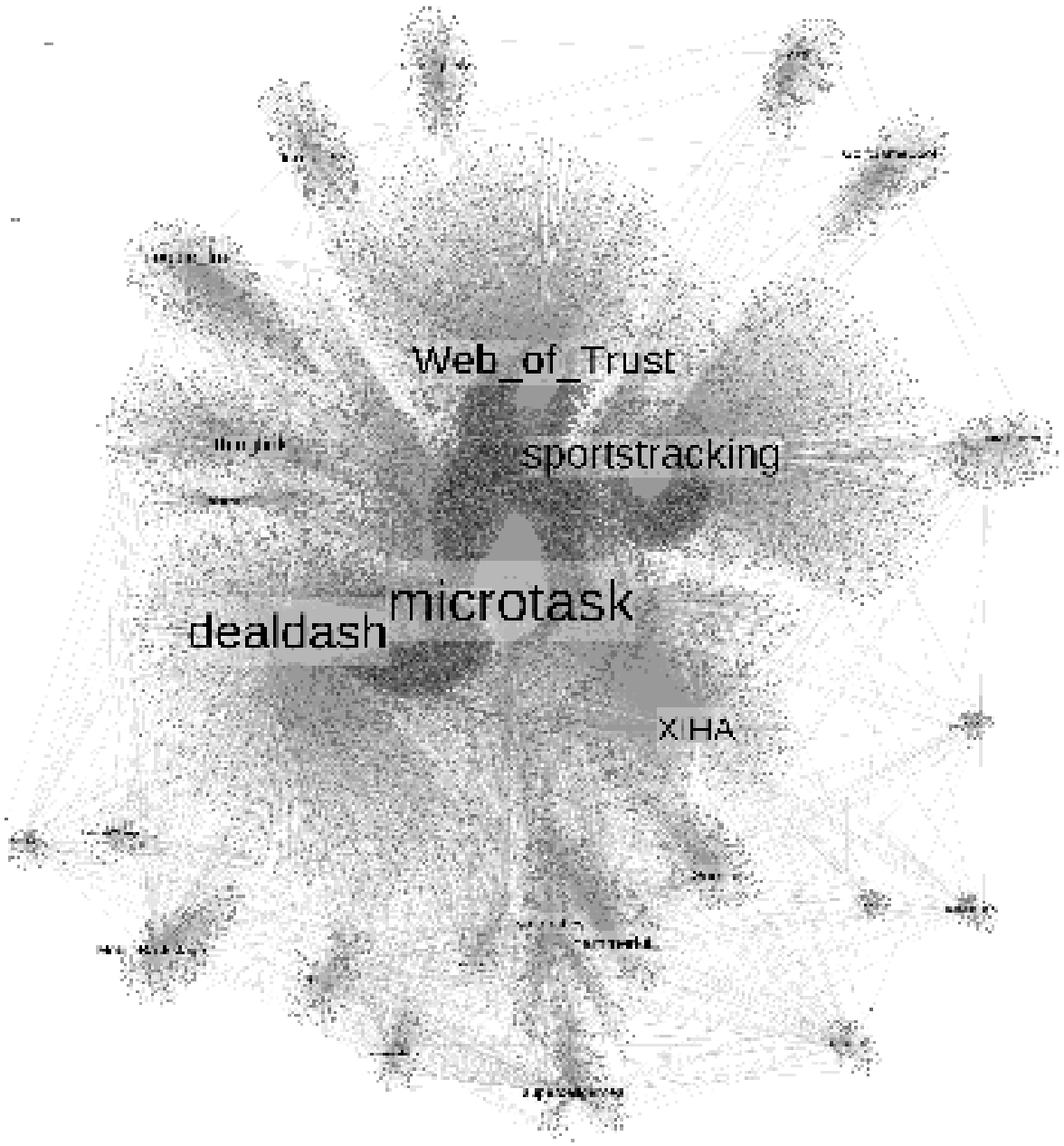


Figure 4: Network of Tekes Young Innovative Companies and their followers

Figure 3 shows the distribution of Twitter follower count for the different companies. As we can see, Microtask (http://www.microtask.com/), a company providing solutions to human powered document processing, has attracted over 30,000 followers and a few other companies have some thousands of followers. However, for most of the companies the follower count is small. This power law like distribution is commonly found in networks that are scale free (Barabási and Bonabeau 2003): this

means that as a result of the process of preferential attachment, one actor dominates the connections in a network. We see that in this context, direct conclusions should not be drawn from the values for individual companies. Rather, a more valuable approach for providing insights on follower data is to create an overall or ecosystemic view to the companies.

For showing the Twitter-mediated interlinkages between the companies, we created a union of 1-step egocentric networks. In other words, the followers of a company were connected to a company with a directed connection but the connections between the followers were not included. Again, a combination of clustering and relation-based compacting stages were used to layout the network. The resulting visualization in Figure 4 shows all the 72,880 nodes and 75,755 connections in the network and can be used to pinpoint e.g. patterns in follower-based connections between the companies. We chose to present a view to the network where node size is representational to its indegree, i.e. the number of Twitter followers of a company. We acknowledge that the modeling and visualization design decisions depend on the questions that one seeks to discuss and answer with the help of the network: if one would be interested in finding the most active followers in the network, node size should be proportional to its outdegree. To find the companies that are most strongly connected to each other through shared followers, a one mode network of companies could be created with connection weight proportional to the number of shared followers. For example, Microtask shares the most amount of followers with other companies: 444 followers with XIHA; 188 with Web of Trust and 155 with Hammerkit.

4. Discussion

Our goal was to explore the networks of growth of Tekes Young Innovative Companies using social network analysis, social media data and network visualizations. We wanted to highlight the role of companies as resource integrators within networks, acting with other resource integrators in order to succeed and grow. Through the process from social media data through analysis we produced concrete visualizations of the networks. Our findings made visible the existing relationships that young Innovative Companies in Finland have: (1) directly with individuals and financing organizations, (2) with individuals, other organizations and financing organizations within their reach, and (3) with people and organizations interacting with them. They show that Young Innovative Companies already have connections (both direct and indirect ones) with a number of individuals and organizations through which they can access resources and interact with resources needed for their growth and success, and due to the nature of data from social media, these visualizations are rather timely snapshots. Hence, we want to highlight that the results are often not generalizable or conclusive. This should not come as a surprise when taking into account the complex, paradoxical and context-sensitive nature of innovation.

First, we evaluated the process and results internally. Initially, we explored the fact that not all Young Innovative Companies were found in the IEN dataset. Through the analysis of their websites, we found out that only a few of the companies did not have their web site in English and that most of them actively issue press releases and news to communicate about them (also in English)—therefore they seem to be actively gearing for international communication and presence, and have the potential for being added into the IEN dataset, furthermore demonstrating the applicability of using the IEN dataset for analysing this sample of the Finnish innovation ecosystem. However, to be included into the IEN dataset requires activities of individuals for recognizing and adding entities to it (either within or outside of the companies), which means that we acknowledge that there are individuals, companies, and financing organizations missing from it, which can be explained with the concept “public bias”. In addition, we addressed the limited connections that are visible in the IEN dataset: for example, we know that certain individuals are married, have gone to school together, and might be neighbors—these connections are not visible in the IEN dataset nor in Twitter data, altogether highlighting the fact that some actions take place in social media or can be traced through social media and some remain outside of it.

As our proposition is that the network visualizations can provide insights for Young Innovative Companies as well as for the ecosystem trying to support them, we then presented the visualizations to experts of the Finnish innovation ecosystem at Tekes for their evaluation, and discussed the value of the process and the results with them. We noted that as network analysis and visualizations are not traditional ways of exploring innovation, the first reaction was “interesting, fascinating”, followed by questions (1) about the methods of producing the visualization: Why is this individual node so big? What do these different colors of line mean? and (2) about the meaning of the overall results: Is this

about gatekeepers in networks? About weak ties? Is this a system? What is the bigger phenomenon that can be explained with these visualizations? Only after arriving in the shared understanding about the visualizations and what they represent, the experts had comments about insights of them: for example, one of them commented that “I would have expected company X to have more connections”. One novelty offered by the visualizations was clearly that it showed the investors within the network— this was something that the experts had not seen before and something that the data they have routinely access to does not show. They then proceeded to provide suggestions for allowing for better and clearer insights: indicating by color the Finnish and international actors of the networks, indicating the specific market segments of companies (for example mobile, gaming, pharma etc.), and bringing in timelines, for example for showing what connections have formed after the company has become participant of the Tekes Young Innovative Companies program.

The kind of modeling used in both parts of this study can be utilized to create network views for further insights on several complementary aspects. First, due to the fact that the networks are directed, node indegree and outdegree values can be used to highlight actors in different roles. In Twitter analysis, for example, the companies that have the most followers have a large indegree and the Twitter users that follow many companies a large outdegree. Second, as the first part of the study shows, betweenness value provides an easy and intuitive way to find actors that have a particularly significant role as connectors in the network. Finally, the network can be filtered or split to smaller pieces e.g. in Twitter case to find individuals following a specific set of companies, for example, operating in the same domain.

We are tempted to suggest the process of navigation as a metaphor or analogy for the kind of cartography we provide here: while being a long way from a modern proactive car navigator, the visualizations shown here make the topology of parts of innovation ecosystem explicit. Indeed, visual network analysis affords investigators insights on the (often latent) (social) configurations of the networks and allows sharing the insights to others (cf. Freeman 2009). The results presented in this article represent the first evolution of the analysis. In order to validate the approach, we plan to engage with different stakeholders to see both what is missing from the networks and, even more interestingly, what are the new insights that the networks afford the stakeholders.

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References

Barabási, A.-L. and Bonabeau, E. (2003). Scale-Free Networks. *Scientific American*, 288(5), 50–59.

Bastian, M., Heymann, S., & Jacomy, M. (2009). Gephi: An Open Source Software for Exploring and Manipulating Networks. Presented at the International AAAI Conference on Weblogs and Social Media, San Jose, California,USA.

Benbasat, I., Goldstein, D.K.and Mead, M. (1987). The Case Strategy in Studies of Information Systems. MIS Quarterly, 11 (3): 369-386.

Chesbrough, H. (2003). Open Innovation: The New Perspective for Creating and Profiting from Technology. Boston: Harvard Business School Press.

Dhanaraj, C. and Parkhe, A. (2006). Orchestrating innovation networks. Academy of Management Review, Vol. 31, No. 3, pp. 659-669.

Etzkowitz, H. and Leydesdorff, L. (2000). The Dynamics of Innovation: From National Systems and ‘Mode2’ to Triple Helix of University-Industry-Government Relations. Research Policy, 29 (2): 109-123.

Freeman, L.C. (2009). Methods of social network visualization. Encyclopedia of Complexity and System Science. Springer: Berlin.

Friedman, T. (2005). The World is Flat: A Brief History of the Twenty-First Century. Farrar, Straus and Giroux: New York.

Huhtamäki, J., Russell, M.G., Still, K. and Rubens, N. (2011). A Network-Centric Snapshot of Value Co-Creation in Finnish Innovation Financing. Open Source Business Resource, March 2011.

Ibarra, H. and Hansen, M.T. (2011). Are you a Collaborative Leader? Harvard Business Review, July-August, 69-74.

Martin, S., Brown, W. M., Klavans, R., & Boyack, K. W. (2011). OpenOrd: an open-source toolbox for large graph layout. Presented at the Visualization and Data Analysis 2011, San Francisco Airport, California, USA. doi:10.1117/12.871402

Owen-Smith, J. and Powell, W.W. (2004). Knowledge Networks as Channels and Conduits: The Effects of Spillovers in the Boston Biotechnology Community. Organization Science, 15: 5-12.

Ramaswamy, V. & Gouillart, F. (2010). Building the Co-Creative Enterprise. Harvard Business Review, 88(10).
Ritala, P., Armila, L. and Blomqvist, K. (2009). Innovation Orchestration Capability—Defining the Organizational and Individual Level Determinants. International Journal of Innovation Management, Vol. 13, No. 4, (569-591).
Rubens, N., Still, K., Huhtamäki, J. & Russell, M.G. (2010). Leveraging Social Media for Analysis of Innovation Players and Their Moves. Innovation Ecosystems Network, Media X, at Stanford University.
Russell, M.G., Still, K., Huhtamäki, J., Yu, C. and Rubens, N. (2011). Transforming Innovation Ecosystems through Shared Vision and Network Orchestration. Proceedings of Triple Helix Conference.
Tekes annual review 2011, http://www.tekes.fi/u/Annual_Review_2011.pdf
Vargo, S. and Lusch, R.F. (2004). Evolving to a New Dominant Logic for Marketing. Journal of Marketing, Vol. 68 (January 2004), 1-17.
Vargo, S. (2009). Toward a transcending conceptualization of relationship: a service-dominant logic perspective. Journal of Business and Industrial Marketing, 24/5/6 (2009) 373-379.
Wasserman,S. and Faust, K. (1994). Social Network Analysis: Methods and Applications. 1st Edition. New York, NY: Cambridge University Press.
Wellman, B. (1988). Structural Analysis: From Method and Metaphor to Theory and Substance. In Wellman, B. and Berkowitz, S.D. (Eds.) (1988) Social Structures: A Network Approach. Cambridge University Press: New York, NY, 19-61.
Wind, J., Fung, V.K.K. and Fung, W (2008). Competing in a Flat World: Building Enterprises for a Borderless World. Wharton University Publishing: Upper Saddle River, NJ.
Yim, D.S. and Kang, B. (2008). Policy Options of Establishing Effective Subnational Innovation Systems and Technological Capacity-building. Asia-Pacific Trade and Investment Review, 4, 115-137.
Yin, R. (1994). Case study research: Design and methods. 2nd edition. Beverly Hills, CA: Sage Publishing.

Spin-Off Performance: Entrepreneurial Capabilities and Social Networks of the Founders in the Creation Period

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Abstract: This study examines spin-off performance from the perspectives of resource-based view and social networks of the founders. This explores the roles of pre-established factors in the financial and operational performance of a new venture. Such factors comprise entrepreneurial capabilities and social networks of the entrepreneurs before the spin-offs were established. These capabilities are constituted by technology, organizational capability, human resource, strategy, and commercial capability. The social networks are analyzed in structure, governance, and content dimensions. Based on the data from 181 university spin-offs in Spain, the paper empirically demonstrates that the entrepreneurial capabilities positively influence the performance of the spin-offs. The social networks of the founders indirectly affect the spin-off performance through enhancing the entrepreneurial capabilities.

Keywords: university spin-offs, resource-based review, social networks

1. Introduction

Many scholars have studied the success of university spin-offs through the influences of internal and external factor approaches. Although an entrepreneurship process comprises both foundation and development phases, most of the scholars have focused on the later stage. Several scholars have studied the influences of a new firm's capabilities on its performance, but have omitted how social capital and entrepreneurial capabilities of the entrepreneurial teams contribute to an entrepreneurship process. Most of the European researches have focused on the environment that influences the spin-offs (Welter & Lasch, 2008). In environment aspect, social dimensions of entrepreneurship studies were initially discussed in Europe (Landstrom, 2005). O'Donnell et al. (2001) generally classified entrepreneurial networks into inter-organizational networks and personal networks. This topic has increased in empirical studies, but most have emphasized the structural elements of network players (Larson & Starr, 1993). In resource-based entrepreneurship studies, most of scholars have accented the influences of entrepreneur's capabilities on several stages of a creation process, such as new idea creation, opportunity recognition, or opportunity framing. However, social network characteristics are also studied on content and governance dimensions (Amit & Zott, 2001), and a spin-off performance must be considered with the contributions of entrepreneurial capability of founders in the creation process. By examined the influences of entrepreneurial capabilities and social networks of the founders on a spin-off performance, this study covered the theoretical gap that neglected the contributions of pre-established factors to the post-established aspects. To delineate the research's goals, we determined the Spanish university spin-offs as the study's subjects.

2. Definitions, concepts, and hypotheses

A university spin-off refers to a new company that was founded by current students or faculty of universities to exploit their inventions, and was based on the formal or informal transfers of invented technologies or knowledge (Smilor, 1990). In the creation period, the entrepreneurs mostly prefer internal funding, but others explore external funding such as the banking debts and loans. The universities prefer capitalizing from alternative sources based on university's reputation or networks (Roberts, 1991). The potential investors evaluate the professional managements and commercial experiences of the founding teams in developing and exploiting the technology platforms. The entrepreneurs cannot disclose all of their inventions, which determine their competitive advances, lead to the potential investors make their decisions base on the limited information (Shane, 2004). The information asymmetries push the investors into risky choices lead to pursue an untalented project of commercial opportunities with potentially restricted values instead of choosing a talented project (Sahlman, 1990). The uncertainties yield difficulties to investors in opportunity evaluations, and generate the disagreements between entrepreneurs and investors about the profitability of the projects (Shane & Stuart, 2002). To surmount the information asymmetries and uncertainties, the entrepreneurs must demonstrate the spin-off's values and exploit social capital (Shane, 2004).

The theory of organizational effectiveness has developed and concerned on the competing theories, values, and views about management. The organizational effectiveness cannot be one universal

model (Cameron & Whetten, 1983) and must be multidimensional (Wiklund & Shepherd, 2005). To measure the spin-off's performances, the entrepreneurship theory employed all models of organizational effectiveness (Cooper & Artz, 1995). A spin-off's performance comprises financial performance (Markman & Gartner, 2002), operational performance (Venkatraman & Grant, 1986), and venture longevity (Baron & Markman, 2003). In this study, we utilized financial and operational performance factors to measure the performance of a new venture (Murphy, Trailer, & Hill, 1996).

To maintain market competencies, firms necessitate accommodating to the changes of customer demands. Firms must continuously innovate and update their knowledge related to the changes of social, demographic, technological, economic, and political trends before their competitors do (Bharadwaj, Varadarajan, & Fahy, 1993). The founders of a spin-off must manipulate affectively the entrepreneurial, managerial, and technical-functional roles (Pavett & Lau, 1983). Many prior studies have found that spin-off's initial resources positively relate to their subsequent performances (Cooper, Gimeno-Gascon, & Woo, 1994). Other entrepreneurship researchers propose that there are relationships between the original resources and performance of a new venture (Baron, Hannan, & Burton, 2002). A spin-off's development depends on how it interacts with its market and its parental institution in terms of initial resources (Heirman & Clarysse, 2004).

The entrepreneurial strategy of entrepreneurs influences the financial performance of their spin-off (Lumpkin & Dess, 2001). The formal education provides useful skills in entrepreneurial activities lead to a better financial performance compared to those less educated. Managerial experience positive relates to the performance (Teach, Tarpley, & Schwartz, 1986). Entrepreneur's experience, venture capital investments, startup's technology sourcing, and technology portfolios positively influence a firm's performance before and after IPO (Kim & Heshmati, 2010). The adaptations for the success of a new technology-based spin-off require human, technological, financial, and networking resources (Andries & Debackere, 2006). The entrepreneurs with the combinations of entrepreneurial skills, motivations, and strategies are more successful than others because these combinations provide more credits to entrepreneurs in spin-off's evaluations of venture capitalists (Agarwal & Chatterjee, 2007).

H1: Entrepreneurial capabilities of founding teams predict spin-off's performances.

Witt (2004) proposed that founders, who benefit from entrepreneurial networks, positively relate to success of a start-up regarding to profitability, growth, and value creation. The information achievements of individuals depend on their collective behaviors and structure networks (Floyd & Wooldridge, 1999). The obtained information can be useful for various implications as knowledge. Explicit knowledge (know-what) is codified, efficiently shared, and transmittable in formal language, and tacit knowledge (know-how) is associated with work routines and practices. This information motivates the strategic management of individuals. The networks importantly provide information and knowledge to the entrepreneurs (Floyd & Wooldridge, 1999). New ventures can gain their knowledge in terms of know-how through their relationships with others. The networks are advantageous environments for entrepreneurs and spin-offs to learn crucial skills, especially managerial skills (Deakins, 1996). Knowledge acquisitions are positively associated with knowledge exploitation to enhance new-product development, technological distinctiveness and cost efficiency, and lead to competitive advantage (Yli-Renko, Autio, & Sapienza, 2001). Social networks open accesses to the opportunities of commercial trading lead to generate incomes and develop the business. The external social capital positively influences on the market knowledge, and ultimately improves the growth of new ventures. The networks, which provide access to valuable, rare, inimitable, and non-substitutable resources, will enhance the competitive advantages of the start-ups (Barney, 1991). The entrepreneurs' social adaptability and accuracy in perceiving other members in the networks are associated with their financial success (Baron & Markman, 2003). Company systems correctly operate based upon brokers who emerged and spread good ideals in the networks. For competitive strategy preparation, entrepreneurs must mind that the competitors may know information about sales and profits of their competitor's new ventures although this information is private (Brush & Vanderwerf, 1992). Networking capability is central to a firm's growth not only in the hi-tech sectors but also in low-tech sectors (Mort & Weerawardena, 2006). Entrepreneurs simply value the relationships with their friends and families who motivate the assembling assets and personnel's recruitments, and lead to success of their ventures (Dahl & Sorenson, 2009). Thus, social network characteristics of the founders in the creation period were supposed to influence a spin-off performance.

H2: Social network characteristics of entrepreneurial teams improve a spin-off's performance via their influence on entrepreneurial capabilities.

3. Description of the data, measurement of variables and methods of analysis

This study employed web-based survey approach to collect data because of its advantages. The first advantage of the web-based surveys is comparatively low costs compared with other methods. Secondly, the surveys are also faster and more accurate than others. With this method we can avoid missing data with the prompts that alert interviewees if they skip or incorrectly answer questions (Fleming & Bowden, 2009).

The entrepreneurial capabilities of founders comprising entrepreneurial technology, organizational capability, human capital, entrepreneurial strategy, and commercial capability were divided into original entrepreneurial capability and necessary supplemental capability (Vohora, Wright, & Lockett, 2002; Shane & Stuart, 2002; Shane, 2004). Entrepreneurial technology factor was measured by the license literature, market signal of technologies, and continuity of technology (Tushman & Anderson, 1986). Organizational capability of the founders is measured by scales adapted from Antoncic and Hisrich (2001). Human capital mostly measures industrial, managerial, and entrepreneurial experiences (Cooper, Gimeno-Gascon, & Woo, 1994). To measure entrepreneurial strategy, this study employed the instruments from Lumpkin and Dess (2001) with innovation, proactiveness, risk-taking, and competitive aggressiveness factors. The measurements of founder's commercial capability base on the customer relationships, technology training of staffs, and process redesigns (Nadherny, 1998). The social network characteristics of founders comprising ties, density, centrality, reputation, reciprocity, trust, and information quality were catalogued into structure, governance, and content dimensions (Amit & Zott, 2001). The strength of ties measures the previous levels of mutual confidence in a relationship (Parks & Floyd, 1996). Marsden (1993) defined density of a network as the number of ties among members compared with the possible number of ties in the network. According to Rowley (1997), centrality of an entrepreneur refers to her central degree in the information flow in a network. The reputation of the entrepreneurial teams was measured by asking their evaluation about their characteristics employed from Shane and Cable (2002). Reciprocity refers to level of support, accumulation of favors, and the fairness contained in the relationships among members (Miller & Kean, 1997). This study measures trust by questions adapted from Tsai and Ghoshal (1998). To measure the information quality that flew in the networks, this study utilized the four-question set developed by O'Reilly (1982).

To examine the hypothesis, this study used the data of 181 founders of Spanish university spin-offs. Each response represented a company. The Spanish university spin-offs are new entries on the markets. Most of the firms were established after 2004. Because this survey focuses on the individual relationships, the key members of the entrepreneurial teams are considered as interviewees. They could be professors or faculty staffs of the universities. Thus the research population comprises subjects with various levels of education. Most of the key members of the entrepreneurial teams were post-graduated individuals with 70 percent of sample.

To construct the indicators, the research utilized the exploratory factor analysis (EFA). However, EFA is considered as an insufficient method of evaluation of dimensions. The EFA cannot test the model with higher-order factors (Rubio, Berg-Weger, & Tebb, 2001). In this study, we utilized the first-order confirmatory factor analysis (CFA) to construct the lower-order factors, and second-order confirmatory factor analysis (CFA) to construct the higher-order factors. We used LISREL 8.8 program, which based on the maximum likelihood method, to test the hypotheses.

The models with latent variables require at least a sample size of 100 observations (Marsh, Balla, & MacDonald, 1988). The sample size for the confirmatory factor analysis model with no missing data must be equal or greater than 150 respondents for normal distribution and 265 for non-normal distribution (Muthen & Muthen, 2002). In this study, all observed variables revealed significant kurtosis and skewness p-values, which satisfied the normality test of all variables. Moreover, the measure of relative multivariate kurtosis is 1.036. This value is relatively small, and it thus appears that the multivariate distribution is reasonably normal. The Maximum Likelihood can be used as estimation method for this research. With 181 observations, the sample size of this research satisfied the minimum requirement for confirmatory factor analysis according to Muthen and Muthen (2002).

The results from EFAs construct seven factors of network characteristic, five factors of entrepreneurial capability, and two factors of performance, which are correlated each other and indicate higher-order constructs. The results from first-order and second-order CFAs of network structure, network governance, network content, original entrepreneurial capability, necessary supplemental capability, and spin-off performance measurements reveal acceptable fit (Table 1). The ratios chi-square/degrees of freedom were below 2, which indicate that the models are acceptable fit. All parameter estimates are significant at the 0.5 level suggesting that there is sufficient evidence of convergent validity. The composite reliabilities of these factors are greater than 0.70 except the composite of reputation measurement is 0.632. This means that the measurements passed the reliability test are acceptable reliability (Hatcher, 1994; Hair, Anderson, Tatham, & Black, 1998). All items load on one factor each that leads to a verification of indicators pass the discriminant validity test.

Table 1: Parameter estimates for indicators

Path Label	Parameter Estimate (Standardized estimate)	t-value	Path Label	Parameter Estimate (Standardized estimate)	t-value
DEN1, Density	1.28 (0.12)	10.35*	TEC1, Technology	0.84 (0.13)	6.44*
DEN2, Density	1.83 (0.11)	16.06*	TEC2, Technology	1.26 (0.10)	12.28*
DEN3, Density	1.81 (0.11)	15.97*	TEC3, Technology	1.23 (0.11)	11.46*
CEN1, Density	0.80 (0.11)	7.42*	TEC4, Technology	1.16 (0.10)	11.51*
CEN2, Centrality	0.88 (0.093)	9.40*	TEC5, Technology	0.96 (0.13)	7.46*
CEN3, Centrality	1.06 (0.11)	9.54*	ORG2, Organizational	0.74 (0.097)	7.69*
CEN4, Centrality	0.88 (0.11)	7.78*	ORG3, Organizational	1.00 (0.11)	9.27*
TIE1, Tie	1.09 (0.11)	9.55*	ORG5, Organizational	0.63 (0.098)	6.40*
TIE2, Tie	1.71 (0.12)	14.25*	HUM1, Human	0.72 (0.11)	6.57*
TIE3, Tie	1.53 (0.12)	12.67*	HUM2, Human	1.35 (0.11)	11.70*
REP1, Reputation	0.71 (0.089)	7.98*	HUM3, Human	1.43 (0.13)	10.97*
REP2, Reputation	0.46 (0.097)	4.47*	HUM4, Human	1.51 (0.12)	12.14*
REP3, Reputation	0.52 (0.078)	6.64*	STR1, Strategy	0.81 (0.089)	9.06*
REP4, Reputation	0.44 (0.064)	6.82*	STR2, Strategy	1.01 (0.12)	8.38*
REC1, Reciprocity	0.71 (0.069)	10.25*	STR3, Strategy	1.03 (0.095)	10.80*
REC3, Reciprocity	0.85 (0.10)	8.14*	STR4, Strategy	0.92 (0.13)	6.95*
REC3, Reciprocity	1.09 (0.11)	10.34*	STR5, Strategy	0.39 (0.13)	3.02*
REC4, Reciprocity	1.03 (0.068)	15.02*	COM1, Commercial	0.38 (0.086)	4.43*
TRU1, Trust	0.72 (0.054)	13.31*	COM2, Commercial	1.27 (0.14)	9.07*
TRU2, Trust	0.79 (0.052)	15.04*	COM3, Commercial	1.41 (0.12)	11.68*
TRU3, Trust	0.73 (0.084)	8.71*	COM4, Commercial	0.86 (0.12)	7.24*
QUA1, Quality	1.16 (0.079)	14.79*	FPE1, Financial per	1.03 (0.076)	13.62*
QUA2, Quality	1.25 (0.082)	15.29*	FPE2, Financial per	1.14 (0.073)	15.70*
QUA3, Quality	1.17 (0.081)	14.33*	FPE3, Financial per	0.80 (0.098)	8.15*
QUA4, Quality	1.06 (0.086)	12.34*	FPE4, Financial per	0.91 (0.088)	10.28*
QUA5, Quality	1.07 (0.085)	12.54*	OPE1, Operational per	0.91 (0.095)	9.62*
			OPE2, Operational per	0.88 (0.11)	8.12*
			OPE3, Operational per	0.78 (0.092)	8.41*
			OPE4, Operational per	0.64 (0.087)	7.40*
*p<0.05					

Table 2: Parameter estimates for CFAs

Models		χ^2	**df**	**p-value**	**RMSEA**	**NFI**	**CFI**	**GFI**
First-order CFA	Network structure	62.80	32	0.00092	0.073	0.94	0.97	0.93
	Network governance	26.95	19	0.011	0.048	0.94	0.98	0.96
	Network content	35.03	19	0.014	0.068	0.97	0.99	0.95
	Original entrepreneurial capability	72.78	51	0.024	0.049	0.92	0.97	0.94
	Necessary supplemental capability	30.24	26	0.026	0.030	0.94	0.99	0.96
	Social network	13.44	11	0.027	0.035	0.98	1.00	0.98
	Entrepreneurial capability	0.79	4	0.094	0.00	0.99	1.00	1.00
Second	Spin-off's performance	33.91	19	0.019	0.066	0.95	0.97	0.96

Models		χ^2	df	p-value	RMSEA	NFI	CFI	GFI
-order CFA	Network structure	64.05	35	0.0020	0.068	0.94	0.97	0.93
	Network governance	42.86	20	0.0021	0.080	0.91	0.95	0.94
	Network content	43.23	20	0.0019	0.080	0.96	0.98	0.94
	Original entrepreneurial capability	86.87	54	0.003	0.058	0.90	0.96	0.93
	Necessary supplemental capability	35.29	27	0.013	0.041	0.93	0.98	0.96
	Spin-off's performance	37.23	20	0.0109	0.069	0.94	0.97	0.95

Measurement model

The CFA of measurement model comprising of social network characteristic and entrepreneurial capability measurements reveal a good fit (χ^2=62.27, df=44, RMSEA=0.049; NFI=0.93; CFI=0.97; GFI=0.95). All of indices satisfy the requirement of a good model fit. All parameter estimates are statistically significant at the 0.5 level, and all variables load on one factor each. The measurement model passes the test of convergent validity and achieves a certification of discriminant validity of indicators (Figure 1). Thus, the endogenous latent variable, social network characteristics, is interpreted by network structure, network governance, and network content variables. The original entrepreneurial capability and necessary supplementary capability variables construct the entrepreneurial capability endogenous latent variable.

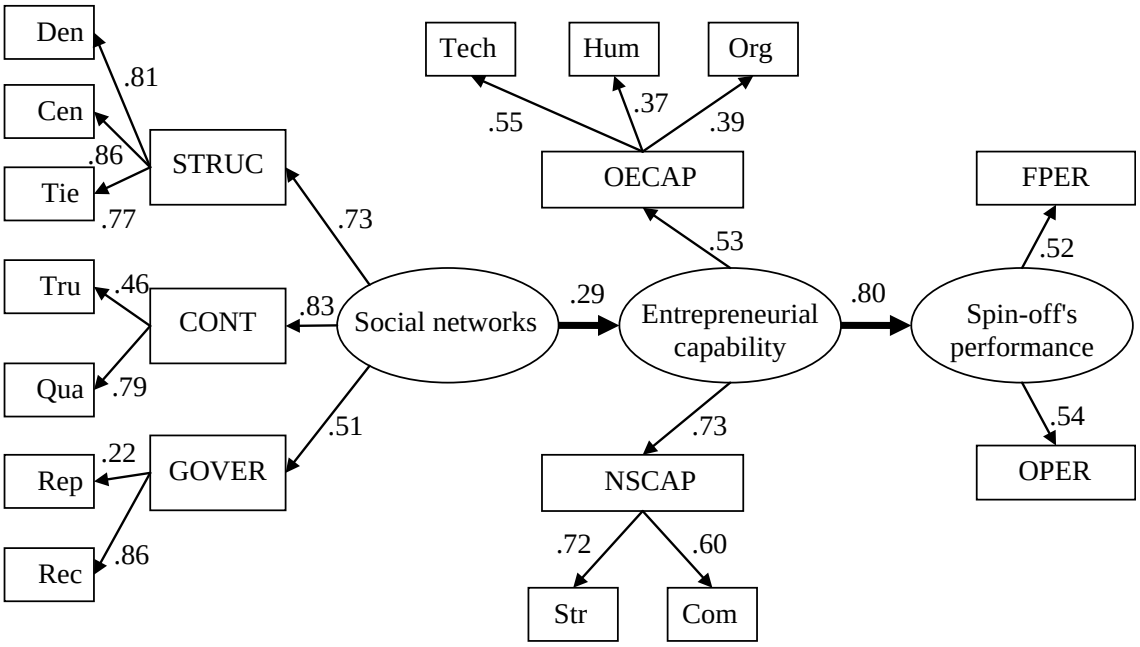
Hypothesis test

The results from first-order CFA of the model revealed an acceptable fit (χ^2=13.78, df=11, RMSEA=0.037; NFI=0.97; CFI=0.99; GFI=0.98). The results from the second-order CFA of model also reveal a good fit (χ^2=14.91, df=12, RMSEA=0.037; NFI=0.96; CFI=0.99; GFI=0.98). The ratio chi-square/degrees of freedom is below 2 (χ^2/df = 1.24) indicated that the model is acceptable fit. All parameter estimates are statistically significant at the 0.5 level, and all variables load on one factor each. Thus, the model passes the test of convergent validity and achieves a certification of discriminant validity of indicators. Eventually, the social networks of the members of founding teams significantly and positively influence the entrepreneurial capabilities of the teams, and lead to affect the spin-off's performances in the growth or development stages. This means that the hypotheses 1 and 2 of this research were supported. This result partially concur with the prior propose of Collins and Clack (2003) and Hoang and Antoncic (2003) that social networks of founding teams affect the firm's growths. The network factor indirectly influences the performance measure via the direct effect on the entrepreneurial capability indicator (Figure 1). As prior mentions, the inventors prefer working in the academic environment instead attending to the new firms. These inventors can keep their relationships with the spin-offs via working in advisory boards. However, during the creation's processes, the abilities of the founders were transferred and become the firm's capabilities.

4. Discussion and conclusion

Beyond the network approach, the social network characteristics of entrepreneurial teams in the period of spin-off's foundation comprise of network structure, network governance, and network content. The study indicated that network structure was compounded from network ties, density, and centrality, and network governance includes reciprocity and reputation. The results supported the hypotheses that entrepreneurial capabilities include originally entrepreneurial capabilities constructed by entrepreneurial technology, organizational capability, and human capital, and necessarily supplementary capabilities comprising entrepreneurial strategy and commercial capability. The results also reinforced validity of firm's performance instruments, which comprise both financial and operational performance factors.

Overall, results of the analysis suggest that the hypothesized structural model represent a good fit. It supports the hypothesis that there is an existence of the relationships between entrepreneurial capabilities and spin-off's performances. However, the results revealed that the social networks of entrepreneurial teams in the period of spin-off's foundation dissociate with the performances of spin-offs in the development stage. The results also depicted a direct linkage between social networks and entrepreneurial capabilities of the founding teams. This showed an indirect influence of the social network characteristics of the entrepreneurial teams on the spin-off's performance.



(All estimates are significant at the 0.05 level, all error terms omitted for clarity)

Figure 1: Parameter estimates for the theoretical model

This study conduces to the entrepreneurship theory by introducing another approach in foundation's successes and spin-off's performance measurements. It describes the contributions of both social networks and entrepreneurial capabilities in the foundation's processes and business performances. This study also indicated the benefits in measuring the performances of spin-offs based on both financial and operational performances. This study partially enriches the entrepreneurship theory by covering the gap in researching the relationship between the pre-established factors and post-established outcomes.

The results from measurement model and CFAs indicated that the study necessitates further improvement. Most of the scales indicated high composite reliabilities except the scales measured network reputation. Basing on the internet-based survey, the further studies can extend the location to European university spin-offs that can generate more reliable results and refinements in the academic entrepreneurship. The further research can focus on the influences of social networks on the spin-off performances toward the approach based on three dimensions of networks. This study only evaluated the network characteristics of entrepreneurs in the creation's period. These characteristics can be changed over time because of the new individual attendances or changing in relationships. The spin-offs can recruit more employees with relationship and capability additions. Each dimension of networks can variously influence the outcomes of the firms. Most of the prior studies have focused on the network analysis rather than network approach. This suggestion differs from prior studies according to the structure, governance, and content dimension approach.

References

Agarwal, M. N., & Chatterjee, L. (2007). Entrepreneurial human capital and new venture performance: In research of the elusive link. Academy of Entrepreneurship Journal , 13 (1), 1-22.

Amit, R., & Zott, C. (2001). Value creation in E-business. Strategic Management Journal , 22, 493-520.

Andries, P., & Debackere, K. (2006). Adaptation in new technology-based ventures: Insights at the company level. International Journal of Management Reviews , 8 (2), 91-112.

Antoncic, B., & Hisrich, R. D. (2001). Intrapreneurship: Construct refinement and cross-cultural validation. Journal of Business Venturing , 16 (5), 495-527.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management , 17, 99-120.

Baron, J. N., Hannan, M. T., & Burton, M. D. (2002). Building the iron cage: Determinants of managerial intensity in the early years of organizations. In S. Shane, The Foundations of Entrepreneurship. Northamton, MA: Edward Elgar.

Baron, R. A., & Markman, G. D. (2003). Beyond social capital: The role of entrepreneurs' social competence in their financial success. Journal of Business Venturing , 18 (1), 41-60.

Bharadwaj, S., Varadarajan, P. R., & Fahy, J. (1993). Sustainable competitive advantage in service industries: A conceptual model and research propositions. Journal of Marketing , 57, 83-99.
Brush, C. G., & Vanderwerf, P. A. (1992). A comparison of methords and sources for obtaining estimates of new venture performance. Journal of Business Venturing , 7 (2), 157-170.
Cameron, K. S., & Whetten, D. A. (1983). Organizational Effectiveness: One Model or Several? In K. S. Cameron, & D. A. Whetton, Organizational Effectiveness: A Comparision of Multiple Methods (pp. 1-24). New York: Academic Press.
Collins, C., & Clark, K. D. (2003). Strategic human resources practices, top management team social networks and firm performances: The roles of human resource practices in creating organizational competitive advantage. Academy of Management Journal , 46, 740-751.
Cooper, A. C., & Artz, K. W. (1995). Deerminants of saisfaction for entrepreneurs. Journal of Business Venturing , 10, 439-457.
Cooper, A. C., Gimeno-Gascon, J. F., & Woo, Y. C. (1994). Initial human and financial capital as predictors of new venture performance. Journal of Business Venturing , 9 (5), 371-395.
Dahl, M. S., & Sorenson, O. (2009). The embedded entrepreneur. European Management Review , 6, 172-181.
Deakins, D. (1996). Entrepreneurship and Small Firms. London: McGrawHill.
Fleming, C., & Bowden, M. (2009). Web-based surveys as an alternative to traditional mail methods. Journal of Environmental Management , 90, 284-292.
Floyd, S., & Wooldridge, B. (1999). Knowledge creation and social networks in corporate entrepreneurship: Renewal of organizational capability. Entrepreneurship: Theory and Practice , 23, 1-21.
Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate Data Analysis (5th ed.). Upper saddle River, NJ: Prentice Hall.
Hatcher, L. (1994). A Step By Step Approach To Using The SAS system For Factor Analysis and Stuctural Equation Modeling. Cary, NC: SAS Institute Inc.
Heirman, T., & Clarysse, B. (2004). How and why do research-based start-ups differ at founding? A resources-based configurational perspective. Journal of technology Transfer , 29, 247-268.
Hoang, H., & Antoncic, B. (2003). Network-based research in entrepreneurship: a critical review. Journal of Business Venturing , 18 (2), 165-187.
Kim, Y., & Heshmati, A. (2010). Analysis of Korean IT startups' initial public offering and their post-IPO performance. Journal of Productivity Analysis , 34, 133-149.
Landstrom, H. (2005). Pioneers in Entrepreneurship Research. In G. Corbetta, M. Huse, & D. Ravasi (Eds.), Crossroads of Entrepreneurship (pp. 13-31). New York: Springer.
Larson, A., & Starr, J. A. (1993). A network model of organization formation. Entrepreneurship Theory and Practice , 17 (2), 5-15.
Lumpkin, G. T., & Dess, G. G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. Journal of Business Venturing , 16 (5), 429-451.
Markman, G. D., & Gartner, W. B. (2002). Is extraorinary growth profitable? A study of Inc. 500 high-growth companies. Entrepreneurship Theory and Practice , 27 (1), 65-75.
Marsden, P. (1993). The reliability of network density and composition measures. Social Networks , 15 (4), 399-421.
Marsh, H., Balla, J., & MacDonald, R. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effet of sample size. Psychological Bulletin , 103 (3), 391-410.
Miller, N., & Kean, R. (1997). Reciprocal exchange in rural communities: Concumers' inducement to inshop. Psychology & Marketing , 14 (7), 637-661.
Mort, G. S., & Weerawardena, J. (2006). Networking capability and international entrepreneurship - How networks function in Australian born global firms. International Marketing Review , 23 (5), 549-572.
Murphy, G. B., Trailer, J. W., & Hill, R. C. (1996). Measuring performance in entrepreneurship research. Journal of Business Research , 17, 15-23.
Muthen, L., & Muthen, B. (2002). How to use a Monte Carlo study to decide on sample size and determine power. Structural Equation Modeling , 9 (4), 599-620.
Nadherny, C. C. (1998). Technology and direct marketing leadership. Direct Marketing , 61 (7), 42-45.
O'Donnell, A., Gilmore, A., Cummins, D., & Carson, D. (2001). The network construct in entrepreneuship research: a review and critique. Management Decision , 39 (9), 749-160.
O'Reilly, C. (1982). Variations in decision makers' use of information sources: The impact of quality and accessibility of informatio. Academy of Management Journal , 25 (4), 756-771.
Parks, M., & Floyd, K. (1996). Meanings for closeness and intimacy in friendship. Journal of Social and Personal Relationships , 1, 85-107.
Pavett, C. M., & Lau, A. W. (1983). Managerial work: The influence of hierarchical level and functional speciality. Academy of Management Journal , 26, 170-177.
Roberts, E. (1991). High Tech Entrepreneurs: Lessons from MIT and Beyond. New York: Oxford University Press.
Rowley, T. (1997). Moving beyond dyadic ties: A network theory of stakeholder influences. Academy of Management Review , 22 (4), 887-910.
Rubio, D. M., Berg-Weger, M., & Tebb, S. S. (2001). Using structural equation modeling to test for multidimensionality. Structural Equation Modeling , 8 (4), 613-626.
Sahlman, W. A. (1990). The structure and governance of venture capital organizations. Jounal of Financial Economics , 27 (2), 473-521.

Shane, S. (2004). Academic Entrepreneurship: University Spin-offs and Wealth Crreation. Cheltenham, UK: Edward Elgar.
Shane, S., & Cable, D. (2002). Network ties, reputation, and the financing of new ventures. Management Science , 48 (3), 364-381.
Shane, S., & Stuart, T. E. (2002). Organizational endowments and the performance of university startups. Management Science , 48 (1), 154-170.
Smilor, R. (1990). University Spin-out Companies: Technology Start-ups From UT-Austin. Journal of Business Venturing , 5, 63-76.
Teach, R. D., Tarpley, F. A., & Schwartz, R. G. (1986). Software venture teams. In R. R. al., Frontiers of Entrepreneurship Research (pp. 546-562). Wellesley, MA: Badson College.
Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. Academy of Management Journal , 41, 464-478.
Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. Administrative Science Quarterly , 31 (3), 439-465.
Venkatraman, N., & Grant, J. (1986). Construct measurement in organizational strategy research: A critique and proposal. Academy of Management Review , 11 (1), 71-87.
Vohora, A., Wright, M., & Lockett, A. (2002). The formation of high-tech university spinouts: The roles of joint ventures and venture capital investors. Nottingham, UK: Nottingham Business School.
Welter, F., & Lasch, F. (2008). Entrepreneurship research in Europe: Taking stock and looking forward. Entrepreneurship Theory and Practice , 32 (2), 241-248.
Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configuration approach. Journal of Business Venturing , 20 (1), 71-91.
Witt, P. (2004). Entrepreneurs' networks and the success of the start-ups. Entrepreneurship & Regional Development , 16 (5), 391-412.
Yli-Renko, H., Autio, E., & Sapienza, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. Strategic Management Journal , 22, 587-613.

An Agile Approach for Measuring the Performance of a Marketing System

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Abstract: The need of measuring marketing performance in an organization is not new. The usual approach on this regard, still used by many companies, is to analyze sales value or profit, but an increased sales value or profit may be due also to other activities than marketing. Companies are trying to use systems for tracking Key Performance Indicators for several years, but it is difficult to quantify the contribution of marketing on the overall performance of a company. The field of measuring marketing performance is still in its infancy and research is required in this respect in order to improve the way marketing is seen within a company. The purpose of measuring marketing performance is not only to identify the entire contribution of the marketing system on the overall profitability of an organization but also to compare the performance of different projects or marketing campaigns and their effects over the marketing systems. The Agile methods, such as Scrum, may be useful for the existing problems of today's marketing managers. In the current business environment all companies need to deliver their products and services faster and with fewer resources. The Agile approach in a marketing system represents the best solution in this respect by helping organizations to adapt to the ever-evolving business environment. The Agile approach in developing a marketing activity may lead to an increased marketing performance therefore should be given more attention on the use of agile methods also in other areas not just in software development. The paper's authors consider that a Scrum approach for marketing gives much more flexibility to a project leading to a decrease in terms of financial risks. This paper presents the following issues: the reasons why a company should consider Scrum as a method of developing the marketing activity, a Scrum marketing framework and also a model of how the first iterations of the Scrum framework for marketing might look like was constructed as a starting point for any company that is considering a transition to agile methodologies for their marketing campaigns, the changes brought by the use of this agile method in measuring the marketing system's performance and future research directions for using Scrum in marketing.

Keywords: agile method, Scrum, marketing system, iterative development, key performance indicators, marketing performance

1. Introduction

Agile methods are usually used in the development of software systems. The most used agile methods in the last years are Scrum, Kanban and Extreme Programming. Agile methods like Scrum can be applied to any type of project to deliver improved results in ever evolving business environments (Iver, 2009). Scrum is increasingly used also in other areas than software development. Actually, the first use of Scrum was by Takeuchi and Nonaka in product development in manufacturing (Sutherland et al., 2011). As the marketing activity is based on developing certain projects, the principles of traditional project management also apply in the marketing field. Being a transparent development process, Scrum allows seeing possible problems at early stages and allows managing them quicker and with minimal losses. Adoption of Scrum in the marketing system is still in its early stages, but several companies around the world already adopted the methodology with great success.

The marketing system is characterized by uncertainty and the Scrum framework may offer a better way to approach how the work is organized and measured in the marketing department, to focus on the real business value. As one of the main concerns nowadays is to emphasize that marketing is a real investment and not just an expense, the use of agile methodologies on this regard might be a valuable approach.

Marketing performance measurement is a very disputed topic over the last years as it was listed on the Marketing Science Institute's top priority topics for several years in a row (O'Sullivan and Abela, 2007). Several approaches in the literature support this issue and propose certain tools and metrics to quantify the contribution of marketing on the overall profitability of a company. Usually financial metrics are still the most used in measuring the value of marketing (Ambler et al., 2004) but also non-financial measures are becoming increasingly used with the growing interest on the individual customer. Due to the technological evolution, many decision support software tools have facilitated the path for all departments within a company to quantify their contribution at the company's success

using standardized metrics; but this is not also available for marketing that suffers from credibility on this regard.

In the study conducted by (O'Sullivan and Abela, 2007) was shown that the ability to measure the performance for several marketing activities has a positive impact on firm performance and CEO satisfaction with marketing. Cohn (2010) considers that one of the main reasons a company should consider transitioning to Scrum is that time-to-market is reduced and every two weeks to a month the client can see a valuable functionality of the actual project and decide to release it as it is or continue to enhance it for another Sprint. This can be associated with an increased customer satisfaction and indirectly with an increased CEO satisfaction so a transition to agile could be benefic.

Accardi-Petersen (2011) emphasize that the marketing activity should be the concern of the whole company not only of the marketing department. She considers that in order to respond to the demands of the customer and to facilitate the movement to agile, as a starting point the focus should be on the participants, basically on the marketing team. The team must work towards a common goal and must be totally involved in the process, and this can be achieved by using the 3C approach: communication, cooperation and clarification.

The present paper is focused on identifying how the Scrum tools used in software development can also be used for marketing. The authors believe that the specific meetings and roles usually used in Scrum can be also be used for a marketing project and that's why they present how these activities can be conducted on this situation. A model of the first four iterations was created to highlight the starting point for such a process. This model was developed considering that the marketing measuring process is an iterative one because Key Performance Indicators and marketing activities must be constantly adapted according to customer's feedback. The effectiveness of the Scrum framework will be emphasized by defining some Key Performance Indicators required to be measured.

2. Agile development

As in (Kerzner, 2009), marketing projects require the ability to identify and pursue business opportunities in the market. A traditional approach in marketing project management is more appropriate and proven effective for simple marketing projects.

Rico, Sayani and Sone (2009) suggest that new product development methods represent the direct antecedents of agile methodologies. New product development methods used in their early stages were considered as "push methods" for product development because manufactures wanted to wield on the market their technology to an unnamed market segment, without any market research. In this manner a consistent link with the marketing discipline was created. Customer collaboration, adaptability, iterative development and teamwork, emerged from the new product development values. The process of new product development involves two directions: one refers in identifying market trends and the second one refers to idea generation and product design, detail engineering and testing.

In other areas than software development agile development methodologies are also known as flexible product development and refer to the ability of changing the developed product without being disruptive and giving a great flexibility to the development process. In contrast with traditional project management techniques focused on following the initial plan, agile or flexible methods use several techniques allowing a low cost of change.

2.1 Scrum overview

Scrum is an iterative, incremental methodology for project management usually seen in agile software development. Scrum framework is structured to support complex product development. Scrum implies the use of several rules and of some predefined roles. Each component within the framework serves a specific purpose and is essential to Scrum's success and usage (Schwaber and Sutherland, 2011). As in any other type of project, a Scrum project starts in the same manner. First, the objectives of the project must be defined. In Scrum this is called Product Backlog. The Product Backlog is a prioritized list with the features of the product. The difference from traditional methods of project management is that in Scrum, the Product Backlog, is not seen as a final list of functionalities and can change several times during the project. The tasks in the Product Backlog can be reprioritized before every Sprint.

Sprint represents the basic unit in Scrum (Cohn, 2010). As presented in Figure 1, the usual duration of a Sprint is two to four weeks or maximum one calendar month. A new sprint starts immediately after the conclusion of the previous Sprint (Schwaber and Sutherland, 2011). Each Sprint can be considered as an individual project with duration of maximum one month. During the Sprint no changes are allowed. During a Sprint, the following meetings take place: Sprint Planning Meeting, Daily Meeting, Sprint Review Meeting, and the Sprint Retrospective Meeting. Sprint Planning meetings are used to select from the Product Backlog tasks to be completed during Sprint, forming the Sprint Backlog. In Scrum, work is never assigned. Team members choose by themselves the work they will perform during the Sprint. Daily Scrum Meetings are used to coordinate the work during the Sprint and to keep the team focused on the Sprint goals. At first, they will not be able to estimate very precisely the total work they can accomplish but the process self-regulates after a few Sprints.

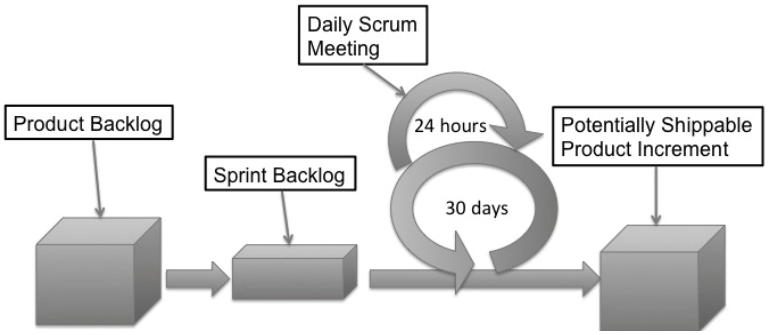


Figure 1: Framework for Scrum (Cohn, 2002)

A Sprint Review meeting is conducted at the end of every Sprint, to assess the work done during the Sprint and demonstrate the completed work. Usually the Sprint Review meeting takes the form of a demo, which shows the functionalities implemented during the Sprint. In the end, there is the Sprint Retrospective meeting where is analyzed what worked properly and what did not during the Sprint so that the necessary changes are made during the next Sprint. The Scrum Team consists of several members: a Scrum Master, a Product Owner and the development team. Scrum Teams must be self-organizing and cross-functional (Schwaber and Sutherland, 2011). Development Teams are cross-functional, with all of the skills necessary to create a product increment. They are self-organizing because they choose and manage themselves the work to be done. The Product Owner is the person that defines the functionalities of the future product, prioritize them and add them to the Product Backlog. Scrum teams should have a single Product Owner. In order to succeed, the entire organization must respect the Product Owner's decisions (Schwaber and Sutherland, 2011). The Scrum Master is the person responsible for eliminating any obstacles that stand in the way the team to function at optimal parameters. He is not a team leader he is more like a buffer between the team and anyone that can distract it. The Scrum Master is responsible for adopting Scrum values and practices and enables a close collaboration between all the members of the Scrum Team.

The Scrum Master doesn't take the place of the project manager from traditional project management techniques. He supports the team but he doesn't lead the team.

2.2 Agility in marketing

In an agile marketing process the attention must be constantly maintained on the business values of the company and satisfying what the market and customers demand. An agile marketing system involves the following:

- *An iterative marketing process*: for short marketing projects, regular feedback may be easily obtained, in order to improve the ability to respond to changing market conditions.
- *Increased productivity*: which can be measured in terms of results. In a marketing campaign, this might be the number of visitors to a website, conversion rate or return visitors.
- *Transparency*: with an agile approach everyone can see on what is every member of the team working. Agile marketing allows management, sales and development teams to clearly see what marketing is working on and, and to see more clearly how financial resources are used on the marketing activity.

- *Measurability*: agile marketing teams can run tests or get feedback from users investing more time and resources in the most valuable projects. Feedback may also be obtained by measuring the most important performance indicators for marketing known as Key Performance Indicators (KPIs) for marketing. Key Performance Indicators are usually defined as financial or non-financial metrics used to help an organization to measure its progress relative to its objectives. KPIs are the most important metrics within an organization (Rasmussen et al., 2009). Measuring marketing KPIs helps organizations to spend more time on the activities that increase the marketing performance and less on those that are not as relevant.

By going agile in marketing, customer needs are met more quickly as in a traditional approach and customer satisfaction tends to increase.

3. The Scrum framework for measuring marketing performance

The leading role of marketing is to improve the performance of an organization by developing profitable relations with its clients.

The Scrum framework in marketing can borrow almost all the elements used in software development.

First, one of the most important things before transitioning to Scrum is to ensure that the people in the marketing team are willing to try it in order to reach the goals and objectives of the project. Transition to Scrum requires changing the entire marketing system in the organization. Marketing teams need to learn about the agile environment. For most companies, changing the beliefs of the employees might be the most difficult thing (Accardi-Petersen, 2011). Second, the budget assigned to the project or campaign is an important factor that will influence the objectives of the project.

By transitioning to Scrum as (Sutherland, 2010) presents, a number of roles must be defined, as it follows:

- *The Scrum Master*: one of the key stakeholders. The team must have only one Scrum Master. He will be the person that runs the Daily Scrum meetings. The Scrum Master role will be assigned to the marketing manager.
- *The Product Owner*: he represents the client and he is the person that clearly defines the goals for the marketing project or campaign. He develops the Marketing Backlog and he is the person responsible for the performance indicators.
- *The "development team"*: is represented by the marketing team, which cannot exceed nine members, depending on the complexity of the marketing project. The team must be self-organizing and cross-functional and consists of marketing specialists in each of the marketing areas that will be addressed in the project.

The Scrum framework developed in Figure 2 starts by defining the Marketing Backlog. Two situations may occur:

- *In case of product development*: the features of the future product may be obtained through market research, using market surveys, questionnaires, focus groups or workshops.
- *In the case of a marketing campaign*: the project's marketing objectives are established and also a list with the most relevant Key Performance Indicators for measuring the performance of the project.

This first step is just for shaping the vision of the client and creating the Marketing Backlog. The project or campaign is usually broken into Sprints based on the needs of the business.

After the Marketing Backlog is ready, the duration of the Sprints must be decided. In agile project management, the work is usually broken in smaller tasks. At the beginning of every Sprint, its goals must be set.

The first Sprint is always the most difficult. Usually the team cannot yet estimate very precisely the amount of work they can complete during one Sprint. Before starting the Sprint, tasks in the Campaign Backlog must be discussed and broken in smaller parts if necessary.

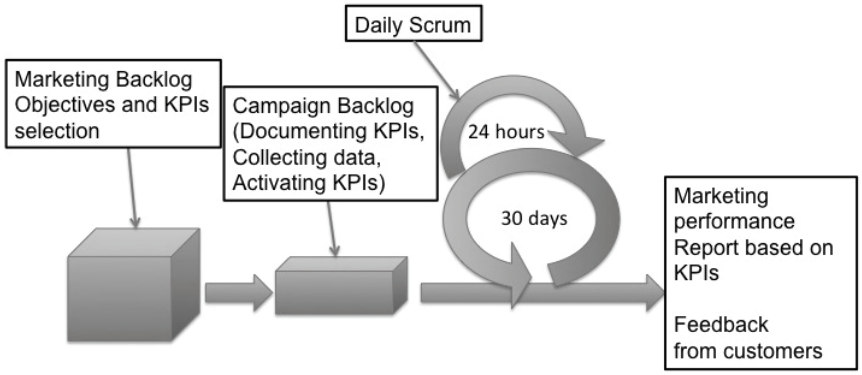


Figure 2: Scrum in a marketing system (adapted from Cohn, 2002)

The team may encounter several obstacles in documenting the KPIs in the Campaign Backlog because of the availability of data. It's not unusual that some data is not delivered in the right format or in time, and this can lead to the failure of the Sprint. Also, during the documenting process, the team need to ascertain targets for every KPI, which can also lead to some difficulties for some new indicators due to the lack of historical data.

In Figure 3 the authors created a model of how might look in developing the framework for measuring marketing performance based on Scrum the first several Sprints.

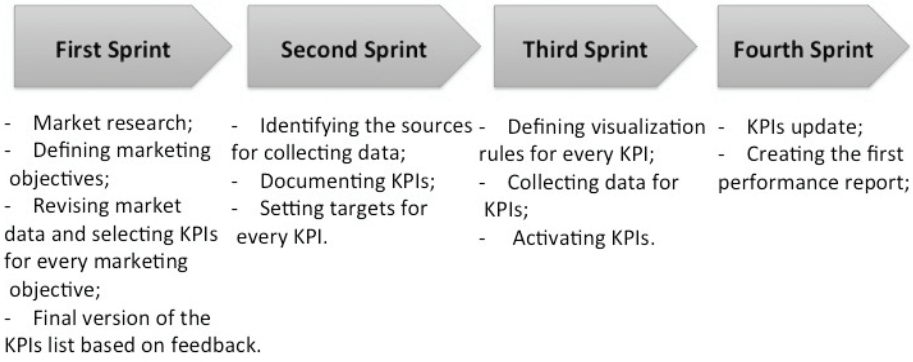


Figure 3: A model for the first iterations of the marketing measuring framework based on Scrum

As it is usual in Scrum for one Sprint, the following meetings will take place: Sprint Planning meeting, Daily Scrum meeting, Sprint Review and Sprint Retrospective (Sutherland, 2010). In the following, each meeting will be discussed in detail.

The Sprint Planning Meeting: the entire marketing team should attend this planning, in order to be able to estimate the time needed to complete every task in the Campaign Backlog and, to make sure that all of the correct tasks are selected to meet those important business goals. A clear planning at the beginning is absolutely necessary in order to ensure that the project's goals are met.

The Daily Scrum meeting: usually the daily meetings are not longer than fifteen minutes. Every member of the marketing team will respond three questions: What did I do yesterday? What am I going to do today? and What are the risks (if there are any)? (Schwaber and Sutherland, 2011). Besides the typical three questions, every member of the marketing team may report the number of customers engaged, since the last Scrum meeting. The daily meeting also gives everyone the opportunity to get on the same page with what is happening. The daily meeting facilitates communication of the status and also of the impediments, representing valuable information for the Scrum Master. For achieving the Sprint's goal, the marketing team must be completely dedicated to the marketing project or campaign, during that Sprint.

The Sprint Review meeting: takes the form of a demo for the new features of the product increment, implemented in the Sprint that has ended (Cohn, 2002). In marketing, the meeting will take the form of

a performance meeting. The performance report developed during the Sprint will be presented. KPIs activated during the past Sprint may offer an overall view of the performance of several activities in the marketing department. The KPIs activated during the Sprint, are shown using graphs and charts in order to reveal trends or current values for them.

The Sprint Retrospective meeting: takes place at the end of every Sprint, and it is very important for the marketing process continuous improvement. During the Sprint Retrospective meeting is analysed what went well during the Sprint and what can be improved in the next Sprint (Cohn, 2002). Considering the uncertainty given by the rapidly changing business environment, marketing activities must be continuously adapted. The marketing performance is measured through Key Performance Indicators, and adjusted over time by the marketing team. If the performance really can be measured, this means that the team will know for sure how can improve the progress of a marketing project. This is one of the most important benefits of using agile methods, because it allows rapidly seeing where things are going wrong and gives the opportunity to improve where is necessary. Selecting and defining KPIs is a continuous and iterative process. KPIs always need to be updated and targets need to be adjusted, in order to reveal a clear view of the overall marketing activity

For a complete evaluation of the effectiveness of the entire marketing system when using Scrum the authors considered that a list of specific Key Performance Indicators for Scrum methodology should be defined. Having in mind that the customer is the key element of every marketing process, is required the measurement of certain metrics reflecting customers satisfaction and involvement in product development. The type and number of indicators will vary depending on the context and the marketing objectives of every organization. Some of the KPIs were defined as it follows:

- *% Features changed during a release*: measures the percentage of features changed from the Marketing Backlog after the project starts, in respect to the overall number of features in the Marketing Backlog.

By measuring the percentage of changed features within a release, we can identify the customer's level of involvement during the project development. Even though customer's involvement in the development process is one of the advantages offered by Scrum, the trend for this KPI should be a descending one because changes in any type of project should be minimized as much as possible during the project's progress.

- *% Effort estimation accuracy*: measures the percentage of work completed by the marketing team in respect to the entire work estimated in the Campaign Backlog.

The effort represents the amount of work the marketing team was able to complete during a Sprint. The trend for the KPI should be also a descending one and of course the ideal situation is when at the end of one Sprint the effort is equal to zero but in fact the most important aspect regarding the effort is that the marketing team is committed and works towards the marketing objectives.

- *% Successful Sprints*: measures the percentage of Sprints with 70% completed work from the Campaign Backlog, in respect with the total number of Sprints. A low level of successful sprints can have a negative impact on business, as it can generate customer dissatisfaction. A high value of the KPI can lead to customer loyalty.

Having in mind that the first Sprints will probably fail because the team is not yet able to estimate accurately the amount of work that can be completed during a Sprint, this KPI measures those Sprints with 70% completed work considered to be successful. The trend of this KPI should be an ascending one because a low level of successful Sprints can have a negative impact on business, as it can generate customer dissatisfaction. A high value of the KPI can lead to customer loyalty.

The success of the campaign is determined, by achieving the values set for the Key Performance Indicators. In the Sprint Review meeting, the selected KPIs are measured to ensure the fact that all the activities specified in the Sprint Backlog match the state of "done", and in this manner providing the success for the Sprint or for the campaign. It is very important that the concept of "done" is clearly understood by the whole marketing team (Schwaber and Sutherland, 2011).

4. Discussion

Accardi-Petersen (2011) claims that agile methodologies as project management techniques were developed to handle the constant changes in the requirements from several stakeholders and also to allow marketing teams to succeed in the actual changing business environment.

The foregoing is in fact the basic idea and somehow the starting point for the paper's authors when creating the presented Scrum framework. There are many similarities between how software projects and the way marketing projects are developed. The usual Product Backlog from Scrum was considered to be a Marketing Backlog from which before the beginning of every Sprint a Campaign Backlog will be created. Traditional marketing planning may take six month to a year, but the use of an agile methodology allows the marketing team to adapt to fast-changing market conditions and respond immediately to customer needs. Instead of setting from the beginning the marketing plan, marketers can start by setting the objectives and defining the KPIs for those objectives. The use of Scrum in marketing may have many benefits most of the problems can be detected at early stages and can be resolved quickly and with minimal losses. This is where the transparency offered by Scrum occurs, each member of the marketing team is reporting the difficulties he is experiencing, having in mind that this may influence the entire work group. Objectives or even marketing campaigns can be improved from one Sprint to another without affecting the overall project development.

The paper outlined how can the particular roles and meetings used in Scrum for software development can be defined for marketing projects development. In order to measure the progress of the marketing campaign the authors defined several Key Performance Indicators and gave an example of how the first iterations of the marketing project might look like (Figure 3). We find that the benefits of agile marketing can be emphasized by the positive impact on the marketing budgets and on the level of customer satisfaction. Costs can be kept under control by adjusting change from one Sprint to another and not at the end of the overall project. Also customers receive an increment of the product after every Sprint and thus gaining more confidence in a company's marketing system. This leads to a reduction of the financial risks imposed by any kind of project implementation. Marketing managers may always switch from one campaign to another if after the first Sprint the campaign seems to be unsuccessful without major prejudice to the entire marketing project.

5. Conclusion

As marketing projects have a high degree of uncertainty, organizations should look beyond the traditional project management methodologies and try to adopt agile methods like Scrum. The Scrum framework created in the paper represents the authors' proposal of how an agile method like Scrum may be applied also in other fields than software development. Considering that the research on Scrum is still in its infancy in marketing, the presented framework can be used as a guideline in managing a marketing process. The use of the present Scrum framework for marketing can make the planning process much more flexible. Marketing plans based on Sprints are short-term marketing plans and can be much more effective for a company. New ideas, goals or objectives may be constantly added in the Marketing Backlog, to keep evolving the marketing project or campaign and every performance report will indicate the progress towards the marketing objectives.

As the authors mentioned the effectiveness of agile marketing is reflected by the use of certain KPIs but regarding this issue, every organization will individually define its metrics that will clearly reveal the progress towards its marketing goals.

Future research is needed in this field in order to increase the confidence of companies for agile methods for marketing. The proposed Scrum framework will be used to develop a larger prospective study of using Scrum in marketing with comparability across several marketing projects.

References

Accardi-Petersen, M. (2011) *Agile Marketing,* Apress Media LLC, New York.

Ambler, T. and Kokkinaki, F. and Puntoni, S. (2004). "Assessing Marketing Perormance: Reasons for Metrics Selection", *Journal of Marketing Management,* Vol. 20, pp. 475-498.

Cohn, M. (2002) "An overview of Scrum", [online], MountainGoatSoftware Resources, http://www.mountaingoatsoftware.com/presentations/30-an-overview-of-scrum.

Cohn, M. (2010) *Succeeding with Agile. Software development using Scrum*, Pearson Education, Inc., Boston.

Iver, M.R., (2009) "Scrum is not just for software", [online], Scrum Alliance Resources, http://www.scrumalliance.org/resources/548.

Kerzner, H. (2009) *Project Management: a systems approach to planning, scheduling and controlling,* John Wiley & Sons, Inc., New Jersey, 10th edition.

O'Sullivan, D. and Abela, A.V. (2007) "Marketing Performance Measurement Ability and Firm Performance", *Journal of Marketing,* Vol. 71, April, pp. 79-93.

Rasmussen, N. and Chen, Y.C. and Bansal, M. (2009) *Business Dashboards: a visual catalog for design and deployment,* John Wiley & Sons, New Jersey.

Rico, D.F. and Sayani, H.H. and Sone, S. (2009), *The Business Value of Agile Software Methods,* J.Ross Publishing, Inc., Fort Lauderdale.
Schwaber, K. and Sutherland, J., (2011) "Scrum Guide*",* [online], http://www.scrum.org/scrumguides.
Sutherland, J. (2010), "Scrum Handbook", [online], The Scrum Training Institute, http://jeffsutherland.com/scrumhandbook.pdf.
Sutherland, J. and Solingen, R. and Waard, D. (2011) "Scrum in Sales", [online], http://jeffsutherland.com/ScruminSalesAgile2011.pdf.

Prosumer Involvement in Innovation Strategies – the Prosumer Creativity and Focus Paradigm

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Abstract: Innovation has become a key success factor for sustainable companies that face diversity of thought, globalization of communication means and the rise of a new type of consumer: the prosumer. This concept refers to a technology savvy, that shares goods and services, wants to make his voice heard by developing ideas, products or services in partnership with companies, to become valuable through his creative offer. With the technology boom and the invention of the Web, prosumers, limited by physical boundaries went online, where they found unlimited sources for their rip, mix and burn nature. The old consumption model is dead; long live the new consumption model! The old consumption model was based on mass consumption, mass communication, a centralized economy, standardization and specialization of work places. The usual consumer was uninformed, could be easily influenced by marketing campaigns and generally bought a wide range of products. But with the rapid development of technology, a large number of consumers became knowledgeable, having global access to technology, communication and information. Precisely these changes offer a wide range of competitive advantages for open minded organizations. Therefore a threat is transformed into an opportunity, by innovating alongside their consumers. The degree of prosumer involvement into the innovation process takes time and effort, and depends on a company's characteristics and objectives. The present article takes into account the level of prosumer involvement and creativity output, and presents the four main strategies that have emerged: Company + Company customization, Company + Prosumer crowd sourcing, Prosumer + Company working together and Prosumer + Prosumer co-creation. These four strategies are the starting point for important decision making and complex marketing campaigns creation. The Prosumer Creativity and Focus paradigm is suited for a company's introspection, for defining its position and customer focus, leading to an open innovation and a radical change of mentality.

Keywords: prosumer, co-creation, crowd sourcing, open innovation, prosumer creativity and focus paradigm, virtual knowledge broker

1. Introduction

Companies from all over the world face profound changes in technology, demographical, economical and cultural transformations, which are establishing market success according to innovative activities undertaken. Schumpeter (2003) talks about innovation like an activity designed to "produce something else or to produce otherwise". Therefore, we can argue that an innovative activity must target new products or services or new manufacturing technologies, which will offer new features for common products. But innovation isn't limited to these two possibilities. Extrapolating, and thinking the matter in a systemic manner, it implies courage to enter new markets, which are shown to be profitable, to bring new and revolutionary raw materials in the manufacturing process, to reorganize the internal structure and culture of a firm based on an innovative method or to build a firm's image after a fresh marketing trend, corresponding perfectly to the target audience's needs.

In the years 2007-2008, the economic crisis that put an end to the old consumption model, in a world stroke by poverty and unemployment, brought to life an era ruled by value added actions and prosumption. Therefore, the old consumption model which had known a rapid growth from the massive industrialization era, with principles like mass communication, product standardization, maximization of profits, specialization of the work place, centralization of economy and policy, began to loose ground, because of its bureaucratic and slow reaction to change.

Jean Baudrillard's (1970) consumption society collapsed because of the global recession. The consumption has dramatically decreased causing companies to adopt new market strategies or to declare bankruptcy. But what kind of strategies to adopt, if till then Kotler's (2009) consumer centred marketing determined managers to treat consumers like kings, to analyze their needs and wants and to quickly meet them? What else could they do? It was a firm-client relationship issue. Managers didn't perceive the client as an individual, with a distinctive personality and creative potential, but as an amorphous mass of people, corresponding to certain indicators, which needed to be manipulated through mass communication. But yesterday's uninformed consumer, who was purchasing a wide range of products being influenced by advertising, has rapidly transformed in an informed consumer, demanding in its choices, who could not be manipulated by mass media's boastful ads. Companies

that have not perceived the new changes and have not found innovative methods to reach market differentiation or to reengineer their slow hierarchical structure and to meet the new wave of customized demands, have lost and are loosing the fight for survival.

2. The prosumer concept

This concept derives its origin from the 80s literature, being coined by Alvin Toffler (1980), in its futuristic book called "The Third Wave". The author defined the "prosumer" (formed by joining "consumer" and "producer" in a single word) as the original nature of man, from ancient times. People were prosumers even from antiquity, they were producing their food through agriculture, hunting or fishing, they were making their own clothes from animal skins or cotton products, were building their houses with the help of their families et cetera. The differentiation between the consumer and the producer has marked the beginning of the industrial era, when the worker had a steady and specialized work place which gave him little time to realize all the prosumer activities. He was forced to purchase the goods that he needed with the money from his salary. The few prosumers of the last century were the housewives who were staying at home and raising the children, taking care of their family's meals, cleaning, knitting hats, scarves and different clothes, embroidering pillow cases and cutting clothing items and bed linens.

In our days, with the Internet and especially the World Wide Web, the prosumer power is again brought to the fore. The generation with ages from 14 to 34 has experimented the transition from the industrial era to the post-industrial one, from Web1.0 to Web 2.0, learning to look for references with the help of search engines, to do homework and to read on the computer, and not least, to express their thoughts on forums, blogs and social networks, becoming accustomed to new technology and adaptable to fast shifting online collaboration tools.

Even if the term seemed clarified, in the last years, there have appeared new and modern meanings to it. In Figure 1, the authors propose and systematize four global characteristics that have been appearing in ambigous contexts through the last years in the literature and in the virtual world, meanings that are borrowed by society and companies for electronic products in particular, by bloggers for their posts and by authors for their book ideas. Altogether, when we are saying "prosumer", we can mean different things. The characteristics that we are mentioning below can designate different activities for every need of the prosumer or they can overlap when we are talking about a complex prosumer. The consumer can be seen in one of these situations:

The concatenation between the *producer and consumer* function can be seen especially in the case of consumer's need to customise its desired product or service, to match his personality and his social life. The example of the company known as Cafe Press (which sells custom T-shirts, mugs and sleepers) is very eloquent in this case, because it portrays perfectly the image of a firm that takes advantage of the Web's unlimited options, allowing product customization by anyone through the computer.

The semi-professional consumer, with a passion for photography for example, has the possibility to purchase photo cameras with professional features, but on a lower budget and specially made for his needs. All well known brands have adhered to this trend, manufacturing these kind of electronic products for passionate consumers, managing to use the term "prosumer" for all their products.

The prosumer can designate also *an individual that creates and sells his own products* with or without the help of the Internet. A person in this posture in the real world creates handmade products, but on the Internet it has unlimited creative possibilities. Important businesses like PONOKO have soared, where the firm provides the adequate software, leaving its consumer with the freedom of creating its own product after its personal ideas and wishes, with the possibility for the company to produce as many items as the client wishes to purchase for his use or for selling to others its product.

The wide term of "prosumer" includes also the idea of *a proactive consumer*, who gives his opinion online, with the help of Web2.0 applications. This kind of content producer and consumer appeared with the arise of social media, especially blogs, and evolved quickly. This sort of prosumer is well informed on a particular area, with journalistic features and an endless power to influence, his messages having the possibility to be posted at a click of the mouse and be found through searching engines in few seconds if he has a notorious blog, read by many or if he is writing about an interesting subject.

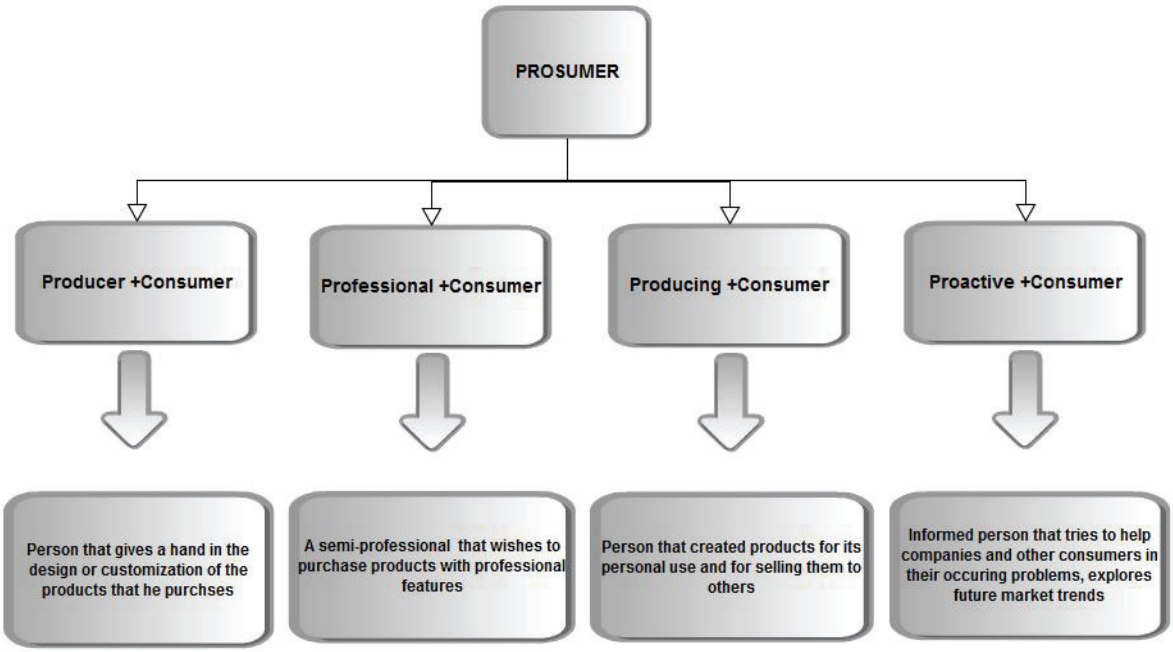


Figure 1: The four global characteristics of the prosumer

A complex prosumer can possess two or more of these above presented characteristics. Such an individual could collaborate with companies like CRUSHPAD, for example, having the possibility of creating its personal sort of wine (Producing + Consuming) and using professional mechanisms (Professional + Consumer). This complex prosumer could have a passion for wines, a desire for cultivating them, but not enough material resources or knowledge necessary for such an investment. CRUSHPAD discovered this breach of uncovered needs and started an excellent business, which provides their land, knowledge and expert tools for a certain fee, allowing passionate prosumers to involve themselves directly in the harvesting, in the process of selecting seeds, realizing and bottling the wine, building their own brand. This type of business is very successful, having 12, 5 million dollars of profit, because its entrepreneur opened his mind and managed to take advantage from the last decades' changes.

Prosumers, limited in the real world by physical boundaries, have started to discover the online environment's business offers, invading this timeless and endless space, creating applications and communities with an unprecedented level of freedom of speech. The authors have tried to include the four characteristics of this concept in a single definition for the virtual prosumer, as "a knowledgeable consumer, a digital user who employs technologies for participating to the product or service conception, design and execution and who has a high impact on his social network" (Izvercianu and Şeran, 2011).

Because prosumer specific characteristics are very important in the market, and its creative power can start innovation in a company's core, the authors have perceived as necessary to build the Prosumer Creativity and Focus Paradigm.

3. The prosumer creativity and focus paradigm

The consumer, with his new role of co-producer of value, can be seen as an external partner in the open innovation paradigm. Therefore, in an open innovation strategy, research and development are seen as an open system, where ideas and external paths to the market can be as important as the ones reserved for the internal ones (Chesbrough, Vanhaverbeke and West, 2006). Boundaries between a firm and its environment disappear in a world based on knowledge distribution. Companies don't afford to rely only on their own research and they start to appreciate the creative resources of their stakeholders, especially of their consumers.

Since in the real world the innovation procedures are known and limited, companies have developed their brands on the Internet. Firms that are realizing the innovative potential of the virtual prosumer are developing even without being aware of them, four main marketing strategies. Managers are

trying new approaches, but they do not know that the key element of the strategy is called a "prosumer" or that its potential can be used differently depending on the company's activity domain and objectives. For that reason, we need to have a clear image of the prosumer's characteristics and the company's purpose, followed by asking these questions:

- To what extent we focus on the prosumer and on the company's objectives?
- Which will be the level of creativity allowed?
- To what extent we involve the prosumer?
- In what area do we leave the prosumer with the involvement opportunity and in what stage of the product's life cycle?

After responding to the first two questions, the firm will be situated in one of the following four categories, presented in Figure 2 from below: *Company + Company (customization)*, *Company + Prosumer (crowd sourcing)*, *Prosumer + Company (working together)* and *Prosumer + Prosumer (co-creation)*. After the manager gets a clear picture of his firm's position in the Prosumer Creativity and Focus Paradigm, he will respond to the next two questions, for building an effective future marketing strategy.

The desire to delineate the method the company must involve its prosumers in innovative activities for meeting the markets needs and wants, the research undertaken led to the paradigm presented in Figure 2, which has two axes. The vertical axis measures the prosumer's participation degree in product or service achievement, either with the emphasis on the company's objectives, the main beneficiary of the strategy or on the prosumer's needs, in this case, the consumer has the maximum gain. The horizontal axis measures the creativity degree allowed for prosumer activities. This is proportional with innovation. The higher the level of creativity, the more efficient innovation is produced, and the strategy is a success. The higher the freedom of the prosumer, the more product performance will be obtained.

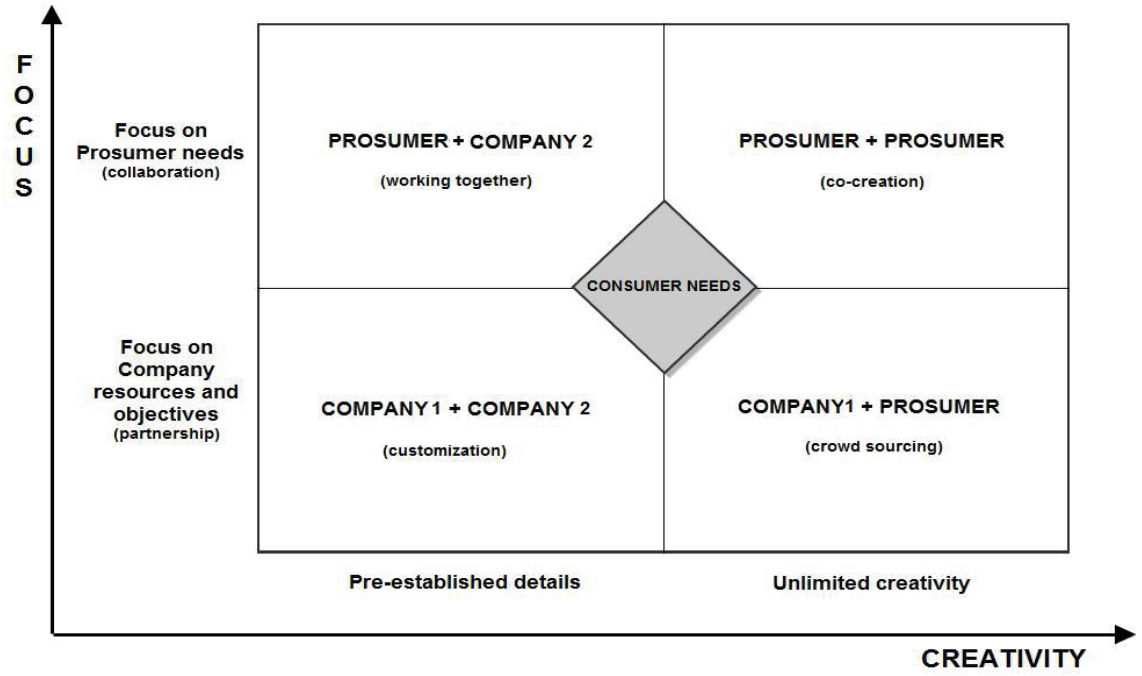


Figure 2: The prosumer creativity and focus paradigm

The four strategies will be explained in the following, being divided into two categories, depending on the focus function on the company or on the prosumer. This classification has the purpose to better understand the existing connections between the strategies of the paradigm's base and top, each with its different meanings.

Therefore, the focus on company's resources and objectives knows two marketing strategies (Figure3) with varied competitive results: product customization and crowd sourcing.

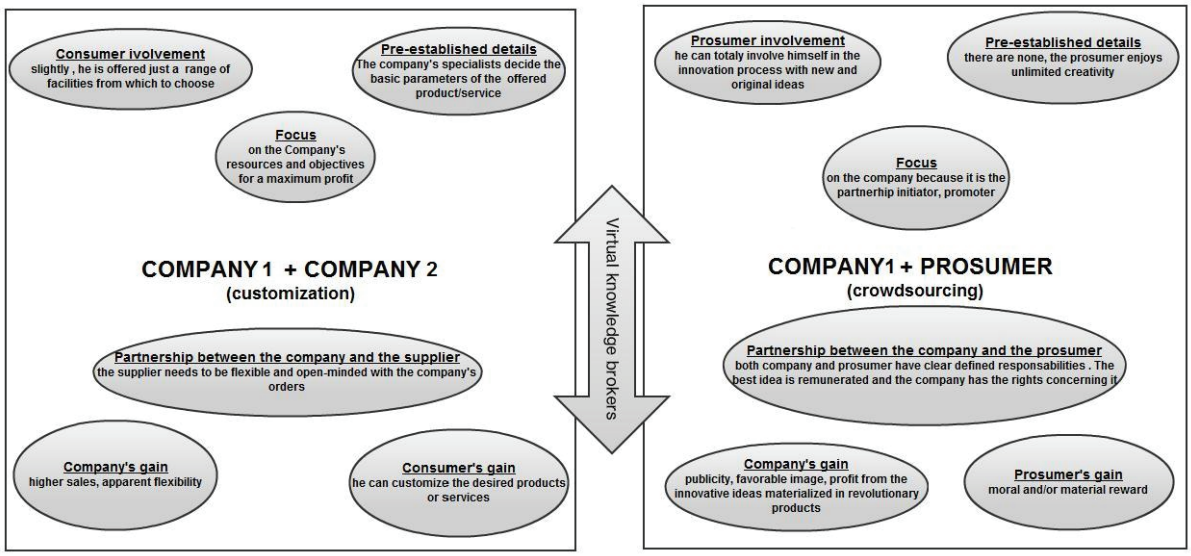


Figure 3: The first two strategies situated on the base of the prosumer creativity and focus paradigm

Company + Company (customization) Strategy represents the companies' first response to the growing desire of consumer individualism in a mass production context, without significant increase in costs. Consumers have developed a culture of self awareness, and the standardized products weren't a suitable option for everyone. Because mass production meant low costs and a fair price to the consumer, companies had a hard time thinking to give up this procedure and start manufacturing unique products at excessive prices. In this context, a compromise solution has been found: the standard product's customization. Thereby, companies don't loose their clients due to high costs and they manage to meet the individualization needs of some of the most demanding of them.

This strategy implies an exclusive focus on the objectives of a certain company which desires to use its resources as efficient as possible, to sell its products in a large number, to obtain a good profit and a nice and fresh image. Such a company seems to offer flexibility to its client, but the range of materials and colours from which the consumer can choose is restricted to a few and allows only a slightly creative involvement of the part of the prosumer.

The partnership takes place between two companies: between the main company that manufactures the products or offers the services that can be customized and company number 2, its supplier, which responds quickly to the different special orders.

This strategy convinced companies from all over the world, from all domains, especially from the service sector, and from the real and virtual world. Therefore, McDonalds with its fast food restaurants introduced to the world standard products that the consumer could combine at ease, giving a freedom of choice, a choice from an existing and pre-defined offer. BMW started to allow customization of its cars from a large range of colours, interior pieces, materials, functionalities, engine types, totalling appreciatively 500 possible models of the same car, but the consumer is restricted to those models. IKEA offers furniture that the consumers can personally assembly or change, by choosing its colour, cut and dimensions from the materials at disposal. Even the instructions for the assembly are standardized. Mobile services have different offers that people can customize to suit their needs, and the companies from the online world allow the personalization of different items from a wide range of colours and images, but the original product is a standard one.

Company + Prosumer (crowd sourcing) Strategy marks the arising of the prosumer in the production process. In this case, crowd sourcing can be seen as a business model where the company is outsourcing certain parts or specific activities that were traditionally realized by its employees or professionals to its clients or other amateurs. The term has been used with other names like: "wide audience end-user engagement" (Antikainen and Vaataja, 2010) or "collective customer collaboration" (Ogawa and Piller, 2006).

In this case, we have a partnership between the producing company and the prosumer. The partnership implies a close cooperation between two or several parts that have specific

responsibilities and duties. Therefore, crowd souring seems like a contest, the main company is the initiator, the promoter of the competition, which launches the challenge for the prosumers: a solution for a problem they are confronted with. It's a way of getting help from the consumers and of rewarding the best of them, who came with innovative ideas applicable in the company's processes. In crowd sourcing, even if the prosumer has unlimited creativity, we are not talking about a collaboration, because this implies doing things in common. In crowd sourcing the prosumer doesn't own the rights for his idea, those are submitted to the company, and thereby the innovation isn't performed in common by the company and the prosumer. We have situations when crowd sourcing is trying to penetrate the strategies from the top of the model, but originally, this represents a way through which a company raises valuable ideas for its own purposes, rewarding the creators with material or other type of compensations.

Crowd sourcing examples occur more often because firms understood the innovative potential of ths process. DELL built an Idea Storm platform which incites computer enthusiasts to opinion about DELL products, improve them or suggest products or services, new strategies that are debated for a week in open sessions by DELL community. The results are impressive for the company: not only high creative ideas, but also a better image at a global level. Consumers perceive the company as an organization interested in their opinions, open, innovative, a plus that brings free notoriety and fame. The show called American Idol has successfully used crowd sourcing, gaining valuable online presence. LAYS snack company has involved Indian families in an eights months' contest under the imperative „ Give Us Your Dillicious Flavour", where they had to propose new flavours for Lays chips, gaining national recognition and a material reward. The success was guaranteed because the marketing strategy came with a proposal, to place the wining family's picture on the bags of chips with the flavour millions of Indians voted. Those sort of rewards appeal to entire communities, bringing a variety of ideas and an international recognition for the organizing company, apart from innovation. And the products thus formed, they are more likely to be purchased, for the simple reason that they involved common persons, with a high degree of credibility.

The confluence of the two strategies is the place where „*virtual knowledge brokers*" come into existence (Verona, Prandelli and Sawhney, 2006). These firms represent the virtual manifestation of knowledge brokers, so called consulting firms. Virtual knowledge brokers are helping companies to overcome their clients' negative perception. Those intermediaries between the company and its consumers are using Internet power to retain valuable market knowledge for innovation. They seem to be more objective and the clients are more likely to trust a third party that wants to help them, through understanding their preferences towards a certain product, brand and manufacturer (Hagel and Rayport, 1997). Virtual knowledge brokers are creating independent communities in the online environment, where they can reach numerous groups of people, whom they are asking questions from time to time, processing the information for relevant results applicable for the firms they provide advice for.

The reason for their location between the first two strategies is because these brokers are focused on meeting the objectives of the company they are working for. Because they are a company that is working for another company, we would be tempted to include them in the first strategy like information suppliers. This becomes impossible for the fact that they collect information from prosumers in a crowd sourcing manner, having a mixed strategy with the tendency heading to the top of the model, in the virtual world.

Passing by these two strategies and the virtual knowledge brokers, we find ourselves in the upper part of the paradigm that is designed for focusing on meeting the prosumer needs through: working together and co-creation. The top of the model has strategies that are used with caution because they represent a high risk for companies, underlying a new business system where the company no longer remains the central authority, assigning this position to the prosumer who enlarges its attributions and benefits. The lack of boundaries in the virtual world leads to the fact that the prosumer can meet all his wishes at a click of a mouse.

Prosumer + Company (working together) Strategy changes the roles of the company and its consumers. Therefore, the prosumer finds himself in the centre of creation an development activities and the company becomes his provider, his helper. We find this type of strategy seldom used in the physical world, full of regulations and limits, but preferred in the virtual world where the prosumer is king.

The services of this company-provider fall within some limits established by it, as we will see the following examples. The company PONOKO manages a Web site where the consumer can design his virtual product with the help of design software and programmes that he finds there. The innovative product is then physically produced by 3D printing in as many copies as the client wishes to. This service is offered by the company for a fee. The prosumer has the legal rights upon his product and he can sale it without problems. We encounter here pre-established limitations when we are thinking about the material of the product and its structure.

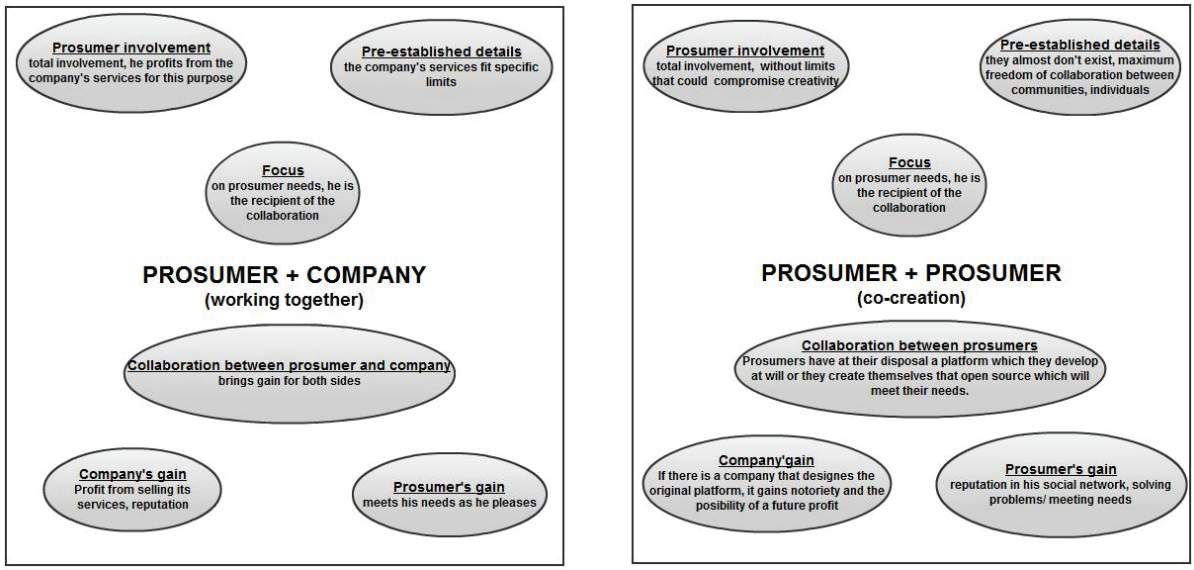


Figure 4: The last two strategies situated on the top of the prosumer creativity and focus paradigm

Other companies that have taken advantage of the rising of the Web 2.0 are Face book, You Tube and other social networking and user-generated content tools. The notorious social network of our recent years, Face book, is a Web site where users can find their acquaintances and connect with unknown people. It offers a pre-established profile with customizable services, changeable for meeting user's needs. You Tube in exchange allows its users to upload and visualize user-generated videos. They can promote their standpoints, hobbies, can accumulate views and become famous. Nevertheless, they have difficulties and boundaries in their freedom of creative expression because of the pre-established specifications of the site's experts like a fixed number of minutes for video and other features that the user can't change as he pleases. The game Second Life of the company Linden Labs is based on last hour digital technology, virtual reality collaborative environments and on mixed visualization facilities. In this world, the prosumer receives an avatar which he can customize and enters in a world where he can build, virtually project and design a lot of things. This type of business has a tremendous success because it was brought to the edge of the last strategy, borrowing its vanguardism, permitting co-creation, but at the same time gaining money from the purchases in the virtual world.

Prosumer + Prosumer (co-creation) Strategy closes in a spectacular manner the influence of a company in limiting its consumer's initiatives. The company almost disappears and the prosumer's involvement is exclusive. The collaboration between prosumers is realized on a platform placed at their disposal by a firm or by others like them. Another way is to personally design an open source which can be developed latter by the entire community on a voluntary base, just for creating in common a new device for everyone to benefit from.

A perfect example is the activity of Jimmy Wales, the founder of Wikipedia. This online encyclopaedia is free and built collaboratively by millions of people using wiki software for editing every page. It reached the stage of a collective conscience of the entire humanity, having overcome eight million articles in 2008 and heading for the next million. This business model brings a huge and invaluable reputation and recognition for the founder and for the brand, but being free, it doesn't produce profit. Wikipedia survives through donations, but it holds an unprecedented power in our information age. Linux, a computer operating system, is the best known example of collaboration and free software development, but it is followed by close in usage and recognition by the Apache system, designed for Web servers and Fire fox for Internet browsers. Through these open source systems, users can meet

a wide range of needs. They can have access to free Internet callings through bandwidth usage in a network of collaborators or they can simultaneous collaborate on a wiki page, or design their products, manage their business and so forth. If we have a starting company in this strategy, its gains are: global recognition today and a future opportunity to make profit in a creative manner, without restricting co-creation power and user's benefits.

4. Conclusions

The present research proposes a theoretical solution and a starting point for developing new marketing strategies for the problems occurring in our shifting society due to lack of consumer knowledge. Companies don't develop a fruitful relationship with their customers because they do not know their specific generation characteristics and they don't possess the tool to respond effectively to their needs. The consumer role has changed and marketing strategies became unsuitable for the masses. The emerging prosumer represents a revolution in consumer behaviour, a change that will make the difference between flexible and innovative companies that have a sustainable management style and the limited, unchangeable organizations which will eventually be rejected by the market.

After a short description of prosumer characteristics and a clarification of his undertaken activities, companies will find it easier to address and involve him in their operations. By answering to some clear and helpful questions, a manager could easily understand the strategy that best suits his company and objectives. The Prosumer Creativity and Focus Paradigm was built for an intrinsic analysis of a company. The examples for each strategy have the purpose of showing the prosumer's innovative potential in today's businesses, whether developed in the real or the virtual world, and a profound understanding of how some smart companies faced the new market changes.

Future research will focus on developing specific procedures for each strategy from the Prosumer Creativity and Focus Paradigm that companies need to adopt for a successful marketing campaign. From the four prosumer characteristics new and detailed prosumer types are to be listed and discussed, based on certain indicators from the real and the virtual world.

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References

Antikainen, M., Vaataja, H.K. (2010) "Rewarding in open innovation communities – how to motivate members", International Journal of Entrepreneurship and Innovation Management, Vol 2, No.4

Baudrillard, Jean, (1970), La societe de consommation, Gallimard, Paris.

Chesbrough, H.,Vanhaverbeke,, W., West, J. (2006) Open Innovation. Researching a New Paradigm, Oxford University Press New York.

Hagel, John and Rayport, Jeffrey (1997) "The new informediaries", McKinsey Quarterly Vol. 4, No. 2, pp 119-128

Izvercianu, Monica and Şeran, Sabina (2011) "Defining and Involving the Virtual Prosumer through Participative Marketing Strategies in the MPT Master Program", RMEE 2011, Cluj Napoca, pp430-436.

Kotler, Philip (2009) Marketing Management, Prentice Hall : Pearson Education Limited.

Ogawa, Susumu and Piller, Frank T. (2006) "Reducing the Risks of New Product Development", MIT Sloan Management Review, Massachusetts Institute of Technology, pp65-71

Scumpeter, J. (2003) Capitalism, Socialism, and Democracy, Harper & Row, New York

Verona, G., Prandelli, E., Sawhney M. (2006) "Innovation and Virtual Environments: Towards Virtual Knowledge Brokers", Organization Studies, Sage Publications, London, Vol.27, No.6, pp 765-788

The Competitive Advantage for Early Stage Entrepreneurs: The Case of Lebanon

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Abstract: The startup usually has less capital, fewer scientists and engineers, less legitimacy or brand presence, fewer strategic alliances, evolving organizational structures and incomplete or even non-existent business processes. At a more abstract level, young firms have liabilities of newness and smallness, so they fail at higher rates than do their larger and older competitors. On the other hand, entrepreneurship is a driving force bringing creativity to the business and establishing a community of high-growth economy. In fact, an embracing of entrepreneurial creativity can also bring a business of wider growth, more competitive advantage, enhanced productivity, numerous jobs and wealth creation and ultimately a better quality of life for all. Increasingly, firms are attempting to design and implement entrepreneurial strategies in order to strengthen their competitive advantage and to survive the early stage. Therefore, our paper will present how Lebanese entrepreneurs are perceiving the below indicators on the reinforcement of the competitive advantage: External/Internal Information evaluation process. Human resource management practices for SMEs. The process that begins with a new idea and concludes with market introduction in order to mark the point of difference in competition. The value chain analysis and its importance in the quest to achieve sustainable competitive advantage for an entrepreneurship; as time elapses, the value chain may lose its ability to generate value for the customer or due that to competition, demand, fluctuations and discovery of weak links. Entrepreneurship skills, marketing capability and sustained competitive advantage; hopefully to propose some new points of view in managing enterprises. Interviewed entrepreneurs have superficial and general information about the basic knowledge that allow them to take the right decisions. According to our exploratory research, we found that this basic knowledge is considered as a key factor of success to their early stage business. Thereby, Lebanese entrepreneurs should undertake training and have a follow up to all the basic knowledge to help them surpass the in flexibility related to the early stage. Entrepreneurs have weaknesses or even ignore the importance of scientific studies like SWOT analysis, interviews, qualitative and quantitative studies, offers and management to the consumers' needs, and also how to look for competitive advantages, though these studies are essential before the formation of their ideas. Our paper is based on a qualitative approach and will be of use first for young entrepreneurs in order to leverage their awareness about the importance of the competitive advantage and to highlight the type of training to get in order to survive the early stage of their entrepreneurial process and second for the government to give a lucid vision about possible regulations to support the entrepreneurs in their early stage

Keywords: competitive advantage, value chain, entrepreneurs skills, information system, human resources, marketing and financial plan

1. Introduction and research design

Knowledge is the key factor of an entrepreneurial success in its early stage. Our paper shows the level of basic knowledge of Lebanese entrepreneurs in their early stages.

As we know, small businesses are the job creators for a country as well as the key driver of the economy. That's why we want to help the Lebanese entrepreneurs to succeed in their starting phase in a competitive market, and that, by detecting their level of knowledge in order to offer them an adapted training to their needs. Therefore, after a primary research, we identified the importance of knowledge's level an entrepreneur should hold in the following areas: The importance of competitive advantage, the value chain, the innovation, the information system, human resources, the awareness and effectiveness of the marketing plan of the entrepreneur, the level of skills and experiences of this latter as well as his acquaintance with the field of financial ratios.

To evaluate the entrepreneurs' level of knowledge in their early stages, we found it necessary to help entrepreneurs express themselves deeply and in details through qualitative methods (semi-structured individual interview).

This article is divided into two sections; in the first one, a literature review about the successful criteria of an entrepreneur was exposed. In the second section, a summary of the results obtained after our qualitative study of (24 Lebanese entrepreneurs) was uncovered.

Section 1: Literature Review & Research Question.

2. Literature review

Based on many research articles we noticed that the main factors contributing on the SME's entrepreneur success in the early stage are exposed as follow:

2.1 The competitive advantage factor

Small companies play an essential in creating job and improving economy of a nation, but unfortunately, numerous entrepreneurship ideas fail to enter their early stage because of the lack of entrepreneurs' knowledge and training. A study (Covin & Miles 1999) shows a relation between entrepreneurial creativity and competitive advantage and also entrepreneurial commitment and competitive advantage.

Corporate entrepreneurship has long been recognized as a potentially viable means for promoting and sustaining corporate competitiveness. According to Schollhammer (1982), Miller (1983), Khandwalla (1987), Guth and Ginsberg (1990), Naman and Slevin (1993), and Lumpkin and Dess (1996), a good corporate entrepreneurship can lead to increase the competitive positioning of a company and consequently improving its market share and opportunities.

And we note that, the label entrepreneurial should not be applied to firms that are not innovative. Because according to Stevenson and Gumpert (1985), innovation is the "heart of entrepreneur-ship." Likewise, Stopford and Baden-Fuller (1994 p. 522) observed that "most authors accept that all types of entrepreneurship are based on innovations".

Many variables lead to competitive advantages as indicated later in our article such as personal creativity, business creativity, product development, product differentiation, entrepreneurial commitment and human resources management. Asselineau & Cromarias (2011) add the proximity to these variables. For them, a small business company can get advantages to grow from geographical proximity to private companies and public institutions. Because of this proximity, SME can get competitive advantage in building a one to one relation with them; this is not the case of international companies supplying products into the national market.

2.2 The value chain analysis factor

According to Krajewski and Ritzman (2007), processes are a firm's basic activities that take inputs, modify them and add value to them in order to create outputs aimed at the firm's end customer. It is important to utilize a process view of the firms since a firm's competitive success is positively correlated with the effectiveness of its internal processes.

Thus a supply chain can be illustrated as a flow of inputs (at different degrees) in a pipeline that conveys flows of resources, e.g. inputs such as raw materials, services, financial resources, information and logistics, that are processed and converted to outputs in an efficient manner.

If each activity in the value chain is well worked on by the entrepreneur, it will provide a (value) competitive advantage for the company which is manifested by an added value different from the competition to the final consumer. On the other hand, value equal cost, equal beneficial price will be well perceived by the customer.

Adoram (2011) stipulate that competencies based on information, skills and know-how accumulated at the firm can strengthen the firm's core competencies. Such competencies are difficult to imitate and substitute and thus are uniquely characterized and can be regarded as distinct sources of sustained competitive advantage. In essence, core competencies are a firm's unique resources based on collective learning and coordination of the organization with regard to the workforce skills and the ability to respond quickly to short-term changes in demand or supply, facilities, market know-how and technology. Core processes such as inward logistics, production (just in time), outbound logistics,

marketing efforts and sales services are essential to create a competitive advantage, dependent on industry uniqueness, in order to deliver value to external consumers.

2.3 The innovation factor

According to Abdul Halim & Che Mat (2010), entrepreneurial creativity can also bring a more growth to business, competitive advantage, productivity improvement, job and wealth creation, and ultimately a better quality of life for all.

In their exploratory study, Abdul Halim & Che Mat (2010) reveals that the variables in entrepreneurial creativity are related with the competitive advantage. These variables are indicating in the table just below.

Table 1: List of variables, indicators and their citations

Variables	Indicators	Citation
Personal Creativity	• Creative in strategic development • Creative to identify opportunities • Creative in problem solving • Creative to develop networking	Marcus, 2005
Business Creativity	• Creative in a business planning • Creative to identify business opportunities • Creative to increase capability • Creative to solve problem	Carey et al, 2006
Product development	• Creative to develop new product • Creative to design new product • Creative to interpreted current issues in a new product • Creative to innovate current products	Gurol, 2006
Product Differentiation	• Creative to differentiate product from competitors • Creative to differentiate in still enthusiastic • Creative to differentiate the product's shape • Creative to differentiate the prize from competitors	Gurol, 2006
Competitive Advantage	• Have a strong product character compare to competitors • Have a great opportunities to expand the market size • Have a strategic to construct the business chain • Have a technology in a product producing	Antoncic et al, 2004. Lamb et al, 2004
Entrepreneurial Commitment	• Highly motivated in developing entrepreneurial personality • Willing to spend much money to attend entrepreneurial program • Highly committed to structure the business strategic • Highly motivated to study the market environment	McKenna, 2005

Due to the rapid pace and unpredictability of technology change, companies need continuous and rapid modification of their product features and ways in to conduct business. Hax (1989) argues that global strategies are dependent in large part on accelerating the speed at which innovations are translated into profitable commercial ventures.

Several common themes emerge repeatedly across studies to suggest that the link between innovation activities and competitive advantage rests primarily on four factors. One, innovations that are hard to imitate are more likely to lead to sustainable competitive advantage (Porter 1985). Two innovations that accurately reflect market realities are more likely to lead to sustainable competitive advantage (Deming 1983; Porter 1985). Three, innovations that enable a firm to exploit the timing characteristics of the relevant industry are more likely to lead to sustainable competitive advantage (Betz 1987; Kanter 1983). Fourth, innovations that rely on capabilities and technologies that are readily accessible to the firm are more likely to lead to sustainable competitive advantage (Ansoff 1988; Miller 1990).

2.4 The information system factor

One area where management and IS researchers can work together is in applying dynamic capabilities theory (Teece et al. 1997). This theory affords the IT field an opportunity to frame its research questions based on situational and environmental contexts within which such technologies can enable a firm to gain and sustain a competitive advantage. It suggests that dynamic capabilities

are essentially change-oriented capabilities that help firms redeploy and reconfigure their resource base to meet evolving customer demands and competitor strategies.

According to Zahra and George (2002) Entrepreneurship defines opportunities, where IT makes these opportunities feasible and viable. Strategy enables firms to differentiate themselves from their rivals to generate wealth. It is this ongoing interplay between entrepreneurship, IT and competitive strategy that makes the firm's capabilities dynamic, even as markets and competitors change. This interplay between entrepreneurship, IT and competitive strategy provides some insights into how value may be created in net-enabled organizations.

2.5 The human resources and management factor

Human resources are an important element to the success of the entrepreneur. Entrepreneurial activities are challenging and as such can contribute to a job's motivation potential (Hackman & Oldham 1975) or can place excessive demands on a firm's human resources for its success.

Schuler and Jackson (1987) identify relation between efficiency of strategy implementation and human resources practices in order to gain competitive advantage by cost focus or differentiation. Human resources practices could include good job description, performance appraisal, and motivation. They also explain the importance of managing resistance to change in modifying human resources practices to match it the company strategy.

Based on these facts, Schuler and Jackson (1987) identify two types of companies:

> *''Businesses pursuing an entrepreneurial strategy to gain competitive advantage would be more likely to have HRM practices that give employees more participation in personnel decisions; offer more employment security; use job performance appraisal and compensation practices that facilitate cooperation across groups; reward employees with more deferred compensation and stock ownership; and provide more broad-based training and development, compared to businesses pursuing an entrepreneurial strategy to gain competitive advantage.*
>
> *Results indicate that in entrepreneurial firms, the jobs held by hourly employees are less likely to allow those employees to acquire skills useful for other positions in the firm, and top-management is more likely to receive training that focuses on a short-rather than long-term needs. Otherwise, the impact of an entrepreneurial strategy on HRM practices would be greatest for employees in top management and least for employees below the level of top management''.*

2.6 The marketing capability factor

Brownlie (1998) identifies the shortcomings of stepwise formal marketing planning and strategy since such processes will always be carried out under conditions of imperfect knowledge about the future. Piercy (1986) argues that despite widespread usage of rational methods, there is lack of evidence that such approaches produce better results than creative, judgmental approaches. If there are problems with larger firm marketing, then the situation is compounded when examining the smaller form with less resources at its disposal, where higher levels of uncertainty are expected.

Marketing decision tools such as SWOT analysis and portfolio analysis still have their role to play, but such tools should be utilized in conjunction with a more creative approach in doing marketing. The smaller firm is more flexible, closer to customers and more capable of adaptation and implementing creative change through exploitation of core competencies, than traditional marketing frameworks recognize (Hill 2001). Gilmore et al (2001) believe that the SME cannot follow formal marketing conventions because of the limited resources at its disposal, and because of the different way in which the SME manager thinks. The process is haphazard, chaotic and non-linear. Networking theory is an alternative to appropriate explanation of SME marketing formulating plans and strategies. As SME grows in experience the nature of managerial judgment changes from acting mainly on intuition to a more considered, planned and yet still incomplete view of future strategy. The figure below presents the Biographical Research and Smaller Firm Marketing Theory Generation according to Fillis Ian (2003).

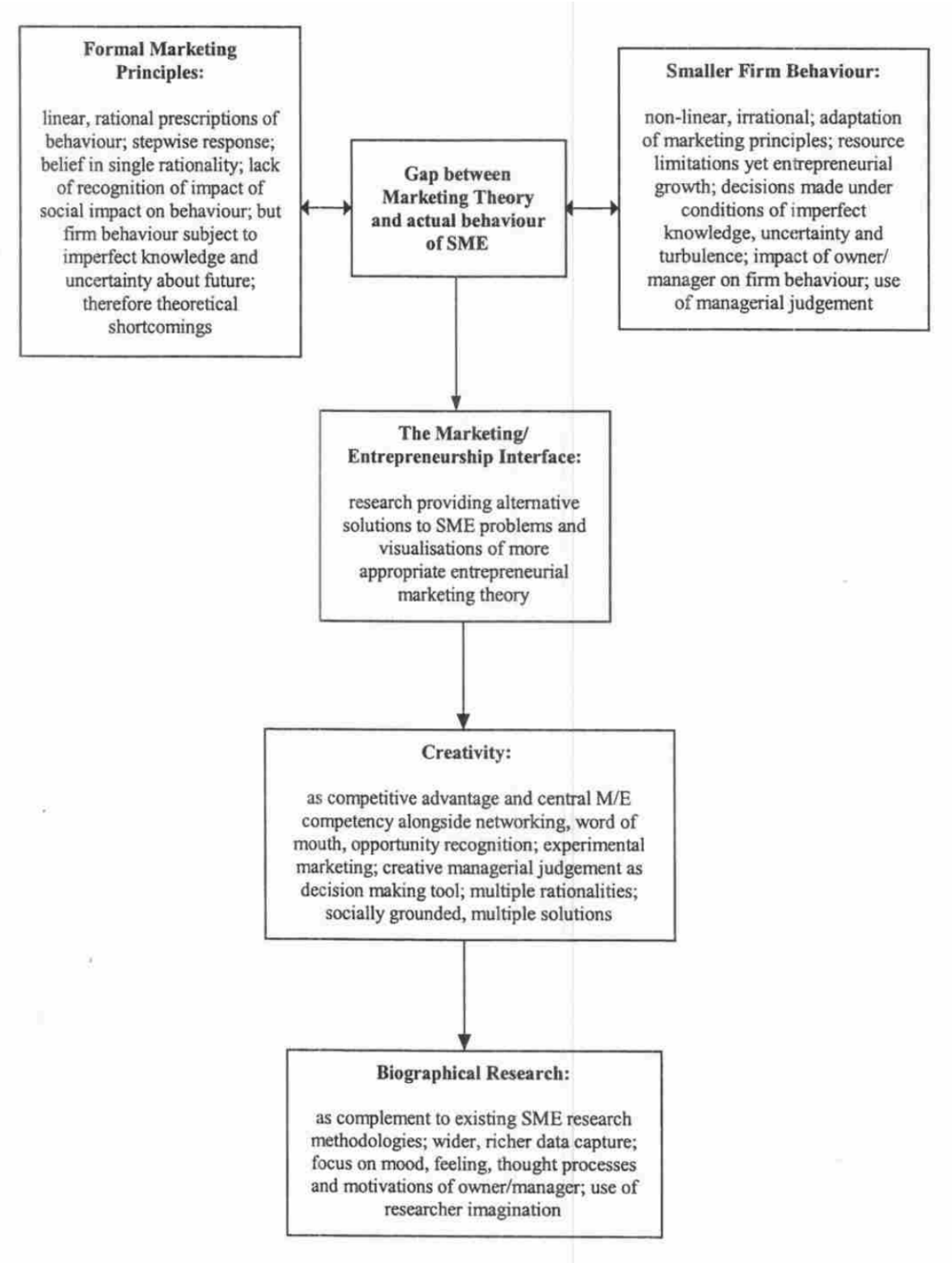


Figure 1: Biographical research and smaller firm marketing theory generation. (Fillis Ian, 2003)

2.7 The entrepreneur skills factor

The benefits of adopting a successful marketing plan include the ability to focus on the owner or the manager skills, mood, feeling, thought processes and motivations in decision making and in providing additional insight into creativity. If an entrepreneur collects more primary and secondary data, this will allow him to take wise decisions and to be unconventional and creating demand rather than following customer wishes. This is sometimes more effective for the entrepreneurial smaller firm in order to establish added value and competitive advantage in the marketplace.

On the other hand, according to John Freeman, Jerome S. Engel (2007) the entrepreneur's success often leads to earlier rather than later replacement by more experienced top managers. This results from the rapid increase in problem complexity attending structural and business process complexity. Managerial work requires more sophisticated skills, and these latter are developed over time. An entrepreneur capable of managing a company when it has twenty employees may be incapable of managing that company when it has two thousand employees. The faster that company grows from twenty to two thousand, the more likely is such succession of leadership.

Finally, these processes of growth include a transition in the company itself. When such companies succeed, they transform themselves into corporations.

The business systems, organizational structures, and highly trained managers who run them produce an organization built for efficiency. Rapid scaling of the enterprise and rising competition demand such efficiency. However, this robs the young company of the very properties that allowed it to innovate rapidly and seize opportunities engendered by innovation.

2.8 The financial plan factor

Managers should understand the meaning of financial data and follow the regulations which affect financial statement of the company. Cash is the most important, yet least productive, asset that a small business owns. Businesses must have enough cash to meet their obligations or run the risk of declaring bankruptcy. It is entirely possible for a business to earn a profit and still go out of business by running out of cash. Small and growing companies are like "sponges," soaking up every available dollar to fund growth and sales. The first step in managing cash more effectively is to understand the company's cash flow cycle. There are several ways entrepreneurs can improve their cash flow. This includes being more aggressive with collectables, increasing prices, offering customers early discounts, take advantage of vendors' payment terms, and charging purchases to credit cards. Cash and profits are not the same. Profit is the net increase over a period of time in capital cycled through the business, indicating how effectively the firm is being managed. Cash is the money that flows through the business in a continuous cycle. A business cannot spend profits only the cash it possesses.

Entrepreneurs must learn how to manage cash flow to insure long-term success for the venture.

3. Research question

Based on our result in the literature review, our main question of research was:

Do Lebanese entrepreneurs in their early stage follow the key factors of success to their new business idea?

According to our literature review these are the research questions that will contribute to the findings:

- Are they on familiar terms with competitive advantage, value chain, and information system? If so, which level?
- How much are they acquainted with human resources management, innovation, marketing plan, marketing and management analysis?
- How well do they know about organization and financial plan?

Section 2: Methodology and Empirical results.

4. Methodology

For this study, a face to face qualitative interview method was used; as a consultant in "Mauris Fadel Prize" for young entrepreneurs in the north of Lebanon, I have select 24 qualified entrepreneurs over 60 participants. Some of these entrepreneurs are fresh graduates while the others have been graduated six years ago; nonetheless, this entrepreneur's experience was their first. The study had eight objectives to cover competitive advantage, value chain, innovation, information system, human resources and management, marketing capability, entrepreneur skills and financial plan factors for a successful entrepreneurship.

We considered the results of this study as an exploratory research which allows us to have solid base for further studies.

5. Empirical results

The questionnaire and the answers below recapitulate the evaluation of the related topics as described by the interrogated entrepreneurs. The table below presents the questions followed by the Answers and Analysis (A.A.):

Table 1: Questionnaire recapitulation

Define what a business competitive advantage is: A.A.: The majority of those interviewed possessed fine knowledge about the meaning of competitive advantage. It meant to them as follows: "It is what makes an idea/product/service different and unique in the market where you are operating. In order to overcome the competition. It also means cost reduction, more profit, quality improvement, and the length of experience. It creates also new job opportunities and serves better the environment."
Describe the competitive advantage of your business idea: A.A.: 16 entrepreneurs out of 24 knew the competitive advantage linked directly to their idea, but in a simplistic way. They did not indicate other aspects that can lead and be a combination to a competitive advantage, such as the skills of the company, the computer intelligence system etc. their claims were not based on interviews with professionals or qualitative studies with customers. Most entrepreneurs relied on their intuitions to build a competitive advantage.
Define what a business value chain is: Describe the importance of value chain for your business idea: A.A.: 6 entrepreneurs out of 24 distinguished the meaning and the importance of their value chain. 7 out of 24 know what does mean a value chain meant, but they were not able to identify its competitive advantage. Finally, 10 out of 24 ignored its significance and its importance.
Describe what an information system is: Describe the information systems needed for your business idea: A.A.: Only 7 out of 24 described the information system. 17 out of 24 recognized its importance but were not able to precise its need. 3 out of 24 entrepreneurs ignored the meaning and the usefulness of the information system to their companies' success.
Define what the role of Human resources management in the company is: Describe the role of human resource management in the success of your idea: A.A.: 5 entrepreneurs out of 24 defined the role of human resources management. 12 didn't have a clear idea about the role of human resources: They gave general descriptions. The other 5 knew nothing about the matter, while 17 entrepreneurs were unable to label their related needs to their ideas; They were unable to determine how human resources can impact their effectiveness in the implementation of their idea.
Define what the meaning and importance of innovation in business success are: Describe the innovation of your idea, and how this latter will enable the success of your business idea: A.A.: 11 entrepreneurs recognized the meaning and importance of innovation in business success whereas 11 others ignored it. 13 entrepreneurs knew the impact of innovation on their ideas, but 11 others didn't give satisfied answers; They didn't have creativity in their ideas.
Illustrate your marketing plan and describe the reasons behind your choice of your marketing actions: A.A.: The majority of entrepreneurs had a marketing plan but unfortunately most of these plans were not based on objectives, strategy, segmentation and positioning of their companies. They missed these steps in their plan. They confused between a marketing mix plan and a marketing plan.
Specify what a qualitative research is and how it is done: Specify what a quantitative study is and how it is done: A.A.: A big number of entrepreneurs needed training in this field for not being properly aware or even instructed about the qualitative or quantitative research
List the strengths and the weaknesses of your business idea Include threats and opportunities of your business idea A.A.: Nearly all confounded among strengths, weaknesses, opportunities and threats.
Describe your business goals A.A.: The majority of entrepreneurs described their business goals, and only 5 of them gave a deadline to achieve them.
Describe your business strategy A.A.: Half of the entrepreneurs interviewed describe their business strategies while the other half mixed up between goal and strategy for not being able to perceive the meaning of business strategy. Still two entrepreneurs related their strategies implementations to a time table.
Write down your different target segments A.A.: A good number of entrepreneurs indicated their target segments without making hierarchies of their importance.
Define your positioning A.A.: Entrepreneurs ignored the meaning of positioning. Only few of them stipulated an adequate positioning

according to their ideas, strategies and market segmentation.
Describe your marketing mix A.A.: A great number of entrepreneurs indicated a marketing mix. They mentioned products and services characteristics, prices, distributions channels and promotions while few of them made an accurate detailed description. Others were not able to give us precise information.
Describe the importance of your internal organization and management for the success of your business: A.A.: Some of them gave us accurate description about their management and organization adapted to their consumers' needs while others described a classic organization, but few had no clear answers. They gave general answers about organization and management knowledge. Their answers were not related to their specific cases. Also they were not able to give more precision which means they had lack of information and about this field
Describe how your financial plan can help you bring your business idea to completion: A.A.: Few entrepreneurs told us in details about financial ratios and their impacts on the financial situation of the company. The majorities of entrepreneurs gave general description which lead to the conclusion that they grasped little in this field.
Describe the liquidity problem that your company might face: A.A.: As the answer of the precedent question, few entrepreneurs were aware of the lack of liquidity their companies could face. They've explained the needs of liquidity caused by the difference between the purchasing dates of products and the selling dates. Based on that they estimated the loan they have to take from the bank to avoid problem payment to suppliers, employees and others. But the majorities of entrepreneurs thought that the liquidity problem was related only to the customers' payments dates.

6. Discussion of results

By interpreting the findings from this qualitative study and by relating them to the key success factors of SME entrepreneurs, we can conclude the following about the Lebanese SMEs entrepreneurs:

- Regarding the competitive advantage factor, Entrepreneurs knew how important it is to the success of their business but the majority failed to combine many elements to lead to competitive advantages such as product and services differentiation combined with core competencies. On the other hand, their answers were not based on scientific studies like, Delphi method, observation, qualitative and quantitative studies; they have weak awareness on how to use these studies.
- Value Chain factor: Entrepreneurs ignored how to build a competitive advantage in every part of the value chain.
- Information System factor: Entrepreneurs had a vague and indefinite idea about its importance and its impact on company efficiency.
- Human Resources and Management factor: Entrepreneurs were not able to determine how its impact is essential to the implementation of their idea. They were not able to build an organisation and a management related to their consumers' specific needs and competitive advantage.
- Innovation factor, Entrepreneurs had a lack of creativity in their ideas.
- Marketing mix factor, Entrepreneurs operational plan was not related to the strategic plan; plus they confounded between the element of a swot analysis and how to use it. They mixed up among goals, objectives and strategies. They didn't give a finishing deadline. They had ignorance of the positioning and its effect on sales.
- Financial plan factor, Entrepreneurs had minor knowledge regarding the financial ratios and plan.

The results of this study highlighted the need to advise the Lebanese entrepreneurs at early stages to undertake trainings and have follow up in the areas studied in our research. Otherwise, they will end up with failing even if their business idea is innovative. These trainings and follow-ups can be proposed and financed by the state or other third parties, like associations and municipalities.

7. Contributions and directions for future research

7.1 Theoretical contributions and future directions for research

This study was intended to provide a clearer understanding of the level of knowledge SME entrepreneurs about competitive advantage, value chain, information system, human resources management, innovation, marketing plan, marketing and management analysis as well as organization and financial plan in order to succeed in their early stages in a third world context.

7.2 Managerial contributions

This study can be considered as decision support tool to help the deciders in the state or particularly the entrepreneurs of the third world SME to be aware of their lack of knowledge and to know which field of training they have to perform in order to succeed in a competitive market and in a tough economy as the Lebanese one.

8. Conclusion

The purpose of this study is to list the field in which SME entrepreneurs at their early stages have to complete before entering the market. Meanwhile it is an exploratory study to identify exactly the lack based on a quantitative assessment.

References

Abdul Halim & Che Mat1 (2010). Craftermakers:A Significant Study on Entreprenueurial Creativity and Competitive Advantage. Canadian Social Science Vol.6, No.3, pp. 59-66

Adoram G, (2011). Entrepreneurship and the value chain: importance, risks and suggestions. Advances in Management. Vol 4 (6) June.

Ansoff (1988). The new corporate strategy. New York: Wiley.

Asselineau & Cromarias1 (2011). Construire la proximité, l'exemple d'une stratégie entrepreneuriale menée en milieu rural. Revue française de gestion. N°213. Pp 141-156.

Betz, F. (1987). Managing technology: Competing through new ventures, innovation, and corporate research. Englewood Cliffs, NJ:Printice Hall.

Edward Deming (1983) Quality, Productivity and Competitive Position. MIT Center for Advanced Engineering Study.

Fillis Ian, (2003). A plea for biographical research as insight into smaller firm marketing theory generation. Journal of Entreprising Culture. Vol.11, N°1. March. PP 25-45.

Freeman.J, Engel.J (2007). Models of Innovation: Startups and Mature Corporations. California Management Review. VOL. 50, NO. 1. Pp 94-119.

Guth. W. D.. & Ginsberg. A. (1990). Guest editor's introduction: Corporate entrepreneurship. Strategic Management Journal. //(Summer). 5-16.

Hax A.C. (1989). Building the firm of the future. Sloan Management Review, 30(3): 75-82.

Jeffrey G. Covin G, & Morgan P. Miles, (1999). Corporate Entrepreneurship and the pursuit of competitive advantage. Entrepreneurship theory & practice. Bylor University.

Kanter, R.M. (1983). The change masters. New York: Simon & Schuster.

Khandwalla. P. N. (1987). Generators of pioneering-innovative management: Some Indian evidence. Organization Studies, 8(\), 39-59.

Krajewski L. J. and Ritzman L.P. (2007), Operations Management, 7th edition. Prentice Hall.

Lengnick-Hall, (1992). Innovation and competitive advantage: What we know and what we need to learn. Journal of Management, Vol. 18, N°2, 399-429.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review. 2/(1), 135-172.

Miller. D. (1983). The correlates of entrepreneurship in three types of firms. Management Science, 29,770-791.

Miller. D. (1990). The icarus paradox: How exceptional companies bring about their own downfall. New York: Harper-Collins.

Naman. J. L., & Slevin. D. P. (1993). Entrepreneurship and the concept of fit: A model and empirical tests. Strategic Management Journal, 14, 137-153.

Porter, M.E. (1985). Competitive advantage. Free Press: New York.

Randall S Schuler, Susan E Jackson, (1987). Facilitating Entrepreneurship to Gain Competitive Advantage: Implications for Human Resource Management Practices. Academy of Management Best Papers Proceedings. Volume: 1987, Pages: 274-278

Schollhammer, H. (1982). Internal corporate entrepreneurship. In C. A. Kent, D. L, Sexton, K. H. Vesper, (Eds.). Encyclopedia of entrepreneurship, pp. 209-229. Englewood Cliffs, NJ: Prentice Hall

Stevenson, H. H., & Gumpert, D. (1985). The heart of entrepreneurship. Harvard Business Review, S5(2), 85-95.

Stopford, J. M.. & Baden-Fuilcr, C. W. F. (1994). Creating corporate entrepreneurship. Strategic Management Journal, 15, 521-536,

Teece, D, J,, G, Pisano, A, Shuen, 1997. Dynamic capabilities and strategic management. Strategic Management J. 18 509-5

Zahra & George, (2002). The net-Enabled business innovation cycle and the evolution of dynamic capabilities. Information systems research. Vol. 13, N°2, June, pp. 147-150.

Zimmer and Scarborough (2007), Essentials of Entrepreneurship and small business Management, Pearson, 6th Edition.

The Role of Planning In Innovation Success: Experience of Leading Polish Enterprises

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Abstract: The article describes the role of planning in managing innovation processes; proper management is the key to final success. It was presented basing on the practices of Polish leading innovative enterprises. The research was in a form of semi-structured interviews with managers involved in innovation processes within those enterprises. The interviews were conducted directly according to a questionnaire and a fixed question list which was developed and specified during the conversations. This form of research enabled thorough analysis of the applied management techniques of at least several innovation processes in every company. Only successful cases were taken into consideration however their scope was very miscellaneous: new products, radical changes in manufacturing technology or in machine upgrade or in innovations improving customer service. Their common feature is success defined as a visible influence on company's development gained through implemented innovation. The aim of the research was the management analysis of these kinds of processes and to define whether they were planned and how. It was also determined how managers link innovation process planning with its final success. All the findings were presented, analyzed and discussed and they led to elaborating the initial model of innovation process planning. The model is basing on two main assumptions resulting from the conducted research. The first one deals with distinguishing three categories of innovation processes which characterize particular management approach. The second assumption is directly related to innovation process planning; it indicates the necessity of successive process planning together with its progress. This also is connected with high uncertainty degree of particular actions and frequent non-linear innovation process course. Thus a three-stage planning model was suggested, the stages give more details about previously made assumptions. This approach enables setting the innovation direction and therefore is the basis for carrying out the remaining managing functions. The uncertainty degree is decreasing along with every stage of innovation process, hence the decision making process was also included. Conclusions refer to how the suggested planning approach is linked with innovation success.

Keywords: innovation management, innovation process, planning, innovation success

1. Introduction

Innovation is a purposeful and positive change thus a way to success for every company (Cainelli, 2006) (Roberts, 2001). Innovations may take various forms; the differences are most frequently in terms of novelty and design aspects. A company can develop not only through innovative products but also through innovation processes of manufacturing or products distribution, etc. (Tanaka, 2005). Every example may be characterized by a different novelty degree evaluated in world or national scale or even the scale of a branch and enterprise (Calantone, 2006). Innovations may also be considered in the aspects of effects they would have after hitting the present market: disruptive, sustainable (Christensen, 1997) or continuous, dynamically continuous, and discontinuous in consumer's reception (Robertson, 1971). The implementation effects of particular innovation categories may be observed thanks to the previously mentioned classification. However they do not form the basis for creating rational concepts of managing the whole range of actions where innovation is in the hands of the user. Such processes are challengeable for the managers therefore the decision is not easy and obvious. Even though innovation is regarded as an important competitive factor, the majority of Polish enterprises rarely implements innovation processes. It is mostly due to their uncertainty degree and risk which come along with every innovation process, more than in any other business process. O'Sullivan (2009) enumerates the most frequent innovation failures that result from those factors:

- Poor goal definition
- Poor alignment of actions to goals
- Poor participation in teams
- Poor monitoring of results
- Poor communication and sense of community

It shows that innovation management directly influences its success or failure.

1.1 Innovation management

Innovation management is a multifunctional and interdisciplinary process which requires market integration, organizational structure and technological change (Tidd, Bessant, & Pavitt, 2005). Hansen and Birkinshaw (2007) define innovation management as the active and conscious organization where control and execution of activities lead to innovation. It is the innovation process- oriented definition. In a broader sense innovation management is defined as the intentional design of a complete innovation system, including innovation processes. The idea of system and process view of innovation management was shown in figure 1.

Ortt and Smits (2006), who believed that innovation management is an activity in a multi-level system, conducted an extensive literature study and summarized the changes in innovation management trends as:

- The end of the linear model
- The rise of the systems approach
- The inherent uncertainty and need for learning
- Innovation becomes more entrepreneurial

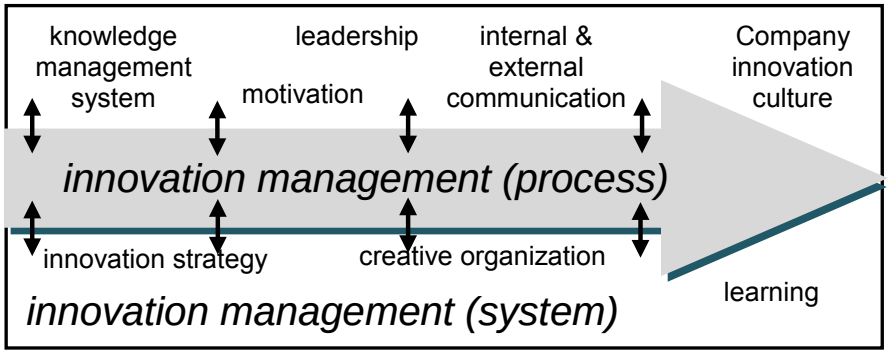


Figure 1: Innovation management as a component of system innovation management and process innovation management

This article concerns operational innovation management related to process realization where innovation is the effect.

1.2 Innovation process

An idea can be regarded as an innovation only when it is implemented. An idea, practice or object which is not adopted is not innovation at all. It results in the necessity of taking actions and decisions between two cases: idea appearance and practical use of its effects. These actions are connected with each other and create innovation process. Utterback and Abernathy (1975) have described innovation as an iterative process, where "a basic idea underlying the innovation is developed over time in a predictable manner with initial emphasis on product performance, then emphasis on product variety and later emphasis on product standardization and costs". Van der Ven (1999) uses the term 'innovation journey' to emphasize the uncertain character of this innovation process.

As Hartley (2006) argues, stages are helpful for conceptualizing the innovation process and determining where drivers and barriers can occur. Models of innovation processes distinguish certain phases, stages, components, building blocks, or main activities. It was assumed in a course of discussion that innovation process comprises three main phases: 'front end', development and implementation/commertialization. The first is regarded as rather unorganized and of a chaotic progress (Koen, 2001).The following phases have more linear features although it is typical for them to develop simultaneously a few ideas, quite similar to 'innovation funnel' conception. It is also assumed that a process should be open to some extent and each innovation process should provide some useful knowledge (Tidd, 2005).

The issues considered in the article concentrate on the following problems:

- Are the enterprises planning innovation processes? If so, to what extent?

- What is the role of planning in innovation process management? In what scope should the innovation process planning be linked with its final success?

1.3 Innovation success

The difficulties of measuring success have driven project managers to use simple criteria such as achieving target budget, scheduled goal and acceptable performance, even though these measures are partial and often misleading of the real project success (Sattler, 2011). Pinto and Prescott (1988) suggest that researchers in project management need to first and most importantly give a comprehensive and clear definition of project success before starting to undertake studies of the project implementation process. Innovation process success is even harder to define explicitly; colloquially it can be defined as achieving the assumed level of sale of the innovative product. In case of non- product innovations a different kind of approach is necessary to determine success. For the need of this research it has been decided that the success of innovation comes with achieving the expected level of organization's development which is adequate to incurred costs. It can be for example the market share increase, rise of sales income, decrease of the guarantee repairs number, time reduction of designing a new product, etc. Nonetheless a manager from Technokabel Company noticed that this definition is not precise enough. He came up with the example of innovation which turned out to be initially a failure in the economic sense; initially because not even a year later this innovation led to elaborating a technology for producing a different, world-scale innovative product. It resulted with a significant and long-lasting market advantage. Therefore the manager suggested that while evaluating innovation success the whole degree of organization's development should be taken into account together with the growth of totally new and unique knowledge within the organization. It is compliant with the Tidd and Bessant's concept (2005) which indicates the significance of learning through the realization of innovation processes. Yet it was decided, regarding the scope and aim of the research, to stick to the original definition of innovation success. Even though this definition omits many cases, it allows to precisely and quickly identify those innovation processes which require further analysis. It relates to the fact that every innovation which leads to development is regarded as a success.

This article is organized into three sections. Section 2 explains the scope and method of the research. Section 3 presents the analyzed and discussed research findings and describes the suggested three-stage planning model for innovation processes. Findings which sum up the article are linked with relations between planning and the remaining managing functions of innovation processes. They also emphasize the role of planning in innovation success.

2. Research method

The genesis of the research was to indicate which management practices in the planning stage lead the innovation process to the final success. More than ten semi-structured interviews were conducted. Firms that were asked to cooperate were top Polish innovation leaders in 2010. At least three different innovation processes were analyzed in every interview and they used the same list of questions. However during the interviews some of these questions were expanded in a different way. Research scheme for elaborating the planning model of innovation processes was presented in Figure 2. This research was financed by the Polish government agency, National Science Centre.

Table 1 presents the selected nine companies where the research was conducted. They were chosen for this presentation due to their variety of branches, size and time presence on the market. Detailed description of innovation processes management in those companies is presented in the further part of the article and uses marks from the first column of table 1.

3. Analysis and discussion of research results

Literature research and observations basing on the interviews in companies which deal with innovation processes on a daily basis led to two main findings, those findings determined further research. The first one refers to differences in approach to managing processes of similar features. A classification was suggested in order to indicate the category with which a particular innovation process should be linked so as to apply rational managing procedures. The second finding covers the specification of planning the innovation processes basing on plan detailing during the realization of the innovation process.

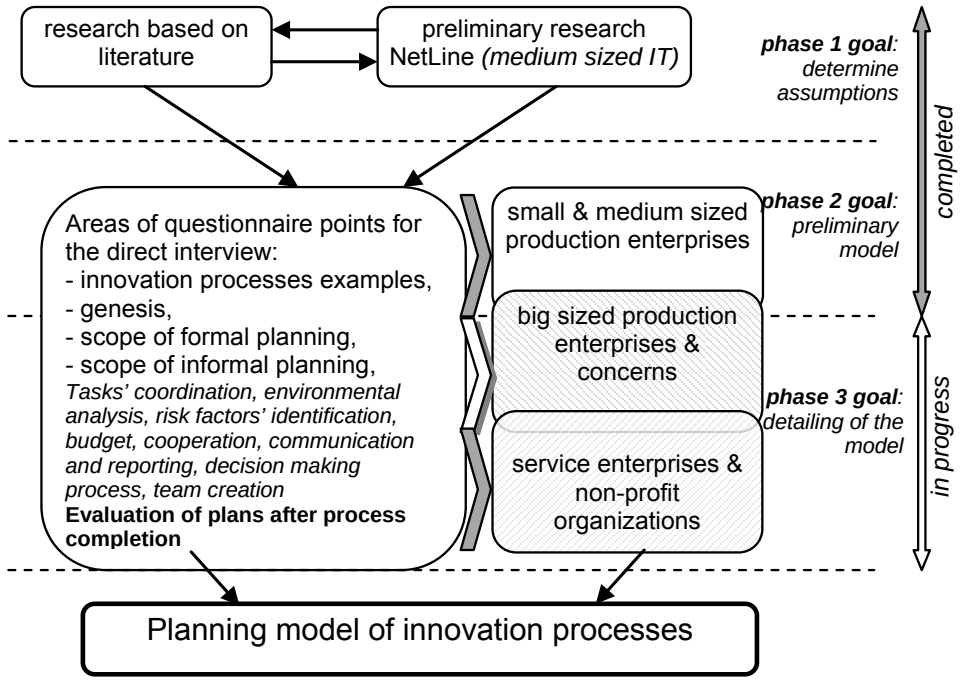


Figure 2: Research scheme

Table 1: Overview of the companies

Mark	Company's description	Main product
A	Dempol - small sized, production & services, established in 2002	coagulants for water treatment and testing of water quality
B	Galaxia eco - medium sized, production, established in 1991	industrial biomass
C	Elhand - medium sized, production, established in 1980	dry type single-phase and three-phase transformers
D	Balton - big sized, production, established in 1980	medical equipment: stents for coronary and peripheral vessels
E	Technokabel - medium sized, production, established in 1982	screened flexible high performance cables for analogue and digital data transmission
F	Somar - medium sized, production & services, established in 2003	Production of automation and monitoring systems of machines and equipment working in coal mines and the creation of software for these systems
G	JAL - small sized, production, established in 1990	melted cheese and sweetened condensed milk
H	Fibaro medium sized, IT and automatics, established in 2010	Home Center - device control system implementing 'smart home' idea
I	IC-Solutions micro sized, IT branch, established 2010	system converting handwriting into digital form connected to Anoto Pen

3.1 Categories of innovation processes

Innovation processes proceed in various manners thus there is not and will not be one proper scheme of how to manage them. Despite that, some regularity was noticed in applied procedures and used managing methods. These similarities arrange in groups linked with innovations that have similar significance in company's development perspective. Innovations which change already existing products are realized in a different manner than those that result in new product or line of products (Orawski, 2010). This correlation may be considered in the whole spectrum of management and other criterion should be used to identify the categories of innovation processes. It has to be referred then to managing aims of a particular innovation; that is why three categories of innovation processes were distinguished related to management horizons for:

- innovation of current needs horizon connected with short term management goals
- innovation of potential development horizon connected with middle term management goals
- Innovation of new business creation connected with long term management goals.

It can be noticed that in terms of products, these categories will be compliant with those suggested by Orawaski R. (2010). A similar division of innovations was also proposed by G. Moore (2007).The characteristics of separated classes of innovation projects allow to choose appropriate managing tools for them.

3.2 Forms of planning the innovation processes

Second major finding from the conducted observations of managing the innovation processes is linked with planning itself. It was noticed that planning takes place successively in several stages where previous plans are being successively developed in more details. All decisions taken on a particular stage directly result from decisions taken on the previous stage. The first and the most general planning phase concerns the effects of an innovation process and its time limits, the next stage applies to particular phases of an innovation process. Innovation processes possess a specific feature that distinguishes them from other business processes, namely plans are being detailed directly before the stage they apply to. It is because the uncertainty degree decreases with the following stages of the innovation process (Trott, 2005). Uncertainty diminishes the most after the realization of front-end phase. Setbacks and unpredictable surprises often arise during the innovation process and can relate to technical, market, social, political, and other factors (Van der Ven, 2000). The second planning phase, generally speaking, concerns defining the expected effects of a given innovation process stage and necessary resources for its completion. The third and the last planning phase deals with assigning tasks to the resources, it is realized up-to-date i.e. all planning decisions directly precede actions they refer to. This is the result of the non-linear course of innovation processes particularly characteristic in the front-end phase. Figure 3 presents the idea of suggested approach to planning the innovation processes. Main planning tasks within every stage of planning model are shown further in the article (table 2).

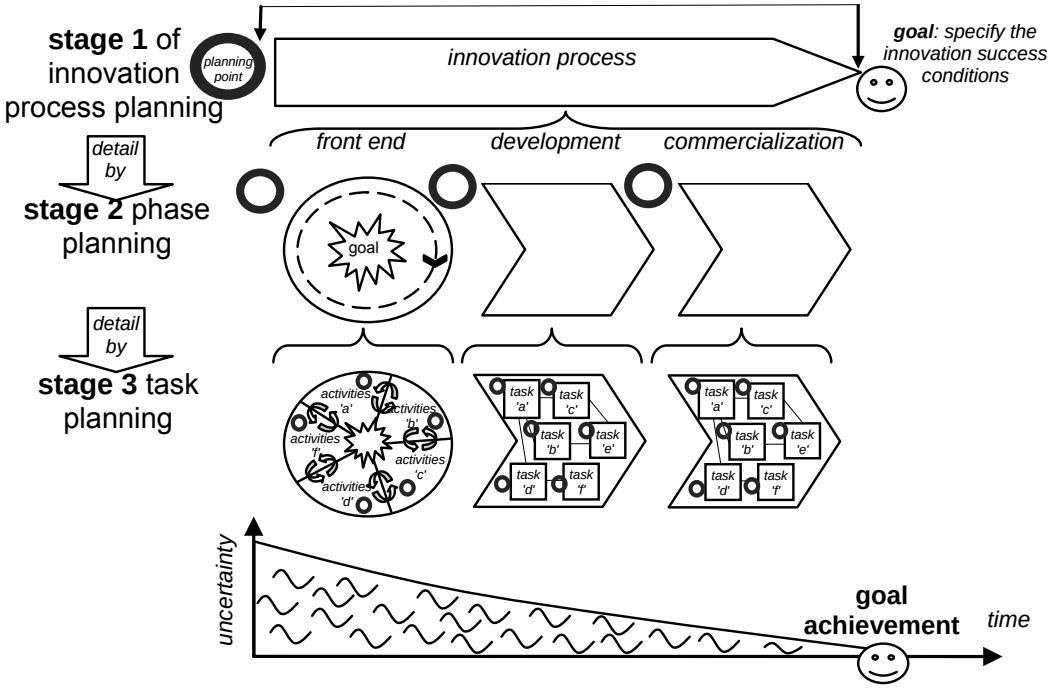


Figure 3: Stages of gradual innovation process planning

3.3 Detailed scope of innovation process planning in particular stages

The most important task of innovation process planning is setting its goal which has to be related to the company's development and has to contribute to the improvement of system functionality. Involvement of resources in innovation processes has only sense when the expected effect is system development. It may be considered from different perspectives, ex. task completion costs, process completion time, resources involved in the process or superior goals of system functionality related to different processes like quality assurance or sales increase. Having assumed that every innovation process influences system development, it led to setting the company's functionality areas where innovative solutions can be found (Jurczyk, 2011a). This was inspired by the Theory of Constraints. That approach refers also to the differences resulting from the categories of innovation processes

described in chapter 3.1. It is worthy of note, that various authors underline the differences in search need and search strategies in relation to continuous and incremental innovation versus discontinuous and radical innovation (Laursen, 2006), (Boer, 2003).

Another major finding from the observations is that enterprises are planning innovation in a formal and informal way. It is not highly related to the size of the company or its organizational culture, in the contrary to primal theories. The degree of planning formalization should rather be linked with the category of innovation process and scope of the planning task, as presented in table 2. The table is the result of the detailed questions from the interviews and shows planning stages where planning area decisions are taken. To some extent the scope of the innovation process planning is consistent with the procedures which are typical for all other tasks in enterprise. The underline font indicates a partial adjustment to the area of the diagram (table 2). For example, when the company indicated that plans only a few tasks formally. Crossing out font indicates that the company does not take planning decisions in such an area.

Table 2: Scope of formal and informal innovation process planning in the researched companies

Planned issues	**Formal planning**			**Informal planning**			Stage of planning
	Innovation of current needs horizon	Innovation of potential development horizon	Innovation of new business creation horizon	Innovation of current needs horizon	Innovation of potential development horizon	Innovation of new business creation horizon	
Goal of the process	A, C, D, E, G	A, B, C, D, E, F, H, I	A, B, C, D, E, F, G, H, I	B, F, G, H, I	G		stage 1
Time frame	A,	A, B, D, E, F, H, I	A, B, C, D, E, F, G, H, I	B, C, D, E, F, G, H, I	C, G		stage 1, stage 2
Scope of environment scanning	H	B, D, E, H	A, B, C, D, E, F, G, H, I	A, B, C, D, E, F, G, I	A, C, F, G, I		stage 2
Core team members	A, B, D, E, F, G, H	A, B, C, D, E, F, G, H, I	A, B, C, D, E, F, G, H, I	C, I			stage 2
Budget	D, E,	A, B, C, D, E, F, H	A, B, C, D, E, F, G, H, I	A, F, G, H, I	G, I		stage 1, stage 2
Report of results (structure, method)	B, D	A, B, D, E, H	A, B, C, D, E, G, H,	A, ~~C~~, E, ~~F~~, G, ~~H~~, ~~I~~	C, F, G, I	F, I	stage 2
Fail signals communication	D, H	A, B, C, D, E, H	A, B, C, D, E, F, G, H, I	A, B, C, E, F, G, I	F, G, I		stage 3
Criteria for assessing ideas	D, H	E, F, H	A, B, C, D, E, F, G, H, I	A, B, C, E, F, G, I	G, I		stage 2, stage 3
Key activities		A, B, D, E, H,	A, B, C, D, E, F, G, H, I	~~G~~, H, ~~I~~	C, F, G, I		stage 2
IN/OUT information of process phases	A, D,	D,	A, C, D, H,	~~B~~, C, E, ~~F~~, ~~G~~, H, ~~I~~	A, B, C, E, F, G, H, ~~I~~	B, E, F, G, I	stage 2
Risk management		D,	A, C, D, H, I	A, ~~B~~, ~~C~~, D, E, ~~F~~, ~~G~~, H, ~~I~~	A, B, C, E, F, ~~G~~, H, I	B, E, F, G,	stage 2
Key decisions (moment & needed information)		A, D	A, B, D, E, F, H	A, B, C, D, E, F, ~~G~~, H, ~~I~~	B, C, E, F, G, H, ~~I~~	C, G, I	stage 2
Level of decisions		D	A, D,	A, B, C, D, E, F, G, H, I	A, B, C, E, F, G, H, I	B, C, E, F, G, H, I	stage 2

Ways of monitoring & control		F	A, D, F	A, ~~B~~, C, D, E, F, ~~G~~, H, ~~I~~	A, B, C, D, E, ~~G~~, H, ~~I~~	B, C, E, G, H, I	stage 2, stage 3
Planned issues	**Formal planning**			**Informal planning**			Stage of planning
	Innovation of current needs horizon	Innovation of potential development horizon	Innovation of new business creation horizon	Innovation of current needs horizon	Innovation of potential development horizon	Innovation of new business creation horizon	
Activities/task coordination			D, B, I	A, ~~B~~, ~~C~~, D, ~~E~~, ~~F~~, ~~G~~, H, ~~I~~	A, ~~B~~, C, D, E, F, ~~G~~, H, I	A, C, E, F, G, H	stage 3
Cooperation	A, D, E, F, H	A, B, C, D, E, F, G, H	A, B, C, D, E, F, G, H, I	B, C, G, I,	I		stage 2

It should be mentioned that planning decisions can be made on different levels depending on the innovation process category they refer to, ex. board decides about ideas which refer to innovation of new business horizon. However, in case of innovation of current needs horizon this decision is made by the project manager. Similar situation is with innovation of potential development where project manager has to consult the board for approval.

Companies have several innovation processes in progress at the same time, mostly in the category of current needs due to short-term goals. Resources are often shared by those processes, on one hand it helps the learning activity in the organization and on the other it causes the necessity to prioritize tasks. It was noticed, together with G. Moore (2007), that long-term time horizon processes are the most spectacular therefore the most favorite. It results from the board's involvement in this category of innovation. However one should consider whether this approach is always the most reasonable.

3.4 The implication of research results for further work

A gap in research on innovation process planning is connected with a problem arising from doubts whether putting innovation processes into a framework of planning will not destroy their creative nature. Some authors agree that it may unfavorably influence a final result of a process (Mumford, 2008). The aim of the conducted research was to check whether Polish innovation succeeding companies are planning the processes. If yes, can the applied practices be more generalized so as they could become universal guidelines for planning. Basing on the interviews which enabled the analysis of several innovation processes in every company it was discovered that the processes are planned. In most cases it is due to product certification or use of external financial sources. Even if there is no such need, the innovation process is always planned. Planning of all the innovation processes also included the front-end phase, however in a different scope. Therefore planning can be treated as a rule but the differences should be considered, differences referring to detailing and planning formalization scope. Further research will lead to elaborating a planning model of innovation processes, its initial assumptions are shown in the article's chapters 3.2 and 3.3. Parallel research is being conducted over the cost estimation model of innovation process linked with the successive planning assumption. Furthermore, creation of knowledge management system is in progress, it includes the differences between innovation categories shown in the article (Jurczyk, 2011b).

4. Conclusions and discussion

The aim of this article was to present main findings and effects from the research concerning innovation process planning. The genesis was to find the principles of effective innovation process management which could allow making reasonable decisions within the required time limit. The research phase presented in the article, concentrates on setting the model of innovation process planning. This tasks can be characterized by setting the aim and way to its achievement. Every researched innovation process was analyzed in this aspect despite crucial differences of form and planning scope. The main finding of the research is the statement that innovation process management should be considered in three different categories due to the approach. However these categories are not analogous with the most popular innovation classifications which determine the level of novelty and innovation form. Management approach results rather from managing horizon and the scope of expected innovation effects. Applying the proposed categories in managing innovation processes allows the use of proper approach to the problem and the use of supporting tools for making managing decisions. It can be exemplified by the most important decision during the planning

stage, i.e. setting the innovation process goal. Environmental analysis is the basis for this decision. In his case a wide spectrum of tools may be applied, starting with those enabling current needs' analysis within given system area, finishing with long-term analysis of competition, market or society. The first set of tools would be used in case of innovation of current needs horizon whereas the last group of tools would be proper for innovations related to long-term horizon of managing the enterprise.

Another finding is connected with the observation that innovative process is successful only if it results with development of the subject that conducts it. Therefore the most important planning task is to set the area where the innovation will have crucial and positive effect on the conducted activity. This decision is the basis of the whole innovation process planning. Time limit within which the effect should be achieved in order to be relevant, is the result of the previously- mentioned decision. This also determines the expenditure, the necessity and scope of cooperation with external units.

Innovation processes characterize with a high level of uncertainty and its significant decrease during the work progress. Conducted research led to the solution which assumes gradual decision making process in planning. One should consider the fact that management will be more effective if the time between decision and its execution is long enough. Therefore, the allocation of limited resources can be better. The proposed planning model of innovation processes combines these two contradictions by implementing three stages within which previous key planning decisions are rendered in more details. This is how the outline of innovation process realization is achieved without constraining its creative nature with detailed decisions.

Innovation process success is not only determined by proper goal setting but also by proper management. Planning is the basis for completing other remaining managing functions. Therefore the scope of decisions has to give the opportunity for proper action organization within the innovation process, and most importantly it should guarantee necessary means. Plans should also indicate the expected effect of the whole process which leads to motivating particular team members who can see their work input in the final expected effect. The proposed model also enables the control and management of innovation processes by distinguishing phases and tasks as well as indicating the conditions of their beginning and end. The role of planning in innovation process success, as it is mentioned in the article, is very important. The proposed planning model is currently being developed within further work and it intends to become the necessary element of the complex innovation process management system.

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References

Boer, H. and Gertsen, F. (2003) "From continuous improvement to continuous innovation: a (retro)(per)spective", *International Journal of Technology Management*, Vol. 26, No. 8, pp 805-827.

Cainelli, G. and Evangelista, R. and Savona, M. (2006) "Innovation and Economic Performance in Services: A Firm-level Analysis", *Cambridge Journal of Economics*, Vol. 30, pp 435-458.

Calantone, R. and Chan J. and Cui, A. (2006) "Decomposing Product Innovativeness and Its Effects on New Product Success", *Journal of Product Innovation Management*, Vol. 23, No.5, pp 408-421.

Christensen, C.M. (1997) *The Innovator's Dilemma When New Technologies Cause Great Firms to Fail*, Harvard Business School Press.

Hartley, J. (2006) *Innovation and its contribution to improvement. A review for policy-makers, policy advisers, managers and researchers*. Department for communities and local government. United Kingdom. [online] http://www.communities.gov.uk/documents/localgovernment/pdf/151336.pdf

Jurczyk- Bunkowska, M. and Jungowski K. (2011b) "Perspectives of knowledge management system application in innovation processes. A Study based on Experience of Polish IT Company". *Proceedings of the International Conference on Knowledge Management and Information Sharing*, Paris, France 26 - 29 October, pp 287-293.

Jurczyk-Bunkowska M. and Jungowski K. (2011a) "Solutions for innovation management system: approach based on Theory of Constraints". *Proceedings of the 12th International CINet Conference: Doing More with Less,* Aarhus, Denmark, September 2011, pp 425 – 435.

Koen P. and Ajamian G. et al. (2001) "Providing clarity and a common language to the 'fuzzy front end'", *Research Technology Management*, Vol. 44, pp. 46-55.

Laursen, K. and Slater, A. (2006) "Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms", *Strategic Management Journal*, Vol. 27, pp 131-150.

Moore, G.A. (2007) "To Succeed In the Long Term, Focus on the Middle Term", *Harvard Business Review*, July-August pp 84–90.
Mumford, M. D., Bedell-Avers, K. E., Hunter, S. T. (2008) "Planning for innovation: A multi-level perspective", [in:] Mumford M. et al Multi-Level Issues in Creativity and Innovation, Research in Multi Level Issues, Vol. 7, Emerald Group Publishing Limited, pp107-154.
O`Sullivan, D. and Dooley, L. (2009) *Applying innovation*, SAGE Publications.
Orawski, R. et al (2010) *A framework for a Product-Service-System portfolio: managing the early planning* [in:] 11th International Design Conference - DESIGN 2010 Dubrovnik - Croatia, May 17 - 20.
Ortt, R., and Smits, R. (2006) "Innovation management: Different approaches to come with the same trends", *International Journal of Technology Management*, Vol. 34, pp 296-318.
Pinto, J. K., & Prescott, J. E. (1988)."Variations in critical success factors over the stages in the project life cycle", *Journal of Management*, Vol 14, No.1, pp 5-18.
Roberts, P.W. (2001) "Innovation and Firm-Level Persistent Profitability: A Schumpeterian Framework", *Managerial and Decision Economics*, Vol. 22, pp 239-250.
Robertson, T.S. (1971) *Innovative Behavior and Communication*, Holt, Rinehart and Winston, NY.
Sattler, M. (2011) *Excellence in innovation management: A meta-analytic review on the predictors of innovation performance*. Wiesbaden: Gabler.
Tanaka, N. and Glaude, M. and Gault, F. (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, Paris: OECD and Eurostat.
Tidd, J. and Bessant, J. and Pavitt, K. (2005) *Managing Innovation Integrating Technological Market and Organizational Change*, 3ed, John Wiley and Sons Ltd.
Trott, P. (2005) *Innovation Management and New Product Development. 3rd edition*. Harlow, England: Pearson Education Limited.
Van de Ven A. et al. (1999) *The Innovation Journey*. New York: Oxford University Press.
Van de Ven, A. H. and Angle, H. L. and Poole, M. S. (2000) *Research on the Management of Innovation – The Minnesota Studies*. New York: Oxford University Press.

Ontologies Enable Innovation

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Abstract: In this article we explore a new kind of way to look at innovation based on the idea of "knowledge increments". We use an existing ontology-based and fuzzy logic based approach as the guideline to exploring what kind of knowledge increments there are and how we can systematically expand our knowledge base on several levels using these knowledge increments. We attempt to show that these knowledge increments enable us to innovate on different levels, i.e. to introduce something new or better than before. The implication of this new proposed approach could be that we can develop systematic multi-knowledge-layer support systems for innovation processes and for innovators.

Keywords: knowledge asymmetry, innovation scope, knowledge increment, evolute system, ontology, fuzzy logic

1. Introduction

Innovation is about creating something new or better than before, i.e. a process, product, service, technology or a combination of them. Typical classifications of innovation are by type or category, see for example (Subramanian and Nilakanta, 1996). In this article, we focus on the knowledge that is the base for innovation. Nonaka and Takeuchi have described how interplay between tacit and explicit knowledge contributes to new knowledge creation (c.f. Nonaka and Takeuchi, 1995). The assumption in this article is that by systematically expanding the knowledge base, we ultimately increase the chance of innovation. We examine the scope of "knowledge increments" and show how these increments enable us to innovate. As the guideline for formulating this examination, we have used the Evolute system (Kantola et al., 2006; Kantola, 2009), which is a generic system for developing and utilizing ontologies for management and development purposes in different contexts. We attempt to show how knowledge increments expand the knowledge base, and to explain how innovation is enabled on different knowledge levels. We hope that this will allow us to understand and manage innovation from a knowledge base perspective on different levels simultaneously. We examine the different scopes of innovation based on different aspects of ontology, the ontology development process and ontology-based resource management. Basically, the innovation scope varies from small detailed innovation to large system level innovation. The knowledge increments enable us to link the knowledge pieces together and thus expand the knowledge base to innovate more widely. In the future, we may need a systematic multi-knowledge-scope management support for innovation.

First, we explain the theory needed to understand these scopes according to the Evolute approach. The first step is to describe ontology and how it can be used to specify any knowledge domain. The second step is to make the domain ontology available to people by presenting it using natural language that can be perceived and understood by everybody. This can be done mathematically with the help of fuzzy sets and fuzzy logic. The third step is to integrate different viewpoints to the domain ontology using the Evolute system. The fourth step is to make the approach continuous to see the dynamics in knowledge domains. In the following sections we will describe these steps in more detail with practical examples, and finally we will discuss why and how this kind of approach can ultimately contribute to knowledge creation and innovation. We will also discuss the limitations and further research into this proposed approach.

2. Ontologies

Ontology explicitly specifies the conceptualization of a domain (Gruber, 1993). Conceptualization is an idea of (part of) the world that a person or a group of people may hold (Gomez-Perez, 2004). Ontologies define the common words and concepts (meanings) that describe and represent an area of knowledge (Orbst, 2003). They thus represent a method of formally expressing a shared understanding of information (Parry, 2004). The main components of an ontology are classes (concepts), relations (associations between the concepts in the domain) and instances (elements or individuals in the ontology) (Gomez-Perez, 2004). Ontologies have become important in many fields, such as knowledge management, information integration, co-operative information systems,

information retrieval and e-commerce (Baader et al., 2004). Table 1 shows the safety culture ontology v1.0 (Salo, 2008).

Table 1: Safety culture ontology v1.0 (Salo, 2008) clarifies the relevant concepts of safety culture.

Main classes	Class groups	Classes
Learning and education environment for safety issues	Learning and tolerance for mistakes	Safety training
		Support and encouragement
	Supporting safety culture	Safety policy
		Management
	Conditions for development of safety culture	Organization's openness to new ideas and change
		Atmosphere
		Efficiency of safety actions
		Resourcing for safety
		Working environment
		Risk management
	Individual awareness and development in safety issues	Safety awareness and responsibility
		Attitudes towards safety
Knowledge-creation activities in safety topics, Nonaka and Takeuchi's SECI (Nonaka and Takeuchi, 1995)	Socialization	Co-operation
	Externalization	Flow of information
		Safety rules and regulations
	Combination	Creation of new knowledge
	Internalization	Learning by doing

By definition, ontologies are well suited to explicitly describing the concepts that belong to knowledge domains. To discover how these concepts are actually perceived in real organizations and how to handle the imprecise human perception of knowledge domains, fuzzy sets and logic is required. In the next section, we will explain how vagueness in linguistics can be captured with fuzzy sets (Zadeh, 1965), and how “human-like” intelligence can be embedded in knowledge systems with the help of fuzzy logic (Zadeh, 1973).

3. Fuzzy sets and fuzzy logic

Vagueness in linguistics can be captured mathematically by applying fuzzy sets (Zadeh, 1965; Lin and Lee, 1996). This is done by creating linguistic variables that ‘contain’ fuzzy sets. Fuzzy sets represent systems better than crisp sets for two reasons. First, the predicates in propositions representing a system do not have crisp denotations. Second, explicit and implicit quantifiers are fuzzy (Zadeh, 1983). ‘Conventional’ mathematical methods require that several preconditions be met before they can be utilized, especially when there is a concern about the independence of the factors used. Fuzzy logic allows us to ignore these preconditions due to the use of linguistic variables (Wilhelm & Parsaei, 1991). A fuzzy set can be defined mathematically by assigning to each possible individual in the universe of discourse a value representing its grade of membership in the fuzzy set. This grade corresponds to the degree to which that individual is similar to or compatible with the concept represented by the fuzzy set (Klir and Yuan, 1995). Perception of different aspects of knowledge domain becomes a degree of membership in fuzzy sets. Just like in real life, everything is a matter of degree. Linguistic variables bridge the gap between the mathematical base variable in the universe of discourse and the meaning in the human mind.

Fuzzy logic is the precise logic of imprecise things (Zadeh, 1973). Fuzzy logic allows reasoning using fuzzy sets and fuzzy rules. It has two principle components. The first is a translation system for representing the meaning of propositions and other semantic entities; the second is an inferential system for arriving at an answer to a question that relates to the information resident in a knowledge base (Zadeh, 1983). In the Evolute system, propositions refer to the semantics (statements) of the

concepts of knowledge domain. Figure 1 shows an example of semantics (statements) from safety culture research (Salo, 2008). Figure 2 illustrates that a concept can be described by several statements.

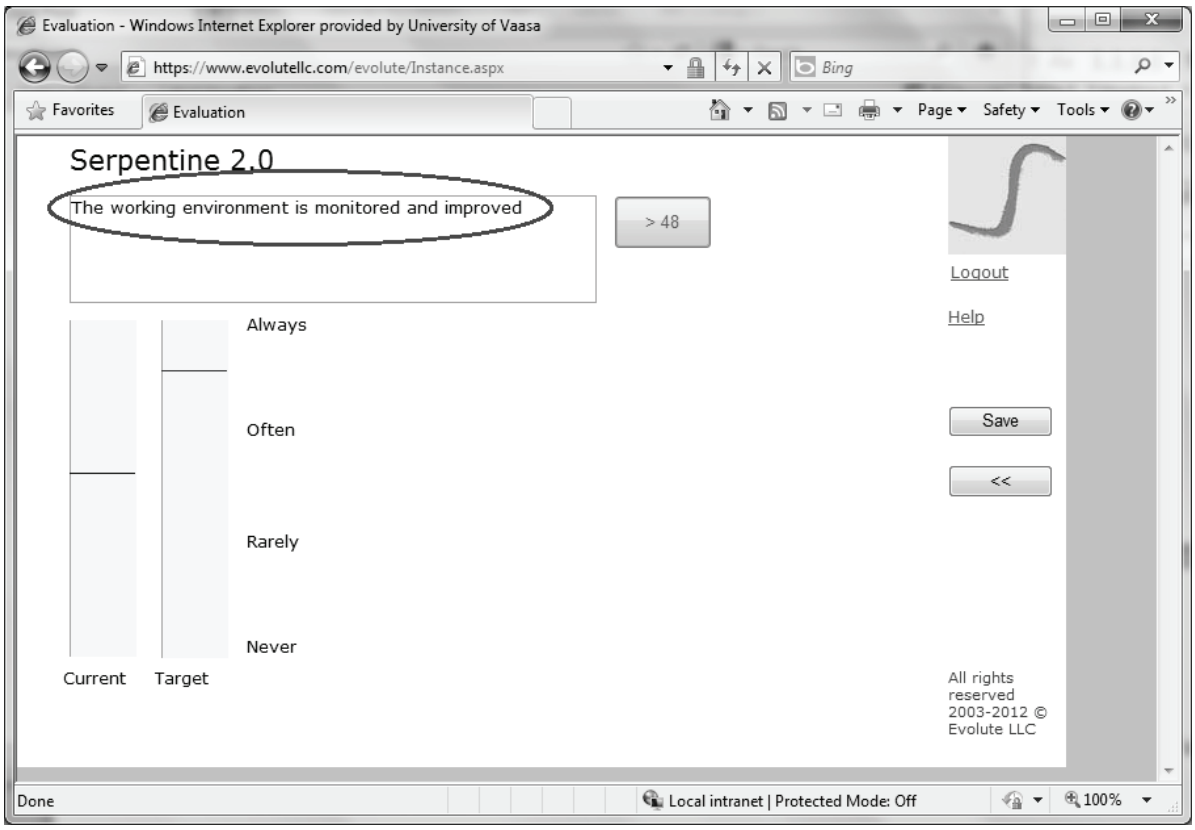


Figure 1: A statement describes a practical view of a concept.

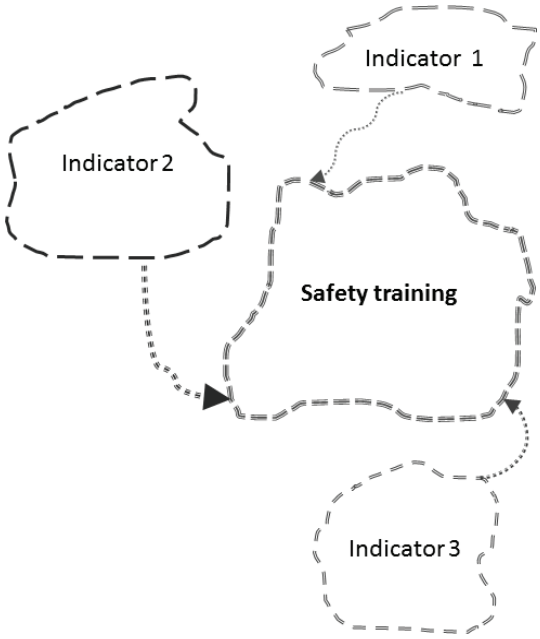


Figure 2: A concept (safety training) can be described by several statements.

The knowledge base refers to the concepts of knowledge domains. In general, a fuzzy logic application resembles an expert's task of evaluating and reasoning based on linguistic information. A general fuzzy logic application consists of four modules: (1) a fuzzy rule base, (2) a fuzzy inference engine, (3) a fuzzification module and (4) a defuzzification module (Mamdani and Assilian, 1975; Klir and Yuan, 1995).

Fuzzy logic has become very successful in many different fields of research and application. In January 2012, *Fuzzy* appeared in the title of 24 journals; *Soft-computing* appeared in the title of 20 journals, over 55,000 fuzzy-logic related patents have been filed in the US and in Japan and there were almost 102,000 scientific articles where *Fuzzy* appeared in the title (245,000 according to Google Scholar) (Zadeh, 2012).

4. Evolute system

Evolute is an online system that supports fuzzy logic applications on the Internet (Kantola et al., 2006; Kantola, 2009). The Evolute system allows researchers to develop specific domain ontology and present it online to the target groups through semantic entities, such as statements. Evolute provides ontology-based 'answers' to perceived propositions. The integral perception of a single person over all the presented propositions will produce an answer, called an instance (Kantola 2009). Figure 4 shows an instance based on the safety culture ontology. The left side lists the concepts in the ontology and the right side shows the perception of the current and target states of the concepts. The grey area between the current and target lines shows proactive vision (Paajanen, 2006), which is the perceived need to develop the concepts.

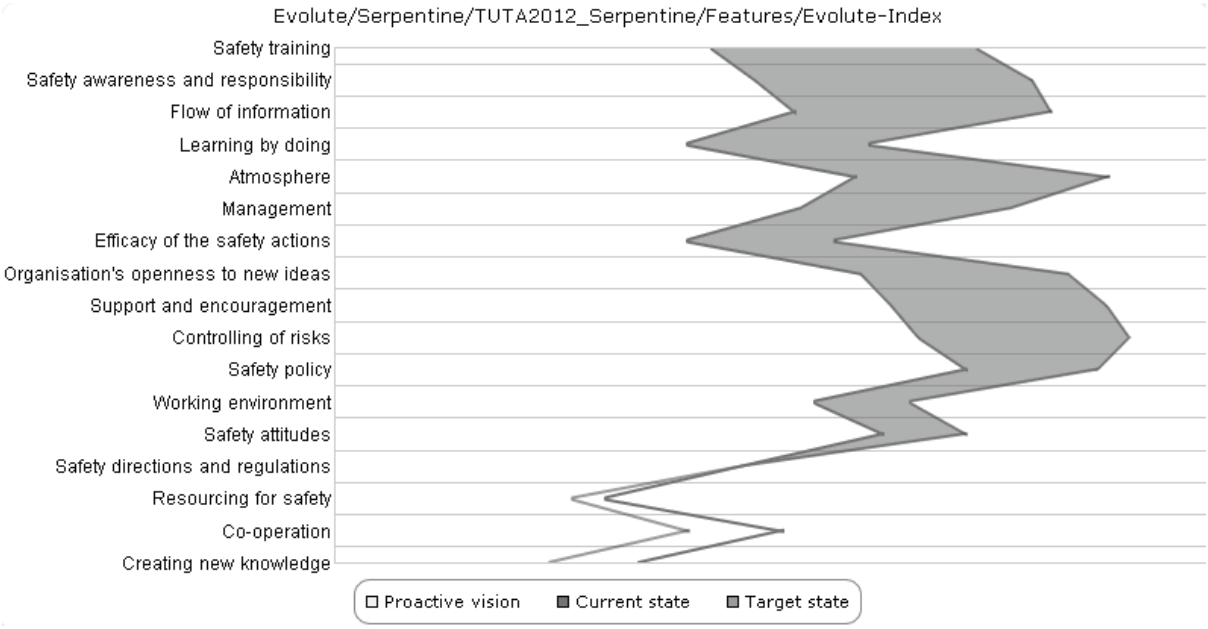


Figure 4: Instance stores and visualizes one's perception of the ontology at a specific time

The Evolute system utilizes fuzzy logic to capture the subjective, abstract and vague nature of the knowledge domain without the individual having to convert any of this on a numerical scale. The goal is to capture a true bottom-up view of the current reality and envisioned future of the features and practices of knowledge domain. The Evolute system works as a generic fuzzy rule base system in the following way (c.f. Mamdani and Assilian, 1975; Kantola, 1998, 2009; Kantola et al., 2006):

- Evaluation of linguistic statements describing the features of the ontology. Inputs from the evaluation are converted into fuzzy sets (fuzzification).
- Fuzzified inputs are used by an inference engine to evaluate fuzzy decision rules in the fuzzy rulebase. This results in one fuzzy set per each class in the ontology (inferencing).
- Fuzzy sets are converted into crisp values that represent the meaning of the perception of the domain by the individual (defuzzification).
- Defuzzified results (the instance) are presented visually and numerically for decision making.

Ontologies and their propositions in the Evolute system knowledge base can be fine-tuned as more is learned about the domain under investigation. This is done by adjusting the fuzzy set design and fuzzy rule design. In addition, the ontology will develop over time as the domain evolves and as researchers learn more about it. When the ontology evolves, new concepts can be added, existing concepts can be modified and some existing concepts can be "terminated".

5. Ontology-based asymmetry

The ontology-based collective perception of the domain shows the asymmetry of the knowledge of the domain. Different ontology-based viewpoints enable solid and valid communication regarding the knowledge domain. A well-constructed ontology enables innovation processes to be turned from productivity-centred processes into more performance-centred achievement-oriented processes. The starting point is always individuals who try to see the current real world from many windows and try to use their innovation competences to create a new future. By using collective knowledge asymmetry for innovation support, there are possibilities to find strong responsive environments with many innovation activities (Kantola et al., 2011).

The collection of instances in the Evolute system reflects a specific management object (assets) portfolio under scrutiny. The collection of instances forms the instance matrix (Kantola, 2009). The instance matrix, as a function of time, describes the Management Object development in the organization. In other words, it charts the organization's assets over time. The instance matrix, as a function of time, can be stated as:

ONTOLOGY $_{\text{identifier 1-m}}$ (individual $_{1-n}$, instance $_{1-k}$):

The instance matrix is useful for managers and other stakeholders since it represents the collective mind of the target groups. It also saves the history of the organization's assets. Figure 5 illustrates knowledge asymmetry based on the safety culture ontology.

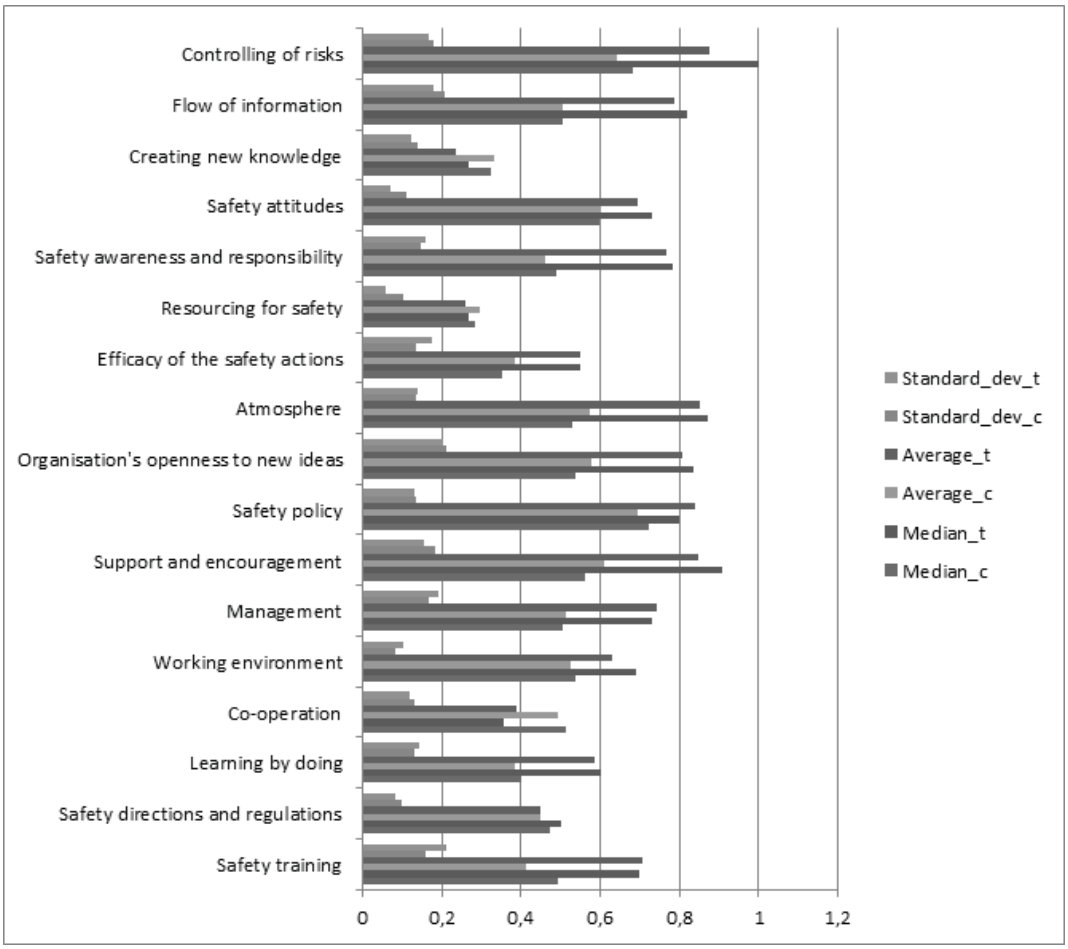


Figure 5: Knowledge asymmetry is the product of all instances, i.e. different viewpoints

Figure 6 illustrates dynamic knowledge asymmetry based on the safety culture ontology over five time periods. In order to grasp our working reality, we should expand the instance matrix to cover all relevant assets (domain ontologies). Therefore, in real life, the instance matrix will cover several domain ontologies that provide the base for a dynamic knowledge asymmetry over certain periods of time.

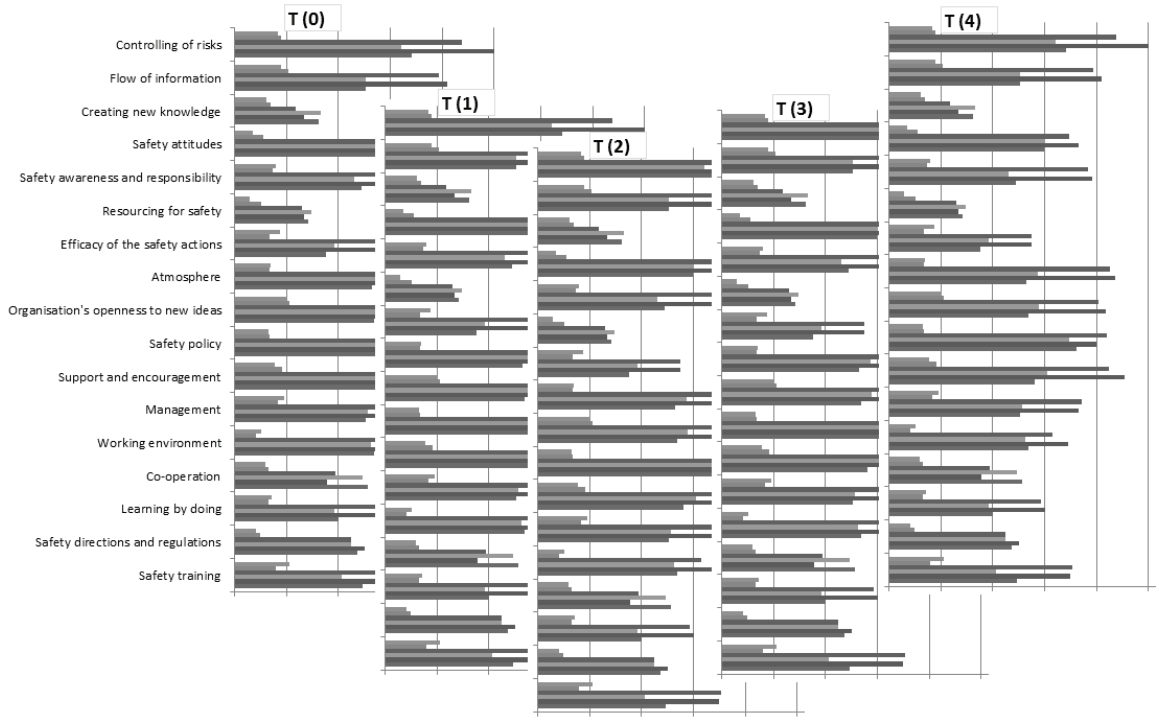


Figure 6: Instance matrix showing dynamic knowledge asymmetry as a function of time T (0-4).

6. Ontology-based innovation

In the previous sections of this article, we have illustrated different incremental steps as to how an existing knowledge base can be built and developed. Each step has added something new to the existing one. We claim that each step is required to be able to build collective understanding of our world and its state, and also on what we should do now. The incremental knowledge base that we are building in these examples enables us to innovate using the new incremental knowledge pieces and the combination they create with existing knowledge pieces on the same level. Figure 7 illustrates the increments. Table 2 attempts to describe the levels and scope of innovation they enable.

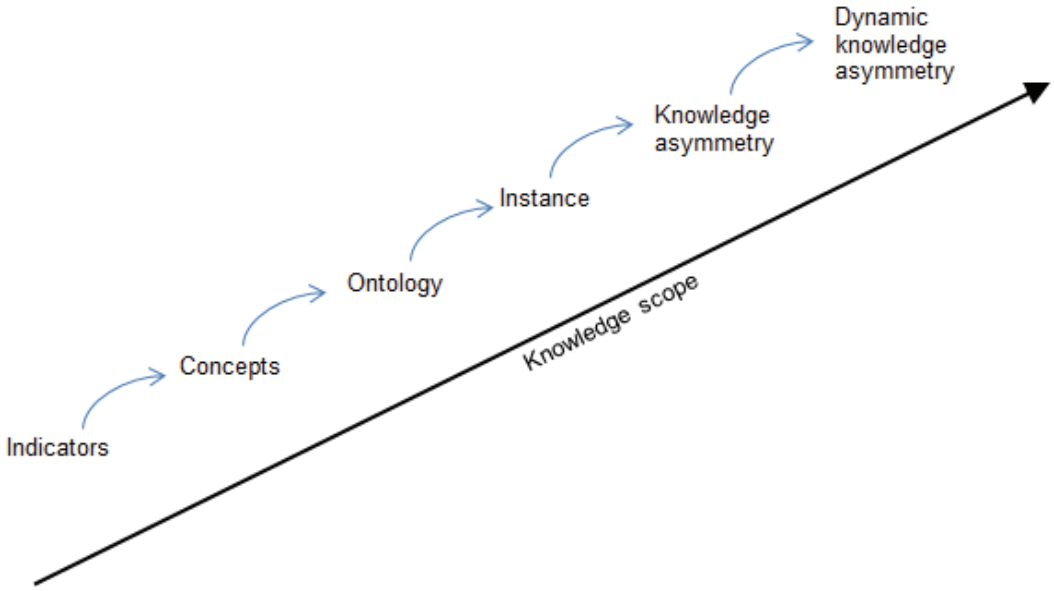


Figure 7: Incremental knowledge base build-up enables innovation on different and intra-levels.

Table 2: Knowledge innovation scopes

Scope	What new is introduced?	What is the new innovation base?
Indicator (linguistic variable	Easily understandable and perceivable viewpoints of concepts	To consider the new factor
Concept in Evolute DB	Collection of easily understandable and perceivable viewpoints of concepts so that the concept is adequately "covered" with indicators	To explore the concept To explore the concept together with other concepts
Ontology in Evolute DB	Presentation of the domain to stakeholders using ontology-based indicators.	To understand the domain in general To understand the domain jointly with other domains
Instance	One's holistic perception of the ontology in Evolute at a specific moment. The instance captures one's context-dependent perception of the ontology.	To understand the current and future states of the domain
Knowledge asymmetry (Instance matrix – one time period)	Collection of all stakeholders' instances. Collective perception. Wisdom-of-crowds today.	To understand the current and future states of all assets
Dynamic knowledge asymmetry (Instance matrix – several time periods)	Collection of all stakeholders' all instances over time. Continuous perception. Continuous wisdom-of-crowds.	To understand how all assets evolve over time.

The proposed approach increases our chances to innovate by 1) Seeing new knowledge combinations on intra-knowledge levels and on inter-knowledge levels (Figure 7), 2) Bottom-up incremental layered reading and use of knowledge to innovate according to the ontology under focus, 3) Understanding changes from bottom to top and from top to bottom, 4) Showing asymmetry – not all think similarly now and never from bottom to top levels, 5) Showing dynamic asymmetry – dynamic collective history and wisdom, 6) Improving knowledge representation and ontological modeling.

7. Conclusions

This article described how knowledge bases can be expanded in practice on different levels starting from linguistic variables and culminating in collective perceived dynamics of knowledge domains. The described steps are the results of more than 10 years of research and application at over 20 universities and over 60 companies. We know that the described steps really work in practice, but we do not yet know whether they lead to increased innovation performance. The assumption was that the proposed approach leads to better chances to innovate as compared to static knowledge bases. We do not claim that these steps and the increased chances to innovate automatically leads to innovation. The mechanisms behind potential new innovations are diverse as described in this article. We will continue this research in order to substantiate the main argument, i.e. ontologies enable innovation in real life. We have to show proof that these kinds of knowledge increments really lead to increased innovation performance. If this is the case, then these kinds of new potential benefits will enable innovation processes and encourage innovators towards better results. In addition, new types of support systems for innovation processes, innovation management and innovators can be developed.

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References

Baader, F., Horrocks, I., and Sattler, U. (2004). Description Logics. In Handbook on Ontologies, (Berlin: Springer-Verlag),

Gomez-Perez, A. (2004). Ontology Evaluation. In Handbook on Ontologies, (Berlin: Springer-Verlag), pp. 251–273.

Gruber, T.R. (1993). A translation approach to portable ontologies. Knowledge Acquisition *5*, pp.199–220.

Kantola, J. (1998). A Fuzzy Logic Based Tool for The Evaluation of Computer Integrated Manufacturing, Organization and People System Design. University of Louisville.

Kantola, J. (2009). Ontology-Based Resource Management. Human Factors and Ergonomics in Manufacturing & Service Industries, *19*, pp.515–527.
Kantola, J., Vanharanta, H., and Karwowski, W. (2006). The Evolute System: A Co-Evolutionary Human Resource Development Methodology. In International Encyclopedia of Ergonomics and Human Factors, (Boca Raton: 2nd Edition),.
Kantola, J., Vanharanta, H., Paajanen, P., and Vanharanta, H. (2011). Showing Asymmetries in Knowledge Creation and Learning Through Proactive Vision. Theoretical Issues in Ergonomics Science.
Klir, J.G., and Yuan, b. (1995). Fuzzy Sets and Fuzzy Logic, Theory and applications (Prentice Hall, Inc.).
Lin, C.T., and Lee, C.S.G. (1996). Neural Fuzzy Systems - A Neuro-Fuzzy Synergism (Prentice Hall, Inc.).
Mamdani, E.H., and Assilian, S. (1975). An experiment in linguistic synthesis with a fuzzy logic controller. International Journal of Man-Machine Studies *7*, pp.1–13.
Nonaka, I., and Takeuchi, H. (1995). The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation (New York: Oxford University Press).
Orbst, L. (2003). Ontologies for semantically interoperable systems. (New Orleans, USA: ACM, New York, USA), pp. 366 – 369.
Paajanen, P. (2006). Dynamic Ontologies of Knowledge Creation and Learning. Licentiate thesis. Tampere University of Technology.
Salo, M. (2008). SERPENTINE– Safety culture. MS thesis. Tampere University of Technology.
Subramanian, A., and Nilakanta, S. (1996). Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. Omega *24*, pp.631–647.
Zadeh, L. (1965). Fuzzy Sets. Information and Control *8*, pp.338–353.
Zadeh, L. (1973). Outline of a new approach to the analysis of complex systems and decision processes. IEEE Transactions on Systems, Man, and Cybernetics *1*, pp.28–44.
Zadeh, L. (1983). Commonsense Knowledge Representation Based on Fuzzy Logic. Computer. Computer *16*, pp.61–65.
Zadeh, L. (2012). [bisc-group] Email on 25 January, 2012, Impact of fuzzy logic.

Fusing Technology, Innovation and Entrepreneurship Into Postgraduate Education

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Abstract: For many years entrepreneurship education was mostly integrated within the academic fields of business and management. Recently though, entrepreneurship education has expanded the boundaries of purely business education to other specialised sectors such as technology and science, promoting thus the need of introducing the teaching of entrepreneurship in non-business environments. Nevertheless, most higher education institutions still provide entrepreneurship education in a business programme context. This limitation requires appropriate addressing since it creates and maintains a gap in relation to the effective knowledge transfer from the academia to the industry. The numerous challenges of infusing interdisciplinary entrepreneurial capabilities to postgraduate students must be tackled through well established mechanisms, especially for executive mode (one long weekend per month) programmes of study. Such mechanisms include constant curriculum development, effective quality assurance methods, innovative and flexible programme delivery and assessment models, and finally, proficiency on educational technologies that can assist all previously mentioned aspects, but can also enhance the students' learning experience. Within this context, this paper presents an interdisciplinary postgraduate programme that aims to instill and develop the habits of a mind characteristic of entrepreneurial thinking to non-business students: the MSc in Business Management and Technology. The programme is innovative and unique in its mode of delivery, quality assurance mechanisms and other core teaching and learning and administration aspects which are presented in detail. Finally, we debate on the effectiveness and efficiency of the programme by analysing the feedback from our students.

Keywords: entrepreneurship education, postgraduate education, curriculum delivery, south east Europe

1. Introduction

The limited diffusion of entrepreneurship into non-business studies has raised a wide literature debate that aims to point towards devising inter-disciplinary entrepreneurial programmes into higher education (Gibb, 2005, Boyle, 2007, Heinonen, 2007 and Brand et al., 2006) rather than focusing on delivering entrepreneurship studies in the traditional business programme. According to the European Commission (EC, 2008) but also to the academic literature (Brand et al., 2006), "*viable business ideas are more likely to arise from technical, scientific and creative studies*", pointing thus towards the challenge of delivering inter-disciplinary entrepreneurship education. The same European agenda (EC, 2008), reports that "*Europe needs to stimulate the entrepreneurial mindsets of young people, encourage innovative business start-ups and foster a culture that is friendlier to entrepreneurship and to the growth of small and medium sized enterprises (SMEs)*" and thus leading to the creation of key competences for all. Furthermore, the high emphasis that is being put on developing these programmes resides mainly in the fact that entrepreneurship is directly linked with economic growth (Brand et al., 2006), job creation and innovation (Ching & Ellis, 2004). Finally, entrepreneurial capabilities may also lead towards intrapreneurship which can renew existing organizations (Hayton, 2004). Nevertheless, the same European Commission report (EC, 2008 and Socrates, 2006) also debates the gap between existing teaching and programme delivery methods and those that are most effective, and emphasises the need for experience-based teaching, interactive learning approaches, multidisciplinary collaboration and staff mobility/exchange.

In this paper we start off by acknowledging the need for entrepreneurship education in a non-business programme, but rather in an inter-disciplinary environment (technological) within postgraduate studies in which traditional entrepreneurship provision methods are replaced by innovative means for delivering the programme, ensuring academic quality and enhancing the student experience. Furthermore, we believe that universities should promote staff mobility and internationalise their programmes in order to offer a diverse but integrated background of knowledge and experiences that

can be infused to students. Finally, this paper presents a successful case of teaching entrepreneurship in postgraduate higher education (PGHE): the MSc in Business Management and Technology. The specific programme is offered by The University of Sheffield International Faculty, CITY College (will be referred to as CITY College) which is located in Thessaloniki, Greece, and is delivered internationally, in Tirana (Albania) and in Sofia (Bulgaria) under an innovative delivery model – The Flying Faculty. The paper is structured as follows: section two presents an overview on entrepreneurship education from different perspectives, the need for inter-disciplinary entrepreneurship in PGHE and several case studies identified in the literature. Section three presents an overview of CITY College and a detailed description of the MSc in BMT programme. Section four discusses the mechanisms for the effective education provision, the flying faculty delivery model and quality assurance procedures. In section five, we present and discuss students' feedback and perceptions and finally, we summarize our discussion in the last section.

2. Entrepreneurship in non-business higher education

2.1 Entrepreneurship education overview

Defining entrepreneurship can take several directions depending on various viewpoints. From a methodological point of view, entrepreneurship can be defined as the process of discovering, exploring and creating opportunities through implementing change when launching innovative ideas in an uncertain/risky and lately, international environment (McDougall & Oviatt, 2000). From another point of view, the Socrates report of the European Commission (Socrates, 2006) defines entrepreneurship as "*the mindset and the process needed to create and develop economic activity by blending risk taking, creativity and innovation with sound management within a new or existing organization*". Nevertheless, the Schumpeterian view of entrepreneurship – of creating and dealing with new and innovative combinations of factors of production and ways of doing things, still provides a high level overview on the existing trends (Gibb et al., 2009). Finally, according to (Luczkiw, 2007 & Gibb, 2006), the essence of entrepreneurship lies in opportunism, timeliness, ability to get into a market space and flexibility to bind around customer's needs. All these aspects must be incorporated in the entrepreneurship education curriculum in order to provide a thorough knowledge base of all the aspects that are involved in triggering entrepreneurial actions. Furthermore, entrepreneurship education differentiates from general business studies. According to (EC, 2008; Gibbs, 2005; Boyle, 2007 and Kuratko, 2005) the main features of entrepreneurship education are the promotion of creativity, innovation and self-employment. More specifically, when teaching entrepreneurship at the higher education level, the European Commission (EC, 2008) recommends that the ultimate goal of this process must be to develop entrepreneurial capacities and mindsets through: developing entrepreneurial drive (awareness and motivation), training students in business start-up, management and growth, and finally, though developing entrepreneurial abilities to identify and exploit opportunities. In spite of the existence of these clear policies and directions on the goals of delivering entrepreneurship studies in higher education, the literature heavily debates on the adequacy of the academic programmes in which entrepreneurship education is being delivered. More specifically, the current debate on the existing gap is whether entrepreneurship should be taught in non-business programmes rather than on traditional business course (Gibbs, 2005).

2.2 Entrepreneurship in non-business postgraduate studies

A possible answer to the gap described in the previous section is presented by the European Commission (EC, 2008) which differentiates the following two types of entrepreneurship education: entrepreneurship within business schools and economic studies (which focuses on venture start-up/creation and business management and growth) and entrepreneurship within science and technology studies (which focuses on management skills, marketing and commercialization of technology based ideas, patenting and protecting the technological concepts/innovations and on financing and internationalizing the high-tech ventures). According to (Hamouda et al., 2009, Brand et al., 2006 and Sandercock, 2001), even though most entrepreneurship programmes are still in the main business courses, this trend decreases and the number of inter-disciplinary entrepreneurial programmes is increasing. One of the reasons for this changing trend is described by (Brand et al., 2006) which debates that entrepreneurship studies suit better non-business students since having a different background, one can have improved strengths and a better grasp of the offered product/service. Moreover, in order to identify the best ways of delivering entrepreneurship education in post graduate courses, (Hamouda et al., 2009) mentions the following activities: in curricular (guest speakers/lecturers, academic/partial modules, project work with/without interdisciplinary focus,

industry placement, business game), extra-curricular (entrepreneurs society, commercialisation and mentoring programmes, enterprise/business week, sabbatical exchange of academics, workshops) and business plan competition. However, for the case of inter-disciplinary entrepreneurship education, which according to (Brand et al., 2006) is the future direction of this field, all these activities must include an inter-disciplinary pillar.

Apart from investigating the enablers (reasons & actions) of delivering inter-disciplinary entrepreneurship education in post graduate studies there also exists the requirement of knowing the potential blockers that may interfere with the desired successful outcomes. These blockers must be carefully identified and avoided/mitigated. To this extent, (Hamouda et al., 2009) identified the following potential blockers: rigidity of programmatic structures, lack of coordination for academic centres, changing the mindset of academics, effective communication with potential students, low staff incentives and the impact of modularisation and semesterisation. To the same extent, (Brand et al., 2006) identifies another potential blocker, namely the heterogeneity of the group of scholars that lack an integrative framework (Kuratko & Hodgetts, 2001), aspect which may decrease the quality of the inter-disciplinary programme delivery.

Many academic institutions throughout the world currently provide entrepreneurship studies for non-business students. (EC, 2008) and (Socrates, 2006b) provide many examples of such universities from different countries of the European Union such as the Northern Ireland Centre for Entrepreneurship (IE), the University of Cambridge (UK), the University of Strathclyde (UK) and Turku University (FI), which have excelled in delivering entrepreneurship education for non business students. The case, however, of CITY College that delivers a postgraduate entrepreneurship programme for non-business students in an international environment is rather unique and is discussed in detail in the following chapter.

3. The MSc in business management and technology

3.1 CITY College – the infrastructure of the MSc in BMT

CITY College is a private higher education college founded in 1989, in Thessaloniki, Greece (City College, 2012). Since 1993 and for sixteen years, the college was an Affiliated Institution of The University of Sheffield. The Affiliation status was never previously awarded by the University of Sheffield to an academic institution outside the UK and reflected the high academic standards of the college and the establishment of mutual trust. Since 2009 the CITY College further cemented its future collaboration and relationship with the University by becoming its sixth Faculty with the other five located at Sheffield. This means that CITY College is academically merged to the University and its academic organisational structure, but it keeps its own independent financial autonomy and governance.

The college comprises of three academic departments, namely Business Administration & Economics, Computer Science and Psychology as well as a Humanities & Social Sciences Division, including an English Language Support Unit. There are also two centres: the Executive Education Centre responsible of the delivery of the Executive MBA programme and the South-East European Research Centre - SEERC (SEERC, 2012). SEERC is an associated Research Centre and apart from conducting funded research it also offers a Doctorate programme. Currently, the academic departments offer six different undergraduate and ten postgraduate programmes, all leading to a University of Sheffield degree. Among these programmes, there exist ones that are delivered only in the Thessaloniki campus while others are also offered in other cities of the South-East European region (Sofia, Belgrade, Kyiv, Tirana, Bucharest and Istanbul) in collaboration with academic institutions in these remote sites. This internationalisation was a strategic plan of the College in order to widen and expand the portfolio of programme and academic influence in neighbouring states of South-East Europe (Kefalas & Ketikidis, 2012). The academic staff of CITY College consists of 70 members, most of them full-time staff, few flexible contract adjunct staff and a number of visiting professors from British Universities. Another 40 people form the administration and support staff. Concerning the college's students, approximately 65% in Thessaloniki whereas the remaining 35% study in other locations in which programmes are delivered. Out of the total number of 900 students, 40% are undergraduates whereas 60% are postgraduate students.

The College has been audited numerous times as a collaborative provision by the UK Quality Assurance Agency (QAA, 2012) and awarded a number of accreditations from the British Computer

Society (BCS, 2012), the Association of MBAs (AMBA, 2012), the British Accreditation Council (BAC, 2012), the Chartered Managers Institute (CMI, 2012), the Assosiation to Advance Collegiate Schools of Business (AACSB, 2012) and others (Ketikidis et al., 2012, Kefalas & Ketikidis, 2012).

3.2 MSc in BMT – programme overview

The MSc in BMT programme integrates multidisciplinary knowledge of business management, innovation and information technology across a central theme: entrepreneurship. The primary goal is to develop a set of entrepreneurial skills which among many include creative thinking, opportunity recognition, problem solving, communication, leadership, risk taking and decision making. This wide range of competences is needed in today's business environments which are characterized by fierce and global competition and constant change (Ketikidis & Zigiaris, 2007). Targeted to graduates from a wide range of disciplines, the MSc in BMT provides an innovative and rigorous curriculum and prepares students for management roles in any type of organisation. The formal aims of the programme are to:

- instill and develop the habits of mind characteristic of entrepreneurial thinking
- develop knowledge and skills to tackle management challenges and seize business opportunities
- enable students to identify and assess the competitive advantages enabled by information technology
- develop an understanding of business contexts within which innovation and creativity are managed
- expose students to the major trends of globalization and technology integration

The programme was designed and is being delivered by the Computer Science Department (CSD) in conjunction with the Business Administration and Economics Department (BAED), and thus, creating a truly inter-disciplinary environment in which entrepreneurial skills can be fostered.

3.3 Programme structure and curriculum

The MSc in BMT programme is delivered in executive mode (teaching is done one weekend per month) in two different locations (Sofia – Bulgaria and Tirana – Albania) for a period of two years. Graduates of this programme can pursue management careers in a wide variety of industry sectors such as consultancies, services, technology-based firms, telecommunications, education, manufacturing, academia and governmental organisations or start their own company. The programme runs in part-time mode and consists of two cycles of lectures which last for 16 months, along with the postgraduate dissertation. The first cycle is composed of one bridging unit and five core units beginning in October and ending in June of the first year. The second cycle is composed of four units, beginning in October and ending in March of the second year. The dissertation must be submitted within seven months after the lectures have been completed. A unit is covered in a three-day session which takes place on a weekend (Friday afternoon, Saturday and Sunday). The curriculum consists of inter-disciplinary flexible and up-to date units which are presented in Table 1 below. Credits are presented following the European Credit Transfer and Accumulation System (ECTS).

Table 1: The MSc in BMT structure and curriculum

MSc In Business Management and Technology Curriculum	
YEAR 1	TAUGHT PART (52.5 credits)
	Fundamentals of Business and ICT (non-credit bridging unit)
	Strategic Management in Modern Business (7.5 credits)
	ICT for Strategic Management (7.5 credits)
	Innovation Management and New Product Development (7.5 credits)
	Entrepreneurship and Innovation (7.5 credits)
	Managing Knowledge-Driven ICT Projects (7.5 credits)
YEAR 2	*Two units from the following:*
	Internetworked Business Enterprises (7.5 credits)
	Knowledge Technologies For Innovation (7.5 credits)
	Managing Strategic Change (7.5 credits)
	DISSERTATION PHASE (37.5)
	Research Methods (7.5 credits)
	Dissertation (30 Credits)

3.4 Programme delivery and assessment methods

The MSc in BMT programme integrates a wide variety of learning and teaching methods in order to assure and sustain the effective and efficient delivery of the programme units and enable students to reach the desired learning outcomes. These methods include:

- *The Induction session* introduces students to Departmental procedures and standards related to the writing and presentation of assessed discursive essays
- *Interactive lectures* where student participation is not only encouraged but expected. Multimedia resources are also utilised and students are provided with handouts of lecture notes and materials
- *Seminars*, either staff-led or student-led that facilitate greater interactivity and allow ideas to be discussed and challenged
- *Tutorials* which are primarily one-to-one online sessions with academic staff and aim to further support students with their independent study or to solve a specific problem
- *Visiting speakers* who can be academic experts that provide valuable insight and knowledge in a specific area or successful entrepreneurs, researchers and industry professionals who provide real-life experiences and examples of good practices
- *Collaborative group-work* which enables students to work on complex, multi-faceted technology-innovation-entrepreneurship problems in a way that reflects professional practice and provides opportunities for students to develop professional and interpersonal skills
- *Individual and group presentations* that aim to improve students' communication skills
- *Dissertation work* under the supervision of academic staff allows students to develop and practice research skills
- *Problem solving exercises* which provide opportunities for students to develop transferable and professional skills
- *Use of a diverse set of ICT tools and technologies* that not only enable and support innovative delivery but also develop the students' online collaboration and communication skills

Concerning assessment, it is easily understandable that final written examinations in which students merely remember and reproduce is not a suitable assessment method due to the inter-disciplinary nature of the programme and the diversity of the materials studied in each unit. The programme aims to develop students' abilities to reflect and use higher order thinking skills and therefore, the assessment methods must provide the opportunity to demonstrate these skills. Depending on the unit, the assessment method can be an individual essay, a group report, a research paper, a case study analysis or even a business plan or a strategy formulation. Each of the aforementioned assessment methods aims to challenge students to analyse, synthesise and apply inter-disciplinary information and to reflect on the impact of each unit's diverse material on their lives and/or profession. Finally, in order to be awarded an MSc degree, a student has to complete a dissertation.

4. Effective education provision and quality mechanisms

4.1 The flying faculty - a new model for programme delivery

The MSc in BMT programme is delivered in a "flying faculty" model (Kefalas, 2012) with academic staff from Thessaloniki or UK travelling over long weekends to deliver courses in the aforementioned cities. The logistics involved in such a model are increasingly complex and careful management is required by dedicated administration staff. Furthermore, according to (Ketikidis et al., 2012), the "flying faculty" model greatly supports quality assurance since the quality of teaching, learning and assessment is equivalent and guaranteed in all locations. Moreover, according to (Kefalas & Ketikidis, 2012) the "flying faculty" model resembles the twining programmes where degrees of one university are delivered in more than one location. However, in the case of CITY College, the same academic staff delivers the programmes in all locations. Figure 1 depicts the activity radius of CITY's "flying faculty".

Nonetheless, the use of enhanced learning technologies as complementary to face-to-face contact proved to be absolutely essential for providing the desired quality of learning experience (Kefalas, 2011, Kefalas & Ketikidis, 2012). To this extent, staff and students involved in the MSc in BMT programme were trained and became familiar with learning technologies that facilitate everyday

contact between learners and instructors. On-line or off-line communication through teleconferencing collaboration or wikis and fora respectively are comfortably employed as best practice.

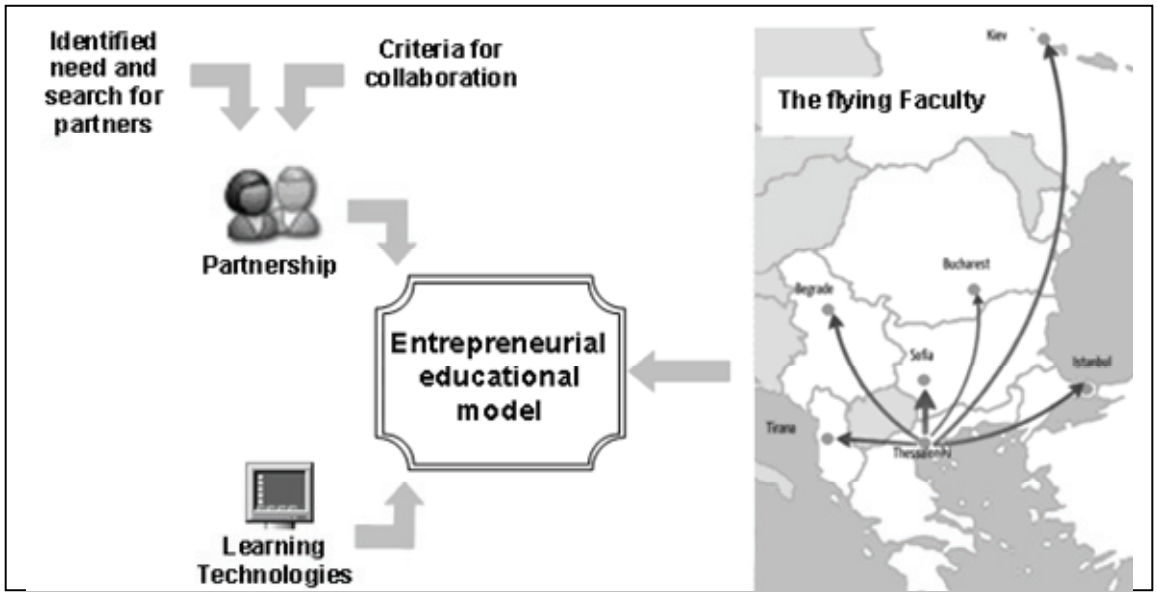


Figure 1: The flying faculty model (Kefalas & Ketikidis, 2012)

4.2 Learning technologies for enhancing the learning experience

As discussed in the previous section, the use of learning technologies is vital for the MSc in BMT which is delivered in executive mode under the flying faculty model. To this extent, Table 2 discusses several learning technologies that are used for delivering the MSc in BMT programme and enhancing the students' learning experience.

Table 2: Learning technologies to enhance student learning experience (Kefalas & Ketikidis, 2012)

Learning Technology	Activities used
Virtual Learning Environment	All learning material is in electronic form and is accessible through the structures of a VLE.
Screencasts	Presentations are created off line, with or without the lecturer's video image in order to be used for delivering introductory material, giving how-to guidelines and/or feedback or any other off-line activity.
Podcasts	Presentations where video seems unnecessary, guidelines, individual or mass feedback or any other off-line related activity.
Virtual Classrooms	Synchronous live presentation and collaboration in a virtual classroom that allows direct on-line interaction through video, audio, text and a shared blackboard, e.g. classes, tutorials, presentations and committees.
Teleconferencing	As in virtual classrooms but aimed mainly for discussions without the need of heavy collaboration facilities, e.g. supervision, advising & focus groups.
Instant Messaging	As in teleconferencing without the video, mostly aimed towards informal everyday collaboration between staff and students or among students.
Video streaming	Synchronous live presentations that take place elsewhere in a form of an invited speaker or workshop presentations.
Wikis	Asynchronous collaboration using shared documents that lead to an emergent result, mainly for student collaboration or project supervision.

4.3 Student services for support and feedback

The fact that the MSc in BMT is delivered with the flying faculty model in remote locations entails a risk: students may feel isolated. After all, they do not come in contact with their lecturers on a daily or weekly basis, they are unable to physically drop by the office for questions or even read a poster about a student party that has been posted on an announcement board. In order to better support our MSc in BMT students, CITY College has implemented a wide range of services and student-staff interactions in order to alleviate a possible feeling of isolation. Such services include staff specific online office hours where a lecturer is available for teleconferencing and the extensive use of social media and centralised and decentralised emailing lists for ensuring the timely and targeted

dissemination of information among the University of Sheffield, City College and its international partner universities.

Furthermore, we consider that one of the most important aspects for supporting our students that attend the MSc in BMT programme is response to detailed feedback. Feedback is the cornerstone of all learning and vital for students to understand and evaluate their progress and to become better independent learners. We have placed great emphasis on devising effective and efficient mechanisms for providing excellent quality supervision on assignments and the dissertation and detailed and personalised feedback on students' work. These mechanisms are categorized according to the type of feedback.

Formative feedback: after the weekend delivery of every unit, students work on their assignment for about a month. During this period at least two scheduled group meetings take place in a virtual classroom where the unit leader provides guidance on the assignment and students have the opportunity to clarify issues related to the assignment requirements. The unit leader also provides formative feedback in one-to-one individual meetings with students over teleconferencing.

Summative feedback: individual and detailed feedback on students' submitted work is provided in two ways. The first one is a detailed feedback form that was created specifically for the MSc in BMT programme. The form provides feedback against the learning outcomes of the assignment and discusses overall strengths and weakness. In addition, since the students submit their assignments electronically, we also mark it electronically. Therefore, the second way for providing summative feedback allows the students to view their submitted work with the annotated comments that we have made. In this manner, students are able to see within their assignment the specific mistakes that were made.

4.4 Quality assurance mechanisms for the MSc BMT

Assuring the quality of the MSc in BMT is of high priority due to the programme's mode of delivery at remote sites under the flying faculty model and its interdisciplinary nature. The quality of the MSc in BMT programme is assured through a diverse set of the college's quality assurance mechanisms for the provision of Higher Education. These mechanisms have repeatedly proven their effectiveness and efficiency and consist of individuals, boards, committees and procedures at two different levels: institutional level and departmental level.

At the institutional level the main quality assurance mechanisms are the following:

- *The College Administration Board* which decides the main policies, strategies and tactics of the College, monitors the running of the departments and their progress in achieving their goals in every field and applies constant quality assessment of the education provided.
- *The International Faculty Advisory Board* which advises on education, staffing, research, recruitment, publicity, strategic planning, corporate planning, administration and industrial liaison.
- *The Quality Strategy and Enhancement Committee* which establishes, monitors and enhances a framework for quality, programme organisation, curriculum design, content and programme inter-relation, student communication and representation, student support and guidance and many other quality assurance and control procedures.
- *The International Faculty Learning and Teaching Committee* which oversees the development of the college's Learning and Teaching strategies, maintains and enhances the learning and teaching culture of the faculty, ensures appropriate implementation of University policies and procedures and ensures that student views are appropriately represented in Faculty learning and teaching discussions.

At the departmental level the primary quality assurance mechanisms include:

- *Academic Boards which take all academic decisions concerning the departments. They deal with the delivery running of the programmes, staff and student matters, development of curricula and quality assessment. All academic staff members who are actively involved in the MSc in BMT programme participate in these bi-weekly boards under the chairmanship of the Head of the department.*

- *The Student/Staff Committee which oversees the delivery process of the MSc in BMT programme. The committee comprises of the academic director of the programme and representative academic and administration staff members together with student representatives. The main purposes of the committee which meets twice per semester are to monitor the programme, find solutions to any problems and most of all enable student input in further developing the programme.*
- *The Examination Boards which are responsible for setting and validating assessment methods and marking. All staff members of both the CSD and BAED participate together the external examiner.*
- *The Industrial Advisory Board which aims to facilitate communication and collaboration with the industry in the Balkan area in order to evaluate the changing needs of the industry, propose action plans to meet the new challenges and support the achievement of the goals of the MSc programme.*

Finally, external quality assurance mechanisms are also applied, the most important being the external examiner who ensures that programmes awarded in similar subjects are comparable in standard to all Universities in the UK, and that the assessment system is fair and operated equitably in the classification of students.

5. Students' perceptions and feedback

Student evaluations are a critical part of the college's quality assurance mechanisms. At the end of each taught unit of the MSc in BMT, we ask students to anonymously complete a questionnaire in order to gather evidence on teaching effectiveness but also to send a clear message that their perception of the education provision does indeed matter and affects the quality of teaching. Unit leaders utilise the feedback provided in order to refine the unit and teaching methods and to enhance the students' learning experience.

The questionnaire uses the Likert scale with seven ordered response levels (one being the lowest and seven the highest). Students are asked to reflect on their educational experience by evaluating the unit leader, as well as, the guest speakers on four main teaching and learning aspects: a) depth, breadth, interdisciplinary and transfer of knowledge in the specific area, b) presentation style and delivery methods, c) ability to motivate and keep students engaged and d) relevance and usefulness of the presented material. Finally, students provide a rating for their overall satisfaction of the unit. Table 3 below presents the results of student evaluations for two cohorts (academic years of 2010 and 2011) for both Sofia and Tirana sites which comprised of a total of 20 and 28 students respectively. The table includes evaluations for each one of the taught units (encoded U1 to U10 in table 1), as well as, an overall average (AVG). The results are highly encouraging and reflect the high levels of student satisfaction and the exceptional quality of education provision of the MSc in BMT programme.

Table 3: Student evaluation results of the MSc in BMT from Sofia and Tirana

UNIT CODE	**U1**	**U2**	**U3**	**U4**	**U5**	**U6**	**U7**	**U8**	**U9**	**U10**	**AVG**
UNIT LEADER AVG	6.61	6.84	6.7	6.63	6.38	6.19	6.65	6.35	6.8	6.6	6.58
• Knowledge	6.71	6.84	6.79	6.70	6.39	6.19	6.75	6.51	6.85	6.72	6.65
• Presentation/Delivery	6.73	6.90	6.72	6.63	6.45	6.29	6.65	6.6	6.70	6.70	6.64
• Motivation/Interest	6.61	6.84	6.78	6.70	6.38	6.17	6.65	6.30	6.85	6.54	6.58
• Relevance/Usefulness	6.38	6.74	6.54	6.45	6.36	6.02	6.56	6.15	6.71	6.54	6.45
GUEST SPEAKERS AVG	6.59	6.20	5.90	6.02	6.54	5.69	6.37	6.46	6.80	6.08	6.27
• Knowledge	6.72	5.95	5.88	6.13	6.62	5.76	6.42	6.56	6.89	6.36	6.33
• Presentation/Delivery	6.68	6.43	5.75	6.07	6.60	5.73	6.13	6.56	6.95	6.01	6.29
• Motivation/Interest	6.55	6.10	5.83	5.68	6.68	5.45	6.37	6.41	6.70	5.75	6.15
• Relevance/Usefulness	6.40	6.35	6.11	6.24	6.36	5.76	6.51	6.29	6.56	6.22	6.28
OVERALL SATISFACTION	6.59	6.74	6.54	6.45	6.32	5.87	6.56	6.30	6.90	6.16	6.44

In addition to the scaled questions, the questionnaire also contains a number of open ended questions through which students can freely respond about how they feel and provide more detailed feedback in terms of overall strengths and weaknesses. These open ended questions cover a wide

variety of issues ranging from teaching and learning aspects, to administrative support and provided facilities. We strongly encourage students to spend time and provide details and comments even though it is reasonable that after the long weekend students may be too tired to do so. Most of the comments that we do receive are positive and strongly support the high evaluations presented in table 3 and only very minor issues have been reported. Lastly, it is important to mention that it is not just the questionnaires that provide us evidence on the success of the MSc in BMT programme. Over the long weekend many opportunities arise for informal meetings between students and academic staff. We highly value the feedback provided in such occasions due to the fact that discussions occur in a more relaxed and informal setting like lunch breaks and dinner outings.

6. Conclusion

This paper presented the MSc in Business Management and Technology inter-disciplinary postgraduate programme as a successful case of providing entrepreneurship education to non-business students. The case responds to the identified literature gap of enabling effective knowledge transfer from the academia to the industry through delivering entrepreneurship education in non-business studies, since it is perceived that technical/scientific students have greater success chances in entrepreneurship. The MSc in BMT programme is offered by the UoS International Faculty, City College (Thessaloniki, Greece) and is delivered internationally (in Sofia, Bulgaria and Tirana, Albania) in executive mode (one long weekend of classes per month). The programme is jointly delivered by the Computer Science and Business Administration and Economics Departments using the Flying Faculty model, an innovative delivery model which provides effective and high quality provision of higher education. The model integrates extensive use of ICT for communication and collaboration between students and academic staff and assures quality through a diverse set of quality assurance mechanisms. The programme has been running successfully for two academic years and student satisfaction and their perception of the quality of education is at the highest levels. We strongly believe that this model can serve as a good reference to other higher education institutions that wish to respond to the latest trends and demands in entrepreneurial higher education for non-business students.

References

AACSB - The Assosiation to Advance Collegiate Schools of Business Website. (2012) Available at http://www.aacsb.edu/

AMBA – Association of MBAs Website. (2012) Available at: www.mbaworld.com

Boyle, Thomas. (2007) “A new model of entrepreneurship education: implications for Central and Eastern European universities”, *Industry and Higher Education*, pp. 9-20.

BAC Website. (2012) Available at: www.the-back.org

BCS – British Computer Society Website. (2012) Available at: www.bcs.org

Brand, Maryse, Wakkee, Ingrid and van der Veen, Marijke. (2006) “Teaching Entrepreneurship to non-business students”, in Fayolle, A (Ed.)., *Teaching Entrepreneurship in Europe*.

City College Website. (2012) Available at: www.city.academic.gr

Ching, H. and Ellis, P. (2004) “Marketing in cyberspace: What factors drive e-Commerce adoption?”, *Journal of Marketing Management*, Vol 20, pp. 409-429.

CMI – Chartered Management Institute Website. (2012) Available at: www.managers.org.uk

European Commission – EC. (2008) “Entrepreneurship in higher education, especially in non business studies”, *Final report of the expert group – DG Enterprise and industry*.

Gibb, Allan. (2005) “Towards the Entrepreneurial University: Entrepreneurship Education as a Lever for Change”, *National Council for Graduate Entrepreneurship – Policy Paper*, Said Business School, University of Oxford.

Gibb, Allan. (2006) “Entrepreneurship: unique solutions for unique environments: is it possible to achieve this with the existing paradigm?”, *International Council for Small Business World Conference*, Melbourne.

Gibb, Allan, Haskins, Gay and Robertson, Ian. (2009) “Leading the Entrepreneurial University”, *National Council for Graduate Entrepreneurship – Policy Paper*, Said Business School, University of Oxford.

Hamouda, Angela et al. (2009) “Entrepreneurship education in Ireland: towards creating the Entrepreneurial Graduate”, *National Council for Graduate Entrepreneurship*.

Hayton, J. C. (2004) “Strategic human capital management in SMEs: An empirical study of entrepreneurial performance”, *Human Resource Management Journal*, Vol. 42, No. 4, pp. 375–391.

Heinonen, Jarna, Poikkijoki, Sari-Anne and Vento-Vierikko, Irma. (2007) “Entrepreneurship for bioscience researchers: a case study of an entrepreneurship programme”, *Industry and Higher Education*, pp. 27-37.

Kefalas, Petros. (2012) “Reaching the parts other delivery cannot: alternatives to campus-based face-to-face education; The Flying Faculty Model”, *6th Annual Learning & Teaching Conference*, University of Sheffield, Available at: http://www.shef.ac.uk/lets/conf/conf12-opening.

Kefalas, Petros. (2011) “From resistance to leadership: Helping students move on to e-professional futures”, *5th Annual Learning & Teaching Conference*, University of Sheffield, Available at: http://www.shef.ac.uk/lets/conference11/session28.

Kefalas, Petros and Ketikidis, Panayiotis. (2012) “An Entrepreneurial Educational Model for Knowledge Based Regional Development through Innovative Learning Practices”, *Proceedings of the 5th International Conference on Entrepreneurship, Innovation and Regional Development (ICEIRD)*.

Ketikidis, Panayiotis, Ververidis, Yiannis and Kefalas, Petros. (2012) “An Entrepreneurial Model for Internationalization of Higher Education: the Case of City College, an International Faculty of the University of Sheffield”, *Proceedings of the 4th International FIPIN Conference on Entrepreneurial Universities*, Munster, Germany.

Ketikidis, Panayiotis and Zigiaris, Sotiris. (2007) “Infusing Business Entrepreneurial Knowledge to 2nd Year Computer Science Students”, *Proc.of Informatics Education Europe II*, Thessaloniki, Greece.

Kuratko, Donald. (2005) “The Emergence of Entrepreneurship Education: Developments, Trends and Challanges”, *Entrepreneurship Theory and Practice*, pp. 577-597.

Kuratko, Donald and Hodgetts, R. (2001) “Entrepreneurship: a Contemporary Approach”, *Harcourt, Orlando, 5th Edition*.

Luczkiw, Eugene (2007) “The End of Entrepreneurship: a holistic paradigm for teaching and learning about, for and through enterprise”, *Industry and Higher Education*, pp. 43-57.

McDougall, P. and Oviatt, B. (2000). “International Entrepreneurship: the Intersection of Two Research Paths”, *Academy of Management Journal*, Vol. 43, No. 5, pp. 902-906.

Sandercock, Patrick. (2001) “Innovations in Entrepreneurship Education: Strategy and Tactics for Joining the Ranks of Innovative Entrepreneurship Programmes in Higher Education”, DePaul University.

QAA Website. (2012) Available at: www.qaa.ac.uk

SEERC – South East European Research Centre Website. (2012) Available at: www.seerc.org

Sheffield University Website. (2012) Available at: www.shef.ac.uk.

Socrates Report. (2006a) “Best Practices & Pedagogical Methods in Entrepreneurship Education in Europe: Quality of Entrepreneurship Education in Europe”, EU Commission - *DG Education and Culture*.

Socrates Report. (2006b) “How Higher Education Institutions in Europe Deal with the Quality Assurance of their Entrepreneurship Programmes – case studies”, EU Commission - *DG Education and Culture*.

Developing Øresund Region's Innovation System With Clean Technology Entrepreneurship

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Abstract: Although it is generally anticipated that innovation as such leads to regional prosperity (Asheim et al. 2011) there is lack of empirical evidence that confirms the direct linkage between the innovation capabilities of regions and welfare increase. It is suggested that entrepreneurship can be seen as a missing link that helps to transfer innovations into business outcomes (Braun et al. 2012). The aim of this explorative paper is to create the holistic view of the regional development, its innovation system related to cleantech, entrepreneurship and triple helix collaboration on the example of Øresund, Danish-Swedish transnational region. Eighteen interviews with regional stakeholders related to academia, business and administrations were conducted in order to understand their vision on cleantech innovation and entrepreneurship development. In addition, available secondary data such as peer-reviewed articles, industry and governmental reports were analyzed. It was found that the process of interregional collaboration and networking for the development of research-based innovations in Øresund seems not as promising as it was expected. Our findings reveal that in order to innovations in cleantech to be utilized, the efforts of entrepreneurs are necessary to promote knowledge spillover from research institutes and "locked" systems into business environment. Upcoming economic recession, could stimulate the development of entrepreneurship, and academic entrepreneurship in particular. Increasing development of research-based innovations related to social science significantly extends the magnitude and possibility to involve academia and students in academic entrepreneurship and cleantech. It was concluded that new agenda for the interregional development could be associated with cleantech. Some of the measures that could support cleantech development include: redirection of public funds towards cleantech, development of sociotechnical innovations; cooperation between cleantech startups with non-cleantech industry, development of fiscal incentives and tax breaks as well as promotion of small and medium cleantech enterprises.

Keywords: regional innovation system, cleantech, triple helix, entrepreneurship, cross-border cooperation, Øresund

1. Introduction

Regional innovation systems and their rots are widely debated topic in the literature (Asheim, et al. 2011; Lundvall 1992). It is often suggested that innovation policy should take into consideration regional advantage (European Commission 2006). Although it is generally anticipated that innovation as such leads to regional prosperity, there is lack of empirical evidence that confirms the direct linkage between the innovation and research capacity of regions and welfare increase. At the same time, it is suggested that entrepreneurship can be seen as a missing link that helps to transfer innovations into business outcomes (Braun et al. 2012). Extending this line of research, we aim to address the following research question: "How can entrepreneurship in clean technologies serve as a driver for regional innovation system?"

In the research we attempted to analyze regional innovation system (RIS) of Øresund from the perspective of cleantech innovations, entrepreneurship and triple helix collaboration, which assumes cross-institutional collaboration between academia, industry and government (Caniëls and Bosch 2011). Øresund is a transnational Danish-Swedish region that consists of Region Hovedstaden and Region Zealand on the Danish side and Skåne County on the Swedish side. The region has a significant capacity to produce research-based innovations, associated with universities and research facilities and related industries. Øresund is one of the leading areas for production of entrepreneurial cleantech start-up companies and commercialization of clean technology innovations (Cleantech Group and WWF 2012). Moreover, cleantech is closely related to low-carbon development, which is an important issue for the regional policies (State of Green 2011; Swedish Energy Agency 2010). Regional innovation system could be described as "a set of interacting private and public interests, formal institutions and other organizations that function according to organizational and institutional

arrangements and relationships conducive to the generation, use and dissemination of knowledge [in the region]" (Doloreux and Parto 2004).

The purpose of our analysis was to make a "snapshot" of Øresund RIS and find its unique characteristics with the respect to cleantech and entrepreneurship. Our paper is structured as following: we first describe the context for that study the development of RIS in Øresund region. This description is based on secondary sources such peer-reviewed articles, governmental reports, industry reports issued by consulting firms. Secondly, methodological approach for the primary data collection of this study is emphasized, which is a face to face interviews with stakeholders and researchers of Øresund RIS. It allowed to get the first-hand knowledge and specific details. Finally, findings are presented and analyzed allowing to obtain the holistic view of the region development, its innovation system related to cleantech and entrepreneurship.

2. Cross-border innovation system and cleantech

The cross-border innovation system of Øresund has a number of important characteristics, which constitute its unity: common agenda in the field of innovations, similar institutions and cultural patterns (OECD 2003; Hansen 2011). There is also a number of similar stakeholders of the RIS on the both sides of the sound. For example, Zealand and Skåne have: major universities, in particular, in Copenhagen and in Lund; cluster initiatives such as Copenhagen Cleantech Cluster and Sustainable Business Hub in Malmö; incubators – Symbion and IDEON.

The construction of the Øresund Bridge in 2000 that connected major central metropolitan areas of Copenhagen and Malmö, became an important step for the regional integration. Lundquist and Trippl (2009) classified Øresund RIS as a semi-integrated with a biotech as a leading industry of cross-border collaboration. At the same time there are some concerns regarding the opportunities to develop strongly integrated system "where economic activity in the region is fully integrated ... (and) knowledge flows are no longer confined to a few industries and no significant barriers to interaction remain" (Lundquist and Trippl 2011). This skepticism is associated with a difference in socio-economic trends on the Danish and Swedish sides (Lundquist and Winther 2006) and in the ways how their economy respond to globalization challenges (Edquist and Lundvall 1993). There are also some cultural and administrative barriers for further integration (Knowles and Matthiessen 2009).

Cleantech is stands for clean technologies, which could be defined as "energy and environment-related technologies developed with the objective of reducing harmful effects on the environment". Implementation of cleantech usually assumes an improvement of environmental performance at a lower cost, productive and responsible use of the natural resources (Swedish Energy Agency 2010). Cleantech solutions could contribute to the regional development of Øresund since it is associated with achievement of low-carbon goals, which are important for the both sides (Table 1).

Table 2: Low-carbon goals of Øresund Region

	2015	2020	2025	2050
Denmark		-30% GHG*		100% RES
Hovedstaden			50% RES	
København			carbon-neutral	
Albertslund	-25% GHG			
Ballerup	25% RES			
Sweden		50% RES,		
Skåne		-30% GHG*		
Malmö			100% RES	
Lund			-50% GHG*	
Kristianstad			-20% GHG*	

XX% GHG refers to XX% decrease greenhouse gases emissions; YY% RES stands for achieving YY% share of renewables in energy supply. * Compared to 1990 level.

Export of clean technologies is usually seen as an important or even the most important factor for development of cleantech on the both sides of the sound. The total Danish cleantech export market value in 2010 was about 12 billion Euros and it is expected to quadruple until 2015 (Ministry of Foreign Affairs of Denmark 2010). At the same time 51% of Swedish export is related to clean energy solutions: biofuels, solar, wind, hydro, sustainable buildings and energy efficiency technology (Swedish Energy Agency 2010).

3. Methodology

This exploratory study of Øresund region has used an interpretive research paradigm. Data for this study were collected using qualitative methods (Denzin and Lincoln 1994; Silverman 2006). We employed an inductive approach where the interviewees were given much space in order to provide their knowledge. Strauss and Corbin acknowledge the importance the importance of a multiplicity of perspectives and "truths" (Strauss 1987; Strauss and Corbin 1990). Although the description of the cleantech RIS of the Øresund region presented in the previous section provides the general picture and allowed to understand characteristics of the regional RIS, there is a need to gain a deeper understanding of a phenomenon through the interpretations from those experiencing it (Shah and Corley 2006). Following the work of other scholars (Leonard-Barton 1990; Gibbert, et al. 2008), we carried our interviews in close interaction with practitioners who deal closely with the development of cleantech innovation in regional perspective.

Eighteen interviews were conducted in the Øresund region between November 2011 and June 2012. We interviewed regional stakeholders related to business, academia and administrations (Table 2) in order to understand their vision on cleantech innovation, entrepreneurship and triple helix collaboration. Using case-study methodology (Yin 2003), we applied such methods as in-depth individual, semi-structured interviews, interviews which leave room for adjustments during the interview process.

Table 2: Organizations, which representatives were interviewed

DENMARK	SWEDEN
Bornholm Regional Growth Forum, regional development agency Copenhagen Business School, business school Copenhagen Cleantech Cluster, cleantech cluster Danish Foundation for Entrepreneurship, education & research organization Management Engineering Department, Danish Technical University, university Geography Department, University of Copenhagen, university Green Campus, University of Copenhagen, sustainability initiative Øresund Committee, forum for policy-making Østkraft Energy Systems, energy company	Centre for Innovation, Research and Competence in the Learning Economy at Lund University, research center Hallbart Universitet at Lund University, students sustainability initiative IDEON, incubator & science park Innovationsbron, investor International Institute for Industrial Environmental Economics at Lund University, education & research institute Lund University Innovation System, technology transfer office SKJ Center for Entrepreneurship at Lund University, education & research center Teknopol, consultancy Sustainable Business Hub, cleantech cluster

4. Results

4.1 Øresund innovation system and triple helix collaboration

Active stage of cross-border collaboration in Øresund began in mid 1990s. It was associated with organizing of the Øresund Committee, construction of Øresund Bridge and financing of the interregional development by European Union. Øresund Committee is a policy-forum that unites 36 chairmen from regions and cities. Forum itself has no political power, but it helps to develop and promote ideas, which could be later implemented on the each side (Steenstrup 2012).

The potential for the development of research-based innovation in Øresund RIS is associated with the collaboration between academia, industry and the regional authorities. Scientific talents are considered as one of the most valuable assets for Øresund RIS. ("It's all about people… bright researchers" [Coenen 2012]). Triple helix model is utilized by the Medicon Valley Alliance (MVA), the interregional cluster project that is aimed on the development of life-science innovations in the region. Initially MVA was funded by European Union as an Interreg initiative, but later it became independent project. MVA is considered as "the most successful project so far" (Steenstrup 2012).

Triple helix collaboration and cluster initiatives are seeing as quite effective by some of the interviewees for the development of cleantech in the region (Coenen 2012; Jonson 2012; Rasmussen 2012). In particular, Sustainable Business Hub seems to be an important actor for cleantech development on the Swedish side since its effective for dissemination of new technologies. The Hub connects local actors and promotes solutions internationally (Coenen 2012). It also has good

connections with a number of Swedish governmental organizations for the purpose of export cleantech goods and services (Jonson 2012). Copenhagen Cleantech Cluster uses the similar approach, but in addition to this it is focused on "feeling the gaps" in regional innovation system by providing different kind of supports, including financial one (Rasmussen 2012).

4.2 Low-carbon transition and cleantech development

Low-carbon transition and cleantech development in Øresund, on the one hand, could be connected with new technological findings, its practical implementation and commercialization (Velander 2012); whereas, on the other hand, dissemination of current clean technologies could play more important role in these processes (Coenen 2012). It was suggested that cleantech development should be based on the cooperation with the existing non-cleantech industries (Rasmussen 2012; Coenen 2012; Velander 2012). Cleantech ventures could have difficulties to compete with the mature industries. Secondly, successful cases for the cleantech development mentioned during the interviews were also related to the cooperation with existing industries: in particularly, the case of flexfuel cars, which could use mixes of biofuels with gasoline or traditional gasoline (Coenen 2012).

At the same time examples of concrete strategies for collaboration between cleantech startups and mature industry were provided. For instance, Teknopol business advisory has two cleantech related initiatives: "Customer financed development" and "Verification and Innovation purchasing". In the first case mature company establishes the fund to help cleantech start-ups to develop their technology to the level, when it could buy it. In the second case, Teknopol helps to translate sustainability needs of the large companies to a concrete demand, which could be met by start-ups (Velander 2012).

The Øresund region could also serve as a testing ground and a model for cleantech. Bornholm Island, which is a part of Danish Hovedstaden region in the Baltic Sea, is a prominent example of how the territory with the social and economic problems could become "Bright Green Island", the testing ground and model for sustainable society and clean energy sources (Gronning 2011). In particular, Bornholm is considered as a smart grid island laboratory and base for EDISON project that involves development of electric vehicles, charging station and intelligent batteries (Bendtsen 2011).

4.3 Entrepreneurial capital and academic entrepreneurship

According to interviewees entrepreneurial capital was increasing in the region during the last decade (Velander 2012; Vintergaard 2012; Löwegren 2012). It is suggested that ten years ago graduates n Sweden were rather interested to become business consultants than to be entrepreneurs (Velander 2012), whereas in Denmark in previous time entrepreneurship was seen as a thing for "daredevils" (Vintergaard 2012). It seems that nowadays students and researchers from academia are becoming more interested in studying entrepreneurship, having their own venture or becoming corporate entrepreneurs. In addition, the recession affects the opportunities for the employment and governments of both Denmark and Sweden are interested in the promotion of entrepreneurship (Vintergaard 2012). At the same time both sides have high level of social security and high perception of risk of failure, which are important barriers for practicing entrepreneurship. It was also suggested that high tax level could negatively affects the initiatives for entrepreneurship ("You lose 60% of your jackpot" [Hansen 2012]).

Three interesting examples of the academic entrepreneurship projects from Øresund were identified. One of the major endeavors to increase entrepreneurial capital of Øresund region was Øresund Entrepreneurship Academy. This networking project was active between 2006 and 2010. It united nine regional universities in order to promote entrepreneurship and enterprising behavior. The Academy supported educators in development of the courses and facilitation cooperation between academia and business organizations. It seems that the Academy had a notable impact and helped to provide education up to 8-10% of the all students in the region (Øresund Entrepreneurship Academy 2010). The Academy became an important step for the development of entrepreneurial spirit in the region. Nevertheless, the project was stopped in 2010, on the one hand, due to the creation of national entrepreneurship strategies on the both sides of the sound and problem with financing of the initiative. On the other hand, it seems that the level of interest to this project on the Swedish side was lower than on the Danish side (Vintergaard 2012).

Another project is Danish Foundation for Entrepreneurship. It supports entrepreneurial education from "from ABC to Ph.D." (Vintergaard 2012), i.e. from school to university in Denmark using a similar

approach as Øresund Entrepreneurship Academy. The other project is SKJ Center for Entrepreneurship, which started its activities in 2011 at Lund University. It provides 14 different courses on entrepreneurship at the different departments. Moreover, the center has a special international master program, which is combined with development of business ventures using the research ideas, provided by Lund University Innovation System (LUIS), technology transfer office (Bogsjö 2012). Students could also choose another track and practice corporate entrepreneurship in the companies (Löwegren 2012).

4.4 Technology transfer and students-driven initiatives

It seems that lack of business tradition when a company contacts university, could be a barrier for development of technology transfer in Øresund (Olsson 2012; Velander 2012). Therefore technology transfer offices such as LUIS at Lund University have to promote themselves among the businesses. There is also an alternative approach to provide research-based innovations to industry directly, through the personal networks of researchers. For example, that is how Bluetooth technology was developed (Olsson 2012). Interdisciplinary research centers, which consists of natural, social scientists and investors, seem to have greater potential for development new technologies comparing to mono-disciplinary departments, since such centers have more "stimulating environment" (Bogsjö 2012). Another issue for academic entrepreneurship is how to mix researchers with entrepreneurs. Students seem to be more entrepreneurial than faculty, in particular, because they more willing to take a risk. Moreover it is considered that many of the university people have hidden capacity to compete and become entrepreneurs. Therefore, the task of such organizations as LUIS is to realize this capacity ("How we could get people running?" [Bogsjö 2012]).

There is a tendency for the increasing number of research-based innovations, which are not related to natural science, but related to social sciences. It significantly extends the magnitude and possibility to involve academia and students in promotion of research-based cleantech innovations (Olsson 2012). In addition, social and sustainability innovations seem to have potential (Olsson 2012; Bogsjö 2012). Although students-driven initiatives in universities are usually underestimated, such initiatives could be effective for promotion of the academic entrepreneurship. Green Campus of University of Copenhagen showed a good example of how students and faculty collaborate for the purpose to decrease energy consumption and, therefore, lowering CO2 emission. It assumes development of changing behavior (social innovation) and implementation of cleantech innovations, supplied from the external company (Jørgensen 2012). The GRØN DYST competition as an as the case of the initiative for partnering students and faculty, alumni and other audiences' with the purpose of the project is to develop engineering education in Danish Technical University (DTU) in order to support sustainable and low-carbon development (Balyk 2012).

An interesting case for the development of cleantech solution and promotion of academic entrepreneurship is utilized in the DTU in collaboration with Copenhagen Business School. These universities took part in the international competition called Solar Decathlon. The purpose of the project is to develop the plus-energy house, which produces enough energy to meet in-house demand and supply it to the grid (Dudareva 2012). Another approach for the academic entrepreneurship is utilized by the Hallbart Universitet, sustainability students group and Lund University. The purpose of the group is to raise awareness and develop environmental projects such as environmental festivals, sustainable city tours, movie screening, etc (Horn 2012). Although such initiatives don't directly relate to cleantech, environmental awareness within the university could be an important for increasing demand for cleantech.

4.5 Current and future stages of Øresund RIS development

There were a lot of expectations regarding the interregional integration after the construction of Øresund Bridge in 2000, but the current results are less than it was initially expected. It could be associated with the fact that social networking and economic cooperation take time (Hansen 2012; Steenstrup 2012). Some of the most prominent integration achievements so far are related to creation of more favorable legislation for cross-border citizenship, employment opportunities as well as economic and social benefits that result from different and complimentary competences of the sides (Steenstrup 2012). At the same time it seems that construction of the bridge didn't affect that much scientific collaboration (Hansen 2012).

Some of the interregional networking initiatives don't seem to be very promising anymore or at least the level of awareness about these initiatives are not as high as it was before (Vintergaard 2012). There is also a degree of skepticism about future of transnational collaboration due to unequal distribution of benefits for between Danish and Swedish sides (Antonsson 2012). The indirect evidence for that – interviewees were more interested to talk about the innovation systems of their countries, rather than transnational innovation system of Øresund. Moreover, as it was portrayed some of the initiatives has *intra*regional rather than interregional focus.

Nevertheless, there are opportunities for the new stage of interregional development, which could be associated with a low-carbon transition, cleantech and sustainable energy solutions (Coenen 2012; Rasmussen 2012; Steenstrup 2012). In particular, cleantech & climate change become an important for Øresund Committee agenda strategy ("The ambition is to resemble something as Medicon Valley Alliance only in the area as "cleantech and climate" [Steenstrup 2012]); there is a special group was established in the Committee and cleantech goals was prioritized in first international cross-border collaboration. Secondly, the new portion of finance from European Union Interreg fund for low-carbon development was recently received (Steenstrup 2012).

5. Discussion and conclusion

The purpose of this paper was to get a holistic view on the regional development, its innovation system related to cleantech, entrepreneurship and triple helix collaboration on the example of the Øresund region and to answer the question of how can entrepreneurship in clean technologies serves as a driver for regional innovation system.

The interviewees provided some insights, based on their personal experiences and their tacit knowledge. New knowledge was not always developed as a result of the answers, but it was rather "weaved" by the both parties in a process of conversation. Interviewees covered different issues during the conversation: some of them described more how organizations are interacting and institutions are functioning, whereas the others told more about specific functions and role of their organizations. Although there were new issues discovered during the interviews, there were not many overlaps in answers and there were not many contradictions in the opinions of different interviewees. Furthermore, new information obtained from the representatives mostly complimented what was already known from the literature and from other participants

It was suggested that other regions could learn from Øresund experiences related to cleantech, triple helix and cross-border cooperation (Lindhqvist 2012; Coenen 2012; Rasmussen 2012). It is important that these experiences not necessarily should be positive, but it could be negative ones as well (Lindhqvist 2012). Interregional collaboration in Øresund for the development of the research-based innovations seems not as promising as it expected to be several years ago (Rasmussen 2012; Vintergaard 2012; Antonsson 2012). The biotech was a leading industry for interregional scientific cooperation (Lundquist and Trippl 2009; Hanson 2012) in the past, but it might be not so perspective in the future (Antonsson 2012). At the same time the region has a strong agenda for low-carbon transition with specific goals, which requires implementation of cleantech innovations.

Mutual interest of Danish and Swedish sides on the national, regional and municipal levels as well as support from the European Union are important for cleantech development in Øresund. Interregional networks, triple-helix collaboration and branding are needed to achieve the same level of success as Medicon Valley Alliance, but new specific policy-measures and incentives seem to be appropriate after a certain stage. Some of these measures could include: redirection of public funds towards cleantech-oriented innovations, their dissemination and implementation, development of transformative "sociotechnical" innovations (Steward 2012a; Coenen 2012); promotion of cooperation of cleantech innovators and startups with the mature non-cleantech industry and finding new opportunities for cleantech to "tap into existing infrastructure" (Coenen 2012). Fiscal incentives and tax breaks to support cleantech technologies development in small and medium enterprises and transforming or diverting regular procurement into public procurement of cleantech innovations could be reasonable as well (Edquist 2010).

Our findings reveal that in order to innovations in cleantech to be utilized, the efforts of entrepreneurs are necessary to promote knowledge spillover from research institutes and "locked" systems into business environment. That finding corresponds with recent claims of Acs, Braunerhjelm, Audretsch and Carlsson (2009) who suggest a Knowledge Spillover Theory of Entrepreneurship in which the

creation of knowledge expands the set of technological opportunity. What is also important is that not only to share knowledge for the development of research-based innovation within the academia, but to exchange it with practitioners on the field (Lichtenthaler 2011). In case of Øresund cleantech development open communication with practitioners could result in specific goal-oriented innovation outcomes.

Therefore, development of academic entrepreneurship in the Øresund region could contribute to the processes of commercialization and dissemination of cleantech innovations. It requires setting entrepreneurial mindset in universities and developing broader mobilization among academic institutions (Brorstad et al. 2009). The achievement of concrete goals requires "focused" entrepreneurial education and support students-faculty partnerships, which promote cleantech. We suggest that entrepreneurial education, which is specifically focused on the cleantech innovations and their dissemination, could be helpful to achieve low-carbon goals of the region and it could promote interest to cleantech startups among the researchers and students in universities.

References

Acs, Z., Braunerhjelm, P., Audretsch, D. and Caelsson, B. (2009) The Knowledge Spillover Theory of Entrepeneurshop, *Small Business economics*, No. 32, pp 15-30.

Asheim, B.T., Boschma, R. and Cooke P. (2011) Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases, *Regional Innovation Systems: Theory, Empirics and Policy*, Volume 45, Issue 7, pp 893-904.

Braun, A., Mueller E., Adelhelm, S. and Vladova, G. (2012) Knowledge Flow at The Fuzzy Front-end of Inter-firm R&D Collaborations – Insights into SMEs in the Pharmaceutical Industry. *International Journal of Entrepreneurship and Innovation Management*, Vol. 15, Nos. 1/2, pp. 29-46.

Brorstad, B., Grünfeld, L., Gulbrandsen, M., Rasmussen, E., Rønning, L., and Vinogradov, E. (2009) *Between Entrepreneurship and Technology Transfer: Evaluation of the FORNY Programme,* Oslo, Norway: Nifu-Step.Rapport 19/2009.

Caniëls, M.C.J. and Bosch, H. (2011) The role of Higher Education Institutions in building regional innovation systems. *Regional Science*, Vol. 90, issue 2, pp. 271-286, June 2011.

Cleantech Group and WWF (2012) "Coming Clean: The Global Cleantech Innovation Index 2012", [online], WWF, http://wwf.panda.org/wwf_news/?203662.

Copenhagen Cleantech Cluster (2011) "About Us. Copenhagen Cleantech Cluster web-site", [online], Copenhagen Cleantech Cluster, http://www.cphcleantech.com/about-ccc.

Denzin, N.K. and Lincoln, Y.S. (1994) *Handbook of Qualitative Research,* Thousand Oaks, CA: Sage Publications.

Doloreux, D. (2003) Regional Innovation Systems in the Periphery: the Case of the Beauce in Québec (Canada). *International Journal of Innovation Management*, No. 7 (1), pp 67-94.

Doloreux, D. and Parto, S. (2004) *"Regional Innovation Systems: A Critical Review",* [online], Université libre de Bruxelles, http://www.ulb.ac.be/soco/asrdlf/documents/RIS_Doloreux-Parto_000.pdf.

Edquist, C. (2010) "The Swedish Paradox – Unexploited Opportunities!", CIRCLE electronic working paper series, Paper no.2010/05, [online], CIRCLE, http://www.circle.lu.se/o.o.i.s/9673.

European Commission (2006) *Innovative Strategies and Actions: Results from 15 Years of Regional Experimentation*, European Commission Working Document, DG Regional Policy, October 2006.

Gibbert, M., Ruigrok, W., and Wicki, B. (2008) What Passes as a Rigorous Case Study?, *Strategic Management Journal,* No. 29 (13), pp 1465-1474.

Knowles, R.D. and Matthiessen, C.W. (2009) Barrier effects of international borders on fixed link traffic generation: the case of Øresundsbron. *Journal of Transport Geography*, No. 17(3), pp 155-165.

Leonard-Barton, D. A. (1990) A Dual Methodology for Case Studies: Synergistic Use of a Longitudinal Single Site with Replicated Multiple Sites, *Organization Science*, Vol. 1, No. 3, pp 1-19.

Lichtenthaler, U. (2011) Open Innovation: Past Research, Current Debates, and Future Directions, *Academy of Management Perspectives,* No. 25(1), pp 75-93.

Lundquist, K.J. and Trippl, M. (2009) Towards Cross-Border Innovation Spaces: A Theoretical Analysis and Empirical Comparison of Øresund Region and the Centrope Area. *SRE-Discussion,* 2009/5.

Lundquist, K.J. and Trippl, M. (2011) Distance, proximity and types of cross-border innovation systems: s conceptual analysis. *Regional Studies*, pp 1-11.

Lundquist, K.J. and L. Winther (2006) The Interspace Between Denmark and Sweden: the Industrial Dynamics of Øresund Cross-border Region. *Danish Journal of Geography,* No. 106(1), pp 115-129.

Lundvall, B-Å. (1992) National *Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Pinter.

Ministry of Foreign Affairs of Denmark (2010) *Denmark – a global cleantech hot spot.* Invest in Denmark, Ministry of Foreign Affairs of Denmark, March 2010.

OECD (2003) *Öresund. Denmark/Sweden*. *OECD Territorial Reviews*, OECD Publications, France, Paris.

Öresund Entrepreneurship Academy (2011). *Öresund Entrepreneurship Academy*. [Online], Official web-site, http://www.Öresund.org/entrepreneurship.

Shah, S.K., Corle, K.G. (2006) Building Better Theory by Bridging the Quantitative–Qualitative Divide. *Journal of Management Studies*, Volume 43, Issue 8, pp 1821–1835, December 2006.
Silverman, D. (2006) *Interpreting qualitative data.* London: Sage.
State of Green (2011) "*Join the Future. Think Denmark",* [online], State of Green, http://www.stateofgreen.com/.
Steward, F. (2012a) "*The Role of Radical and Systemic Changes for Green Transformation"*, OECD Workshop Future of Eco-innovation. Copenhagen, 19 January 2012, [online], OECD, http://www.oecd.org/dataoecd/62/57/49521353.pdf.
Steward, F. (2012b) Transformative Innovation Policy to Meet the Challenge of Climate Change: Sociotechnical Networks Aligned with Consumption and End-use as New Transition Arenas for a Low-carbon Society or Green Economy. *Technology Analysis & Strategic Management*, Volume 24, Issue 4, 2012 pp 331-343.
Strauss, A.L. (1987) *Qualitative Analysis for Social Scientists*, Cambridge: Cambridge University Press.
Strauss, A. and Corbin, J. (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Newbury Park, CA: Sage Publications, Inc.
Sustainable Business Hub (2011) "Sustainable Business Hub – About us", [Online], Sustainable Business Hub, http://www.sbhub.se/.
Swedish Energy Agency (2010) *Swedish Cleantech Opportunities. A Market Overview from the Swedish Energy Agency*, Intellecta Publicisterna, Bromma.
Yin, R. K. (2003) *Case study research: Design and methods* (3rd ed.), Thousand Oaks, CA: Sage.

Communication

Antonsson, P. (2012, 16 February) [Interview]
Balyk, O. (2012, 5 January) [Interview]
Bendtsen, M. (2011, 25 November) [Interview]
Bogsjö, A. (2012, 24 February) [Interview]
Coenen, L. (2012, 16 February) [Interview]
Dudareva, N. (2012, 20 February) [Interview]
Gronning, L. (2011, 24 November) [Interview]
Hansen, T. (2012, 20 February) [Interview]
Horn, O. (2012, 2 June) [Interview]
Jonson, M. (2012, 31 May) [Interview]
Jørgensen, A.G. (2012, 29 May) [Interview]
Lindhqvist, T. (2012, 19 May) [Interview]
Löwegren, M. (2012, 21 February) [Interview]
Olsson, S. (2012, 21 February) [Interview]
Rasmussen, R. (2012, 20 February) [Interview]
Steenstrup, B. (2012, 29 May) [Interview]
Velander, J. (2012, 16 February) [Interview]
Vintergaard, C. (2012, 20 February) [Interview]

At the Intersection of Dynamic Capabilities and Organizational Learning: Organizational Learning Capability as a Determinant of Innovation and Performance

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Abstract: Rapid technological advancement, competition at the global level, and the requirement for innovative, administrative and productive practices (Tu et al, 2006) are forcing organizations to seek out for the creative exploitation of their distinctive capabilities deriving from their knowledge intangibles (Silvi and Cuganesan, 2006). This is a quantitative study which builds upon the intersection of dynamic capabilities view (DCV) (Winter 2003) and organizational learning (Fiol and Lyles, 1985) to highlight the role of organizational learning capability (OLC) defined as the organizational and managerial characteristics, skills or factors that facilitate the organizational learning process and allow an organization to learn (Alegre and Chiva, 2008; Jerez-Gomez et al, 2005) in the enhancement of firm innovation and performance. However, the nomological relationship among these organizational practices (i.e. OLC, product, process innovation and performance) is not empirically investigated. Although studies underline that OLC will promote product innovation (Hung et al, 2011) which in turn is documented to promote firm performance, there is little evidence regarding the relationship between OLC and process innovation specifically. Therefore this research aims at empirically investigating i-) the effect of OLC on product (i.e. the technical design, R&D, manufacturing, management and commercial activities involved in the marketing of a new or improved product) (Alegre and Chiva, 2008) and process innovation (i.e. the introduction of new elements, machinery and capital equipment which aims at improving productivity, quality, and lowering cost of production) (Damanpour, 1991; Reichstein and Salter, 2006), ii-) the direct effect of OLC on firm performance, iii-) the effect of innovation on firm performance and iv-) the effect of OLC on firm performance through the mediating role of innovation. The pertinent hypotheses developed based on the literature are analyzed through the correlation and regression analyses of the 238 surveys (collected through a research in a varied spectrum of sectors in Turkey) through the SPSS 15 software. Finally results and the managerial implications are discussed.

Keywords: organizational learning capability, dynamic capabilities, product and process innovation, firm performance

1. Introduction

Organizational learning, which is the process through which organizations acquire new knowledge and insights from the shared experiences of its members (Jimenez-Jimenez and Sanz-Valle, 2011) is a critical success factor for firms to achieve sustainable competitive advantage (Argyris and Schon, 1978). It indicates the processes/activities regarding organizational change occurring within organizational learning itself (Hung et al, 2010). Firms need to constantly update, renew and reconfigure their skills and resources in order to provide long-term customer value by developing the ability to modify their existing knowledge and skill base (i.e. dynamic capability) (Santos-Vijande et al., 2012). Dynamic capabilities defined as "the capacity of an organization to purposefully create, extend or modify its resource base" (Helfat et al, 2007, p. 4) appear as the antecedent of organizational and strategic routines (i.e., repetitive and patterned behavior that is learned especially through learning by doing and embedded in tacit knowledge (Winter, 2003)) and enables the firm management to acquire new resources, integrate and recombine them to obtain a novel resource base (Salunke et al, 2011). However, many researchers suggest that the literature on organizational learning still lacks some relevant insights (Jerez-Gomez et al, 2005) especially regarding the DCV which need to be further investigated (Bustinza et al., 2012; Ingelgard et al, 2002; Camison and Lopez 2011). At this point, organizational learning capability (OLC) should be evaluated from a dynamic capability view (DCV). Further, leaning on the basic assumption that firms having the ability to learn better sense and flexibly respond to the changes and progresses in the marketplace (Jimenez-Jimenez and Sanz-Valle 2011) indicates the extent to which OLC drives dynamic capabilities through collective learning, coordination and integration (Bustinza et al., 2012). Thus, DCV breaks the limits of one-time solution learning and enables organizations to continue to learn by the virtue of its ability to implement practices to facilitate learning (Goh and Richards, 1997).

Also, from an innovation management perspective, it is well recognized that the capacity to learn is critical to leverage organizational effectiveness and innovative performance (Jerez-Gomez et al 2005). Yet, there is little consensus on the best and most practical approach to achieve organization-wide innovation (Singh and Smith, 2004). Hence, studies suggest that "future work could link .... innovation management with OLC" (Chiva and Alegre 2009, p. 337). Indeed, few studies have up to now empirically investigated the nomological relationship between OLC and innovation and firm performance simultaneously (Jimenez-Jimenez and Sanz-Valle 2011).

Therefore, building on the above arguments the main purpose of this study is threefold; (1) ground the OLC in DCV, (2) empirically examine of the relationship between OLC and innovation, and simultaneously (3) empirically test the relationship between OLC and firm performance. This study hence contributes to the theory by strengthening the conceptual framework of OLC, indeed basing on the DCV, as well as to the practice by empirically examining the aforementioned relationship. Hence the remainder of this paper is organized as follows. The next section briefly introduces the related constructs of the research explicitly; OLC, innovation, and performance, reviews related theoretical underpinnings and develops hypotheses based on the research. The research methodology is then presented along with the measures, samples, variables and regression analyses. The results are then presented with a thorough description of the empirical analysis, including exploratory factor analysis, validity and reliability analyses, correlation and regression. Finally, discussion and conclusion are presented and implications are discussed.

2. Literature review

The research on organizational learning accelerated in 1990s and although it is not in its infancy anymore, its role as a motor of dynamic capabilities is yet to be more extensively and empirically analyzed (Bustinza et al., 2012). Organizational learning is defined as the "collective capability based on experiential and cognitive processes and involving knowledge acquisition, knowledge sharing, and knowledge utilization" (Bolivar-Ramos et al., 2012). The main idea behind the process of organizational learning is the transfer of individual knowledge to the teams and the organization as a whole through shared interpretations resulting from social interactions (Santos-Vijande et al., 2012). Accordingly the capability of organizations to learn is intertwined in the factors or mechanisms within the organization which facilitate or allow the organizational learning process (Alegre et al., 2012). In this study we evaluate OLC from the intersection of the organizational learning and dynamic capability perspective based on the following view regarding dynamic capabilities as assets which enable firms to develop, acquire, assimilate and especially modify knowledge to obtain new and critical sources of sustained competitive advantage (Teece and Pisano, 1994; Winter, 2003). As suggested by Bustinza et al., (2012) dynamic capabilities are behavior patterns with which the firm systematically adjusts its operational routines so to increase its effectiveness." Since OLC is defined as the "capability of an organization to process knowledge -in other words, to create, acquire, transfer and integrate knowledge and to modify its behavior to reflect the new cognitive situation with a view to improving its performance" (Jerez-Gomez et al 2005 p. 716), it can be evaluated as part of firm's dynamic capabilities. Especially, OLC encapsulates the tangible and intangible resources, characteristics and skills of the firm which facilitate and enable the learning process of the firms (Goh and Richards, 1997). This study takes into account the dimensions identified by Jerez-Gomez et al (2005), characterizing OLC as a complex and multidimensional concept involving four dimensions namely i-) managerial commitment, ii-) systems perspective, iii-) openness and experimentation, and iv-) knowledge transfer and integration. Explicitly, *managerial commitment* indicates the creation of culture encouraging organizational learning recognizing its role in obtaining long-term results, *systems perspective* denotes viewing the organization as an integrative whole based on the coordination, collaboration, knowledge sharing and common understanding, *openness and experimentation* suggests the welcoming of new ideas, creativity and the promotion of enterprising culture, taking controlled risks and learning from mistakes, and finally *knowledge transfer and integration* refers to the elimination of internal barriers and leverage the interactions between different departments as well as individuals in terms of the transfer of best practices (Jerez-Gomez et al 2005). Hence this research, following the literature aims to build a theory addressing the missing links between OLC, innovation and performance. This study will then empirically test and present the results of these relationships.

3. Hypothesis development

3.1 The relationship between OLC and innovation

Several studies in the literature argue that OLC is positively related to innovation (Calantone et al 2002; Hurley and Hult, 1998). Most studies consider that learning injects new ideas and strengthens the creativity and the ability to discover new opportunities, so it supports the presence of innovation (F.J. Lloréns Montes et al, 2005: 1160). Most successful innovations are the result of gradual changes in concepts and procedure implemented continually over time (Liao et al, 2008: 185). This gradual process relies on the creation, search, acquisition and sharing of knowledge which in turn will provide organizational learning and will constitute the base for the successful innovation. Although literature abounds of researches implicitly suggesting the positive leveraging power of OLC on innovation there is still a lack of empirical investigation between the two concepts (Jimenez-Jimenez and Sanz-Valle, 2011). OLC is an intangible and non-transferrable resource which is firmly grounded in organizational processes (Santos-Vijande et al., 2012). OLC improves innovation performance through strengthening the interactions among organizational members and departments and exchange between members and artifacts such as processes and values (Alegre and Chiva, 2008). Indeed innovative outcome is achieved through clear, fast and focused communication of knowledge across internal boundaries (Goh, 2003; Baker and Sinkula, 1999) as well as its absorption from external environment (Cohen and Levinthal ,1989). For instance, as the exchange of ideas and collaborative action increases among employees the hierarchical organizational structure is shifted towards a participative decision making which increases commitment to innovate by decreasing resistance to change and allowing the risk-sharing between all related parties (Mat and Razak, 2011). As also indicated by Garcia Morales et al. (2007) "organizational learning performs an essential role in innovation by supporting creativity, inspiring new knowledge and ideas, and increasing the potential to understand and apply them, thus developing organizational intelligence and an innovative culture (Garcia-Morales et al., 2011). OLC encourages the establishment of a learning culture which in turn dedicates all of its members to translate knowledge and learning into innovative outputs (Hung et al, 2010).Camison and Villar-Lopez (2011) refers to the employee empowerment and the use of work groups (i.e. workplace innovations) enabled through OLC. Further, product and process innovation based on a full understanding of customer needs, competitors' actions, and technological development is made possible by organizational commitment to learn (Calantone, 2002). Firms having higher capacity to learn will be less likely to miss market opportunities since they have the necessary knowledge to anticipate and act according to the customer requirements, as well as track and understand competitors'' strengths and weaknesses better (Garcia-Morales et al., 2011). Moreover, based on the argument that innovation is achieved via the knowledge accumulation at the organizational units through exploration and exploitation, we posit that OLC facilitates innovation by balancing between the variation and selection which is equivalent to the process of balancing between exploration (i.e. generation of new alternatives) and exploitation (i.e. selection among routines) (March, 1991). For instance OLC has the potential to explore and exploit knowledge enabling the organizational members to contribute to business processes by adding value by developing and utilizing the existing and new knowledge stocks (Prieto and Revilla, 2006). This way innovation becomes the top priority in firms having high commitment to learning, and a culture based on open mindedness as well as exchange of knowledge since these are the knowledge-enhancing and innovation-driving qualities in an organization (Bolivar-Ramos et al., 2012). Therefore:

H1: Organizational learning capability positively influences innovation.

3.2 The relationship between OLC and firm performance

Organizations that embrace strategies consistent with the learning organization are thought to achieve improved performance (Ellinger et al, 2002; Calantone et al, 2002). The dynamic capabilities based view of OLC emerging from the knowledge-based view offers insight on the performance differences of firms (Teece and Pisano, 1994). OLC is considered as a critical factor which enhances firm performance by many studies in the literature (Carayannis, 2006; Teece et al 1997; Argyris and Schon 1996; Slater and Narver 1995). However, studies which focus both on financial and non-financial measures of firm performance in the measurement stage of their research still lack among the literature empirically examining the relationship between OLC and firm performance (Prieto and Revilla, 2006) with a few exceptions such as Akgun et al (2007), as well as investigating this relationship along with the OLC-innovation link (Jimenez-Jimenez and Sanz-Valle 2011). OLC establishes a mechanism through which coordination and combination of resources and capabilities is

achieved decreasing time and cost of identifying market needs, satisfying customer requirements and responding to changes in the environment by added-value (Prieto and Revilla, 2006). This way also the experimentation and the freedom of the employees to take initiatives in improving their business processes, interactions with the external as well as internal environment and responsibility enhances the commitment and satisfaction of employees resulting in increased firm performance (Chiva and Alegre, 2009). According to Baker and Sinkula (1999) the direct influences of organizational learning can be listed as; (1) the promotion of generative learning as a core competency as a result of knowledge creation, (2) the questioning of long-held assumptions such as to always follow market-oriented strategy, instead try to lead the market with new product development strategy for instance, (3) the realization that customer satisfaction cannot always be maximized with customer feedback mechanism but innovative disruptions are needed. OLC can be seen as the dynamic capability building organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together (Martinez-Costa and Jimenez-Jimenez, 2009) which in turn contribute to the knowledge generation, accumulation and application (Garcia-Morales et al., 2011). Also, OLC leads managers to focus on specific interventions required to develop learning such as training, seminars, weekly meetings, team works, collaborative projects to clearly articulate the mission, vision and goals of the organization (Goh, 2003). This way OLC, encourages the creation of a shared vision among employees, facilitates the understanding of the gap between the current stage and vision of the organization hence leads to an increased effort for productivity (Goh and Richards, 1997). However, it would be misleading to state that organizational learning always leads to increased performance (Garcia-Morales et al., 2011). But it can be claimed that "organizations that have developed a strong culture of learning are good at the creation, acquisition and transfer of knowledge, as well as at the modification of behavior to reflect new knowledge and perspectives" which results in " such as greater flexibility and rapidity of response, enabling them to face new challenges and act before their competitors do" through distinctive competencies generated through learning (Bolivar-Ramos et al., 2012). Therefore we hypothesize that:

H2: Organizational learning capability positively influences firm performance.

3.3 The relationship between innovation and firm performance

Although the link between innovation and performance at various levels of aggregation has been the focus of attention in a number of studies in recent decades (Lööf and Heshmati, 2006), it is recently being suggested that the influence of product and process innovation to performance has not been empirically investigated sufficiently (Calantone, 2002). The ability of firms to satisfy customers' emerging and complex requirements, meet growing consumer expectations and satisfaction, and respond rapidly to changing environments, is largely based on their innovation orientation (Ussahawanitchakit, 2008). Organizations which adopt innovation first are able to protect profit margins and increase their financial performance through creating an inaccessible knowledge base. This increases heterogeneity among firms thus positively impacting firm performance (Garcia-Morales et al., 2011). An organization's openness, acceptance, and implementation of new ideas, processes, products or services and propensity to change through adopting new technologies, resources, skills and administrative systems reflect its innovation orientation, in other words its degree of being ready to innovation (Ussahawanitchakit, 2008). Innovation orientation strongly improves employees' job attitudes, job satisfaction and organizational commitment (Ussahawaniitchakit, 2008). The diffusion of innovations literature also confirms this view and suggests that firms must be innovative to gain a competitive edge in order to survive (Calantone et al, 2002). The study of Calantone et al (2002) resulted in the positive relationship between innovativeness and firm performance. Also the findings in other studies about new product and process development have resulted in positive relationship between the two constructs. Firms without these attributes are less likely to stand out in terms of innovation capability, although they may look elsewhere to find ways to survive (Calantone et al, 2002). Recent innovation studies place much emphasis on innovation as a production process, with new or improved products as a separate output which enhances overall firm performance. This enables a firm's overall sales performance to be linked more explicitly to the innovation process (Klomp and Van Leeuwen, 2001). Klomp and Van Leeuwen conclude that the innovation contributes significantly to the overall sales performance, productivity (as measured by sales per employee) and employment growth. Evidence obtained from the extensive literature research provides support for the consequent hypothesis.

H3: Innovation positively influences firm performance.

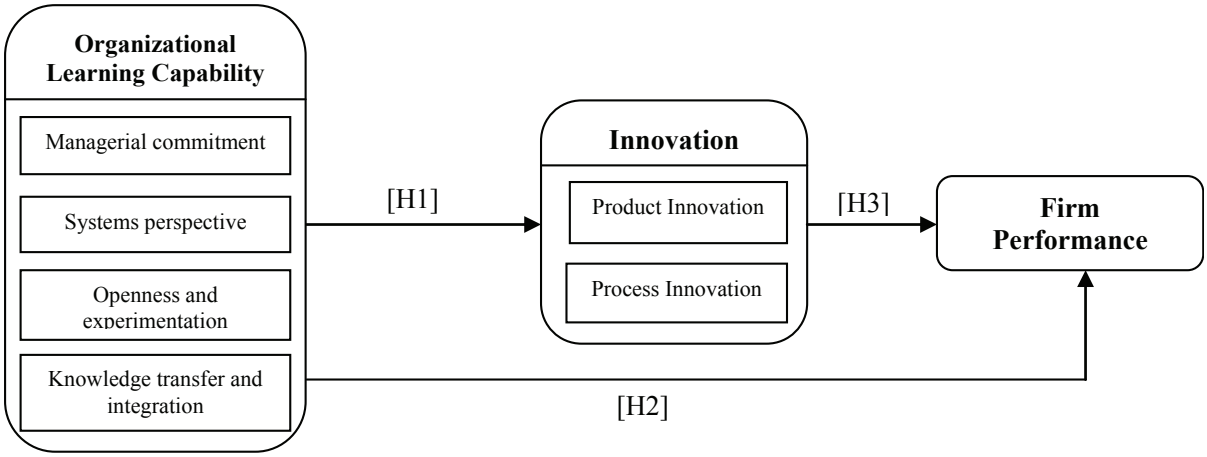


Figure 1: Conceptual model

4. Research method

4.1 Sampling

The data used to test the hypotheses are drawn from a varied spectrum of organizations in Turkey. The sample frame consisted of manufacturing industries. The organizations taking part in the survey have both national and international, operational domains. The initial sample consisted of 500 medium and large sized firms in total, residing in the Marmara Region of Turkey which is the most industrial region. The firms were selected and contacted through the database of Istanbul Chamber of Industry. For the purpose of eliminating flexibility in the survey technique which would breed inconsistency and to provide a common understanding of the questions for each respondent the parallel-translation method is used. The suitability of the survey was assessed through a pilot study with 30 respondents working in the industry. Regarding the warnings and suggestions analyzed through these results the survey was transmitted to more extensive masses. The general managers of the firms were contacted by telephone as a pre-notification of the survey and were announced about the immitent arrival of the survey as well as the aim of the study. The assurance of anonymity and confidentiality regarding any data of their company or specifically products to be undisclosed and the premise that a report of the results and implications will be sent to the respondents in case they request aimed at increasing the motivation of informants to cooperate without fear of potential reprisals. Of the 500 contacted, 276 agreed to answer the survey. Yet, of the 276 returns, 38 were deleted due to incomplete and inconsistent information, leaving 238 usable returns for analysis. Correspondingly, a response rate of 47.6% is obtained.

4.2 Measures

The methodology consistently entails the adoption of a survey research method. A survey was conducted to validate the proposed relationships ascribed in the hypotheses and to develop a reliable discussion coextending with the findings attained. Well verified measures of multi-item scales adopted from previous studies were used. All the measurement constructs were estimated through respondents' perceptual evaluation on a seven-point Likert scale, which was anchored by the end points of "strongly disagree" (1) to "strongly agree" (5). The OLC dimensions are measured using a scale consisting of 11 questions involving respectively; managerial commitment (5), systems perspective (3), openness and experimentation (4), and knowledge transfer and integration (4) dimensions developed and validated by Jerez-Gomez et al (2011). Regarding the innovation construct, we adapted a scale of 11 items categorized in two dimensions namely product (6) and process innovation (5) developed by Hung et al (2011). Finally, we derived the scale for measuring the firm performance from the research of Calantone et al (2002) and asked 12 questions.

5. Data analysis and results

5.1 Measure validity and reliability

Since the scales were used with a new sample, the items were subject to exploratory factor analysis in SPSS 17.00. The best fit of data was obtained with a principal component analysis utilizing varimax rotation with Eigenvalues of 1 as a cut of point. In the data reduction procedure, those items having a

factor load of lower than 0.50 and those having collinearity with more than one factor, were removed one by one while continuing the factor analysis until reaching the ideal factor table. The results of the factor analysis are naturally gathered in ten factors of which one belongs to trust, one to commitment, four are part of IS and the final four constitute SCP.

Table 1 shows that the factor loadings are between 0.590 and 0.889, with a total variance explained 66.31%. Furthermore, the Kaiser-Meyer-Olkin test which informs the researchers about the adequacy level of the scales has been found as KMO= 0.91 and the Bartlett's test of sphericity testing if the correlations between variables are as expected has been found significant p= .000. Consequently, the presented items of the measurement scale were found to be appropriate to measure the variables given in the model.

Table 1: The results of the exploratory factor analysis

KMO: 0.91 Bartlett's Test of Sphericity: .000 *Total Variance Explained:* 66.31%	Managerial Commitment	Systems Perspective	Openness and Experimentation	Knowledge Transfer and Integration	Product Innovation	Process Innovation	Firm Performance
MC1	.784						
MC 2	.775						
MC 3	.740						
MC 4	.653						
MC 5	.645						
SP 1		.888					
SP 2		.865					
SP3		.833					
OE 1			.854				
OE 2			.828				
OE 3			.748				
OE 4			.717				
KTI 1				.800			
KTI 2				.704			
KTI 3				.577			
KTI 4				.546			
PRDI 1					.889		
PRDI 2					.887		
PRDI 3					.856		
PRDI 4					.806		
PRDI 5					.752		
PRDI 6					.655		
PRCI 1						.879	
PRCI 2						.848	
PRCI 3						.838	
PRCI 4						.760	
PRCI 5						.673	
FP 1							.848
FP 2							.773
FP 3							.770
FP 4							.759
FP 5							.752
FP 7							.590

Next, we calculated means and standard deviations for each variable and created a correlation matrix as shown in Table 2. Moreover, Cronbach`s Alpha values representing reliability of each variable are shown on the diagonal of the table. Hence the variables are adequately reliable being all above 0.70 as suggested by Nunnally (1978) with the exception of knowledge transfer and integration. The means and standard deviations are within the expected ranges. It is also seen as a result of the correlation analysis that all of the constructs each differing from each other as a factor, are significantly related to each other when one-to-one correlations are considered; and the relatively low-to-moderate correlations provide further evidence of discriminant validity. Especially the high

correlations between product and process innovation and firm performance indicate a close link between these factors. Regarding to the results of the above statistical tests for reliability and validity, it is assumed that the factors of the variables are sufficiently valid and reliable to test hypotheses.

Table 2: Mean, standard deviation and correlation coefficients

Factors	Mean	S.D.	1	2	3	4	5	6	7
1. Managerial Commitment	3.07	.79	α=.76						
2. Systems Perspective	3.23	.90	.47**	α=.83					
3. Openness and Experimentation	3.44	.79	.55**	.41**	α=.79				
4. Knowledge Transfer and Integration	3.35	.55	.50**	.31**	.54**	α=.57			
5. Product Innovation	3.44	.89	.17*	.36**	.42**	,21**	α=.90		
6. Process Innovation	3.22	.89	.27**	.37**	.45**	,24**	,78**	α=.86	
7. Firm Performance	3.41	.79	.14*	.37**	.35**	.24**	.73**	.75**	α=.87

***p*<0.01; **p*<0.05

Furthermore, to test the hypotheses, we employed regression analysis and the results are presented in Table 3 and 4. Through the regression analysis we investigated the positive relationships between OLC dimensions and product and process innovation and firm performance. The sample estimates signifies the relationships between the variables. β values provide evidence for the acceptance of the H1; OLC positively influences innovation, yet knowledge transfer and integration does not have a significant effect on product and process innovation, besides managerial commitment does not have a significant relationship with process innovation. It can be seen from Table 4 that H2 stating the relationship between OLC and firm performance is also supported. Only openness and experimentation does not have a significant relationship with firm performance. Finally H3 indicating a positive relationship between innovation and firm performance is also supported.

Table 3: Results of the regression analysis – Effect of OLC on innovation

	Dependent Variables			
	PRDI		PRCI	
Independent Variables	**β**	**Sig.**	**β**	**Sig.**
MC	.189*	.012	.040	.593
SP	.283**	.000	.237**	.000
OE	.412**	.000	.380**	.000
KTI	-.008	.905	-.017	.815
	R^2 = .242 F = 18.626 Sig. = .000		R^2 = .242 F = 18.603 Sig. = .000	

***p*<0.01; **p*<0.05

Table 4: Results of the regression analysis – Effect of OLC and innovation on firm performance

	Dependent Variables	
	Firm Performance	
Independent Variables	**β**	**Sig.**
MC	.139**	.009
SP	.124**	.010
OE	-.027	.622
KTI	.106*	.031
PRDI	.321**	.000
PRCI	.479**	.000
	R^2 = .636 F = 67.257 Sig. = .000	

** *p*<0.01; **p*<0.05

6. Discussion and conclusion

This study presents an empirical investigation of the inter-relationships between OLC, innovation and firm performance. Four gaps in the literature are addressed and the empirical analysis have following contributions. Firstly, since OLC is defined as the ability of organizations to promote, continuously develop and enhance the capacity to create, manage and diffuse knowledge (i.e. learn) in order to build value into the business processes in a changing environment (Ingelgard et al, 2002), OLC is regarded from a dynamic capability perspective throughout this research. Second, many studies have investigated the relationship between dynamic capabilities and firm performance (Hung et al, 2010) or OLC and firm performance (Panayides, 2007) but few studies have theoretically analyzed OLC from a DCV and concurrently made an empirical assessment between the two encapsulating both financial and non-financial aspect of performance (with the exception of Prieto and Revilla, 2006). Third, although studies focus on the leveraging power of organizational learning and partially OLC on innovation there is a missing link in the empirical analysis of OLC and product and process innovation distinctively. Finally this research contributes to the literature on organizational learning and innovation also by examining the nomological relationship between the three inter-related constructs; i-) OLC, ii-) innovation, iii-) firm performance simultaneously. Indeed the variance explained in firm performance in the presence of both OLC (i.e. managerial commitment, system perspective, openness and experimentation and knowledge transfer and integration) and innovation (i.e. product and process innovation) is high such as 67.3%.

This study besides the theoretical implications have also managerial implications which may be key in high performance and innovative outcome if effectively managed. Managers should recognize the importance of investing more time as well as energy in developing an OLC. Additionally, although the argument that innovation is critical in increasing performance this research suggests top management to achieve innovation through following a learning based pathway by; i-) encouraging collaboration among organizational members, ii-) involving employees in team work to enhance shared interpretation of knowledge, iii-) allow controlled risks to guarantee the diffusion of best practices, iv-) build strong links with external actors and v-) empower employees in the decision making.

Like any empirical research, this study contains some methodological strengths and limitations. Specifically, our research is prone to common method bias since, the dependent variable in the survey was answered by the same respondents who answered the independent variable questions, in a cross-sectional manner. Second, As with all cross-sectional research, the relationship tested in this study represents a snapshot in time. While it is likely that the conditions under which the data were collected will essentially remain the same, there are no guarantees that this will be the case. Third although yhe breadth of the sample included in this study suggests that the findings are fairly generalizable the results reported here emerge from a local area and may differ for firms operating in different cultural, environmental and political conditions. Additionally, there is not a separation concerning the size of the firms involved in this study; results may differ for SMEs and large sized firms. Also, there wasn't an industrial separation while evaluating data; so the results may differ for different industries. Despite these limitations this study provides important implications in the context of a developing country from theoretical and practical perspectives.

References

Akgun, A.E., Keskin H., Byrne J.C. and Aren S. (2007) "Emotional and learning capability and their impact on product innovativeness and firm performance", *Technovation,* Vol 27, pp 501-513.

Alegre, J. and Chiva, R. (2008) "Assesing the impact of organizational learning capability on product innovation performance: An empirical test", *Technovation,* Vol 28, pp 315-326.

Alegre, J., Pla-Barber, J., Chiva, R., Villar, C. (2012)"Organisational learning capability, product innovation performance and export intensity", *Technology Analysis and Strategic Management*, Vol 24, No. 5, pp 511-526.

Argyris, C. and Schön, D. A. (1978) *Organizational Learning.* Reading, MA: Addison- Wesley Publishers.

Argyris, C. and Schön, D. A. (1996) *Organizational learning II: Theory, method, and practice.* Reading, MA: Addison-Wesley.

Baker, W.E. and Sinkula, J.M. (1999) “The synergistic effect of market orientation and learning orientation on organizational performance”, *Journal of Academy Marketing Science,* Vol 27, pp 31-44.

Bolivar-Ramos, M. T., Garcia-Morales, V.J., Garcia-Sanchez, E. (2012) "Technological distinctive competencies and organizational learning: Effects on organizational innovation to improve firm performance" Journal of. Engineering and Technology Management, Vol 29, pp 331–357.

Bustinza, O. F., Molina, L. M. and Arias-Aranda, D. (2012) "Organizational learning and performance: Relationship between the dynamic and the operational capabilities of the firm", *African Journal of Business Management*, Vol 4 No.18, pp 4067-4078.

Calantone, R. J., Cavusgil, S. T. and Zhao, Y. (2002) " Learning orientation, firm innovation capability, and firm performance", *Industrial Marketing Management,* Vol 31, No. 6, pp 515-524.

Camison, C. and Villar- Lopez, A. (2011) "Non-technical innovation: Organizational memory and learning capabilities as antecedent factors with effects on sustained competitive advantage", *Industrial Marketing Management,* Vol 40, pp 1294-1304.

Carayannis, E.G., Popescu, D., Sipp, C., Stewart, M. (2006) "Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): case studies and lessons learned", *Technovation* Vol 26, No. 4, pp 419 -443.

Chiva, R. and Alegre, J. (2009) "Organizational learning capability and job satisfaction: an empirical assessment in the ceramic tile industry", *British Journal of Management,* Vol 20, pp 323-340.

Cohen, W. M., and Levinthal, D. A. (1989) "Innovation and Learning: The Two Faces of R&D", *The Economic Journal,* Vol 99, pp 569-596.

Damanpour, F. (1991) "Organizational innovation: A meta-analysis of effects of determinants and moderators", *Academy of Management Journal,* Vol 34, No.3, pp 555–590.

Ellinger, A.D., Ellinger, A.E., Yang, B., and Howton, S.W., (2002) "The relationship between the learning organization concept and firm's financial performance: an empirical assessment", *Human Resource Development Quarterly*, Vol 13, No. 1, pp 5–21.

Fiol C. M, Lyles M. A. (1985) "Organizational learning", *Academy of Management Review,* Vol 10, No. 4, pp 803– 813.

Garcia-Morales, V. J., Jimenez-Barrionuevo, M. M., Mihi-Ramirez, A. (2011) " The Influence of Strategic Dynamic Capabilities on Organizational Outcomes through the Organizational Learning Process", *Industry and Innovation,* Vol 18, No. 7, pp 685-708.

Goh, S. C. (2003) "Improving organizational learning capability: lessons from two case studies", *The Learning Organization,* Vol 10, No. 4, pp 216-227.

Goh, S. C. and Richards, G. (1997) "Benchmarking the learning capability of organizations", *European Management Journal,* Vol 15, No. 5, pp 575-583.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J. et al (2007) *Dynamic Capabilities: Understanding Strategic Change in Organizations,* Malden, MA: Blackwell Publishing.

Hung, R. Y. Y., Lien, B. Y-H., Yang, B., Wu, C-M. and Kuo, Y-M. (2010) "Impact of TQM and organizational learning on innovation performance in the high-tech industry", *International Business Review*, Vol 20, pp 213-225.

Hurley, R.F., Hult, G.T.M., (1998) "Innovation, market orientation, and organizational learning: an integration and empirical examination", *Journal of Marketing,* Vol 62, No. 3, pp 42–54.

Ingelgard, A., Roth, J., Shani, A.B. and Styhre, A. (2002) "The Learning Organization", Vol 9, No. 2, pp 65-77.

Jerez-Gomez, P., Cespedes-Lorente, J. and Valle-Cabera, R. (2005) "Organizational learning capability: A proposal of measurement", *Journal of Business Research,* Vol. 58, pp715-725.

Jimenez-Jimenez, D. and Sanz-Valle, R. (2011) "Innovation, organizational learning and performance", *Journal of Business Research,* Vol 64, pp 408-417.

Klomp, L. and Van Leeuwen, G. (2001) "Linking Innovation and Firm Performance: A New Approach", *International Journal of the Economics of Business*, Vol 8, No. 3, pp 343-364.

Liao, S., Fei, W. and Liu, C. (2008) "Relationship Between Knowledge Inertia, Organizational Learning and Organization Innovation", *Technovation,* Vol 28, pp 183-195.

Lloréns Montes, F. J., Ruiz Moreno, A. and Garcia Morales, V. (2005) "Influence of support leadership and teamwork cohesion on organizational learning, innovation and performance: an empirical examination", *Technovation,* Vol 25, No. 10, pp 1159-1172.

Lööf, H., and Heshmati, A. (2002) "Knowledge capital and performance heterogeneity: A firm-level innovation study", *International Journal of Production Economics,* Vol. 76, pp 61– 85.

March, J.G. (1991) "Exploration and Exploitation in Organizational Learning", *Organization Science*, Vol 2, No. 1, pp 71-87.

Martinez-Costa, M. and Jimenez-Jimenez, D. (2009) "The Effectiveness of TQM: The key role of Organizational Learning in Small Businesses", *International Small Business Journal,* Vol 27, pp 98-125.

Mat, A. and Razak, R. C. (2011) "The Influence of Organizational Learning Capability on Success of Technological Innovation (Product) Implementation with Moderating Effect of Knowledge Complexity", *International Journal of Business and Social Science,* Vol 2, No. 17, pp 217-225.

Nunnally, J., (1978) *Psychometric Theory.* New York: McGraw-Hill.

Panayides, P.M. (2007) "The impact of organisational learning on relationship orientation, logistics service effectiveness and performance", *Industrial Marketing Management*, Vol 36, No. 1, pp 68–80.

Prieto, I. M. and Revilla, E. (2006) "Learning capability and business performance: a non-financial and financial assessment", *The Learning Organization,* Vol 13, No. 2, pp 166-185.

Real, J. C, Leal, A. and Roldan, 1. L. (2006) "Information Technology as a determinant of Organizational Learning and Technological Distinctive Competencies", *Industrial Marketing Management,* Vol 35, pp 505-521.

Reichstein, T. and Salter, A. (2006) "Investigating the Sources of Process Inoovation Among UK Manufacturing Firms", *Industrial and Corporate Change*, Vol 15, No.4, pp 653-682.

Salunke, S., Weerawardena, J. and McColl-Keneddy, J. R. (2011) "Towards a Model of Dynamic Capabilities in Innovation-Based Competitive Strategy: Insights from Project-Oriented Service Firms", Industrial Marketing Management, Vol 40, pp 1251-1263.

Santos-Vijande, M. L., López-Sánchez, J. A., Trespalacios, J. A. (2012) "How organizational learning affects a firm's flexibility, competitive strategy, and performance" *Journal of Business Research,* Vol 65, pp 1079-1089.

Silvi, R. and Cuganesan, S. (2006) Investigating the management of knowledge for competitive advantage. *Journal of Intellectual Capital,* Vol 7, No. 3, pp 309-323.

Slater, S.F., and Narver, J.C. (1998) "Customer-led and market-led: Let's not confuse the two", *Strategic Management Journal,* Vol 19, No. 10, pp 1001–1006.

Teece, D. and Pisano, G. (1994) "The Dynamic Capabilities of Firms: an Introduction", *Industrial and Corporate Change,* Vol 3, No. 3, pp 537-556.

Teece, D., Pisano, G., and Shuen, A. (1997) "Dynamic Capabilities and Strategic Management", *Strategic Management Journal,* Vol 18, No. 7, pp 509-533.

Tu, Q., Vonderembse, M. A., Ragu-Nathan, T. S. and Sharkey, T. W. (2006) "Absorptive capacity: Enhancing the assimilation of time-based manufacturing practices" *Journal of Operations Management,* Vol 24, No. 5, pp 692-710.

Tuominen, M. and Hyvönen, S. (2004) "Organizational Innovation Capability: A Driver for Competitive Superiority in Marketing Channels", *The International Review of Retail, Distribution and Consumer Research*, Vol 14, pp 277-293.

Ussahawanitchakit, P. (2008). "Impacts of Organizational Learning on Innovation Orientation and Firm Efficiency: An Empirical Assesment of Accounting Firms in Thailand", *International Journal of Business Research,* Vol 8, No 4, pp 1-12.

Winter, S. (2003) "Understanding Dynamic Capabilities", *Strategic Management Journal,* Vol 24, pp 991-995.

The Significance of the LGBT-Community for Homosexual Entrepreneurs – Influencing Factors and Consequences

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Abstract: Up until now, very little research has been done on gay and lesbian entrepreneurs, and no research at all has been conducted to analyze the role of the so-called "LGBT-community" for their business models. For some homosexual entrepreneurs the "LGBT-community" is a key element of different aspects of their businesses, but for others it seems to be totally irrelevant. To contribute to a better understanding of reasons and consequences of different degrees of commercial community relations, this paper analyzes data from a quantitative survey that was conducted among gay and lesbian entrepreneurs in Austria in 2011. As crucial parameters for explaining the entrepreneurs' community relations, two constructs are identified. Firstly, the degree in which discrimination experienced in one or more of the former jobs is the main-reason for the decision to become self-employed; and, secondly, the individual's assumptions about the economic consequences of customers potentially finding out about the individual's sexuality. Statistically both constructs are not correlated, and therefore they are adequate starting points for the proposed explanatory model. Besides personal, biographical and psychological factors, the latter construct is partially influenced by the general perceived climate for gay and lesbian entrepreneurs and it predicts the probability of the individual entrepreneur perceiving the LGBT community as a target market, as well as the degree of a general commercial and personal relatedness to that community. Discrimination experienced in former jobs seems to be an important reason for choosing an area of self-employment, in which it is assumed to be accepted to be gay or lesbian. Having chosen such an area of self-employment, the LGBT community by trend gains an important relevance for all business areas and also for the individual definition of business success. Furthermore, selecting an area of self-employment that is perceived as being an "adequate" area of employment for gays or lesbians, is a predictor of the personal sensation, of solidarity and belonging to that community, and it partially defines the way in which the gay or lesbian entrepreneur economically supports the community. The different forms of community relatedness and the implication of the analyzed causalities for future research and for business practice will be discussed in the paper.

Keywords: entrepreneurship, homosexuality, gay, lesbian, LGBT community

1. Introduction

Issues related to employees' homosexuality have already been addressed in several organizational studies (e.g. Barreto et al 2006, Gregory 2011, Köllen 2010, Köllen 2012, Hofmann/Steinbacher 2011, Roberts 2011, Waldo 1999, Wright 2011). Research results show that dealing openly with homosexuality has positive consequences for the individual capability of value performance, and supports the usage of all personal resources and qualifications. However, so far, homosexuality has not been an issue in entrepreneurship research. To our knowledge, only two papers have been published on homosexual entrepreneurs (Schindehutte et al 2005 and Galloway 2007), which highlight the importance and relevance of sexual orientation for entrepreneurial ventures. According to Schindehutte et al (2005), gay and lesbian entrepreneurs face different obstacles to heterosexual entrepreneurs: as far as customer and supplier opportunities and retention, acquisition and admission of licenses, marketing and advertisement, employee selection and retention, and acquiring bank loans are concerned, LGBT (i.e. lesbian, gay, bisexual and transgender) entrepreneurs face obstacles based on homophobia. These research results also show that harassment and discrimination at the former workplace do not represent push factors for the foundation of an enterprise by a LGBT person. Furthermore the results show that sexual orientation and the LGBT community, as well as the location of the enterprise near to the LGBT community, only have marginal influence on the entrepreneurial success.

In this paper, we intend to explore these issues further and to go deeper into the importance of perceived and anticipated harassment and discrimination. In addition to this, we will deal with community relatedness; for some homosexual entrepreneurs the LGBT community represents a key element of different aspects of their businesses, and for others it seems to be totally irrelevant. The

aim of this paper is to understand in more detail the importance of the LGBT community and its role for entrepreneurial behavior and success, and to study community-based relations of homosexual entrepreneurs and the communities' influences. In the following pages, based on data from a quantitative survey that was conducted among gay and lesbian entrepreneurs in Austria in 2011, firstly, we develop a theoretical framing based on a "community as solidarity" approach, which tries to sketch the community relations of homosexual entrepreneurs. This is an important contribution, given the fact that this topic has received scant attention so far. Secondly, we hypothesize interrelations of entrepreneurs' experienced workplace discrimination in their former jobs, their anticipation of customers' reaction in the case of knowing about the entrepreneur's homosexuality, the entrepreneurs' perception of the commercial significance and personal relatedness as well as commercial relatedness to the LGBT community. Thirdly, we present the applied method, data and findings. Finally, we end our paper by referring to the limitations of the study, future research perspectives and implications for organizational and political practices.

2. The LGBT community

When speaking about the LGBT community, two concepts have to be clarified first: the concept of "LGBT" and the concept of "communities". "LGBT" (or "LGBTI") is the abbreviation for "lesbians, gays, bisexuals and transsexuals" (with the addition of intersexuals, if adding an I). In diversity research and practice LGBT(I) is often the label for the marginalized group in terms of the diversity dimension of sexual orientation. A narrower use of the term "sexual orientation" relates more to sexuality and focuses on gay, lesbian and bisexual individuals. Both approaches to "sexual orientation" usually exclude heterosexuality. Transsexuality and intersexuality are not directly linked to sexuality or sexual preferences (Dietert & Dentice, 2009) and an attempt to verbally include these phenomena into that diversity dimension is to label the dimension as "sexual identity". It is gays and lesbians who are most frequently discussed in papers of this nature, and for whom, to date, most provision has been made in diversity management within companies. This focus on gays and lesbians is one that this paper retains. However, the term LGBT as retained in this paper will not exclude bisexual and transsexual entrepreneurs from our considerations. Nevertheless, the question remains as to what LGBT(I) entrepreneurs have in common, and how this commonality can affect their entrepreneurial behavior. As an approach to this question the concept of "community" comes into play.

As a theoretical framework this paper refers to the approach of "community as solidarity" (Bhattacharyya 2004) that provides its members with social capital resources (Bourdieau 1983). Generally, communities need a fundamental and constitutive shared similarity. This communality can be a common regional or national origin or location, but can also be a shared experience. Based on Tönnies` "Gesellschaft" (Tönnies 1878), communities generate solidarity among their members that is "based upon shared interests or circumstances" (Bhattacharyya 2004: 11). These shared circumstances for LGBT entrepreneurs are shared experiences of societal marginalization, and the consequent solidarity "implies a willingness to engage in collective effort to create and sustain a caring society" (Swinney 2008: 366). Based on that solidarity, communities can be seen as support infrastructures (Emery et al 2004). The fact that communities, at least to a certain degree, have shared values or behavioral patterns provides entrepreneurs, who belong to those communities, with knowledge about the communities' views and preferences (Anderson et al 2007). Besides the status of being a part of that solidarity group, this can be an additional advantage for doing business with community members.

Although the LGBT community can theoretically be framed by the concept of solidarity, not every homosexual entrepreneur has perceived, or anticipates, discrimination based on his or her sexuality in the same way. Thus for gays and lesbians, the shared experience of being marginalized differs in its intensity and mode of prevalence, and it can be assumed that it affects the different layers of the individual's community relatedness and solidarity. Furthermore, the anticipation of the negative economic consequences of being identified as a homosexual entrepreneur diverges, and besides personal, biographic characteristics depends on individual societal climate perceptions. The anticipation of consequences may also affect the individual choice of the subject the business is based on. Formalizing these assumptions, five hypotheses are formulated that are summarized in figure 1.

H1: The experience of prejudices and discrimination in a former job is strongly related to the choice of a sector of self-employment that is assumed to be accepted for homosexual entrepreneurs.

H2: The perception of a more negative climate for gay and lesbian entrepreneurs is negatively related to an individual's assumption about the consequences of customers potentially finding out about the individual's homosexuality.

H3: The anticipation of customers' negative reactions in the case of finding out about the entrepreneur's homosexuality is related to a higher degree of commercial relatedness to the LGBT community, to a higher degree of commercial significance that the community has for the entrepreneur's business success, and to a general higher personal relatedness to the community.

H4: The choice of a sector of self-employment in which it is assumed to be accepted to work as a homosexual entrepreneur is positively related to a stronger personal and commercial relatedness to the LGB community, as well as to the higher significance the community has for the entrepreneur's business success.

H5: The more positive the anticipation of the customers' reactions in the case of finding out about the entrepreneur's homosexuality is, the more likely it is that the entrepreneur locates his or her business in an LGB district of his or her town.

These hypotheses are visualized in figure 1:

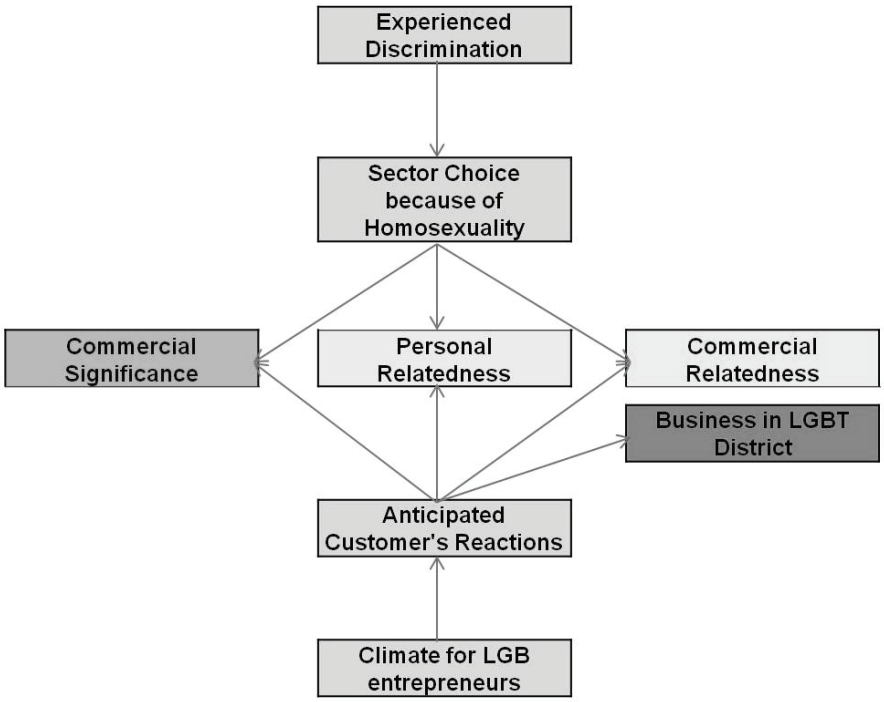


Figure 1: Community interdependency model for homosexual entrepreneurs

3. Methods

We tested our hypotheses in the context of homosexual entrepreneurs in Austria with quantitative data from a survey conducted in 2011. Below, we describe our data and sample and we present our findings.

3.1 Sample and data

The participants of the survey, who were self-employed and identified themselves either as lesbian or gay were recruited in several ways. First of all, an invitation for participation in the survey was distributed via a "mainstream" newsletter of the Austrian chamber of commerce, of which every self-employed entrepreneur is obliged to be a member. Secondly, the self-employed gays and lesbians were invited to participate through advertising on different Austrian lesbian and gay web-pages and newsletters. Thirdly, flyers asking for participation were distributed manually to numerous lesbian and gay bars, cafes and shops. No matter how they were recruited, the participants were informed that they could click on an internet link which directly led them to the online questionnaire of the survey.

The online questionnaire was open from April to August 2011. 90 gay and lesbian entrepreneurs filled out at least the first two pages of the online questionnaire, and 68 of them completed it.

As mentioned above, the participants of the survey (N=90) were self-employed and identified themselves as either gay (64.4%) or lesbian (35.6%). About 41.1% of the participants were running a one-man or one-woman business (sole-proprietors), and 18.9% of the firms were limited companies (GmbH). 60.3% of the entrepreneurs do not have any other incomes beside their business. 66.6% of the respondents are running their business alone, and 13.5% work together with their partner or former partner. Almost half of the participants were between the age of 36 and 45, 16% between 26 and 35, and 28% were between 46 and 55. Only 7% of the entrepreneurs were older than 56 years. As areas of business, consulting (30%) and advertizing/marketing (23%) are predominant. 10% belong to the category of "business services" and the rest of the entrepreneurs are distributed among other sectors. The sample mainly consists of Austrians (88.2%) without any background of migration: 85.3% of the respondents have an Austrian mother, 83.8% have an Austrian father, and 88.2% spent at least the major part of their school-time in Austria. The entrepreneurs have a high level of education, 61.8% have a university degree und another 19.1% have finished high school (Matura).

3.2 Measures

Sexual orientation: Participants were asked to identify their sexual orientation with the question: "How would you describe your sexual orientation?", with the response choices of "lesbian/gay", "more lesbian/more gay", "bisexual", and "heterosexual". For the analysis "more lesbian/more gay" and "lesbian/gay" were taken together.

Experienced discrimination (ED) in one or more former jobs as motivator for self-employment was assessed with the item "How important have been the following reasons for your decision to get self employed?: I got self employed because of prejudices and discriminations in my former job". The four-point response scale ranged from 1=very important to 4= not important at all.

The *anticipated customers' reactions* (ACR) on finding out about the entrepreneur's homosexuality were measured with the question "What influence does it have on your business if your customers would know (or that your customers do know) about your homosexuality? The five-point response-scale ranged from 1 = a very positive influence to 5 = a very negative influence.

The *commercial relatedness* to the LGBT community was measured by six questions on whether special efforts are made to: 1. especially attract LGB customers (CR1); 2. find LGB suppliers (CR2); 3. support LGB events (e.g. as sponsor) (CR3); 4. advertize the business with the fact that the owner is gay or lesbian (CR4); and 5. to find LGB investors (CR5). Participants could agree (1) or disagree (0) to these items.

The *commercial significance* of the LGB community was assessed by three questions that asked about the extent to which the individual business success depends on: 1. the support of the LGB community (CS1); 2. the support of a LGB network (CS2); and 3. the proximity of the business to a lesbian and gay district of the city (CS3). The response scale ranged from 1 = "to a very high extent" to 4 = "not at all".

The *personal relatedness* to the LGB community was assessed by two items. The first item was the response to the question "How important have been the following reasons for your decision to get self employed?: I got self employed to be able to support the LGB community". The four-point response scale ranged from 1=very important to 4= not important at all. The second item was the response to the question "What does business success mean to you personally?: To be able to support the lesbian and gay community", that could be agreed to (1) or not (0).

The importance of an assumed adequateness of the *business sector choice* in terms of fitting to gay or lesbian entrepreneurs was assessed by the question "Did you choose your sector of self-employment because of it is accepted to work as gay/as a lesbian in that business area?". The three-point response scale was 1 = "This absolutely was my consideration", 2 = "Up to a certain degree this was my consideration", and 3 = "This absolutely was not my consideration".

The perceived *climate for gay and lesbian entrepreneurs* was measured by the question "How do you estimate the climate for gay and lesbian entrepreneurs in your city?". Response items ranged from 1 = "very positive" to 8 "very negative".

The location of the business in a *gay or lesbian district* was assessed by the question "Is your business located in a lesbian/gay district" and it could be answered with yes (1) or no (0)

For testing hypothesis 1, 2 and 5 regression analyses were conducted. Hypothesis 3 and 4 were tested by use of correlation analyses.

3.3 Findings

As already mentioned above, regression analyses and correlation analyses were used to test our hypotheses. The following Table 1 presents the descriptive statistics and correlations of our data*:*

Table 1: Correlations

	Mean	Std. Dev.	ED	PR1	SCH	CR1	CR2	CR 3	CR 4	CR 5	DIS	CS1	CS2	CS3	ACR	PR 2
Experienced Discrimination (ED)	3,59	,777														
Self-Employment to support LGB Community (PR1)			,469**													
	3,38	,955	N = 90													
Sector Choice because of Homosexuality (SCH)			,536**	,528**												
	2,59	,669	90	90												
LGB Customers (CR1)			-,154	-,230*	-,238*											
	,36	,482	81	81	81											
LGB Suppliers (CR2)			-,076	-,153	-,131	,486**										
	,15	,357	81	81	81	81										
LGB Events (CR3)			-,258*	-,325**	-,355**	,346**	,442**									
	,33	,474	81	81	81	81	81									
LGB Self-Declaration (CR4)			-,009	-,385**	-,212	,375**	,291**	,404**								
	,16	,369	81	81	81	81	81	81								
LGB Investors (CR5)			-,352**	-,242*	-,449**	,184	-,022	,117	,081							
	,10	,300	81	81	81	81	81	81	81							
Business in LGB District (DIS)			,114	,001	,070	-,179	-,020	-,067	-,180	-,300**						
	1,85	,391	81	81	81	81	81	81	81	81						

Support by LGB-Community (CS1)			,225*	,485**	,452**	-,492**	-,249*	-,213	-,333**	-,259*	,087					
	3,46	,909	81	81	81	81	81	81	81	81	81					
	Mean	Std. Dev.	ED	PR1	SCH	CR1	CR2	CR3	CR4	CR5	DIS	CS1	CS2	CS3	ACR	PR2
Support by LGB-Network (CS2)			,205	,419**	,566**	-,353**	-,125	-,129	-,249*	-,366**	,005	,798**				
	3,35	,883	81	81	81	81	81	81	81	81	81	81				
Proximity LGB District (CS3)			,265*	,335**	,473**	-,368**	,027	-,072	-,146	-,320**	,150	,638**	,644**			
	3,70	,732	81	81	81	81	81	81	81	81	81	81	81			
Anticipated Customer's Reactions (ACR)			-,026	,188	,203	-,120	-,173	-,158	-,326**	,030	,235*	,342**	,222*	,189		
	2,93	,833	81	81	81	81	81	81	81	81	81	81	81	81		
Community Support as Business Success (PR2)			-,236*	-,453**	-,169	,154	,203	,324**	,315**	,138	,021	-,221	-,151	-,113	-,267*	
	,25	,434	73	73	73	73	73	73	73	73	73	73	73	73	73	
Climate for LGBT entrepreneurs (CLI)			-,230	,129	,075	-,031	,028	-,047	-,167	,124	,138	,149	,099	,155	,413**	-,156
	4,07	1,722	72	72	72	72	72	72	72	72	72	72	72	72	72	72
**. Correlation is significant at the 0.01 level (2-tailed).						*. Correlation is significant at the 0.05 level (2-tailed).										

Hypothesis 1 proposed that the experience of prejudices and discrimination in a former job is strongly related to the choice of a sector of self-employment that is assumed to be accepted for a homosexual entrepreneur. We regressed the experienced discrimination (ED) on the sector choice (SCH) and found that the choice is significantly related to the former discrimination experiences of the entrepreneur as employee (see table 2 and 3).

Table 2: Model summary H1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,536[a]	,287	,279	,568
a. Predictors: (Constant), ED				

Table 3: H1-Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,935	,284		3,290	,001
	ED	,461	,077	,536	5,953	,000
a. Dependent Variable: SCH						

Hypothesis 2 predicted that a perception of a more negative climate for gay and lesbian entrepreneurs is negatively related to individual's assumption about economical consequences of customers potentially finding out about the individual's homosexuality. We regressed the climate perception (CLI) on the individual's assumption (ACR) and found that the climate has a significant impact on the assumption (see table 4 and 5). This means that the more positive the perception of the climate for homosexual entrepreneurs, the less the entrepreneur assumes that his/her customers finding out about his/her homosexuality could negatively affect his/her business success.

Table 4: Model summary H2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,413[a]	,170	,158	,713
a. Predictors: (Constant), CLI				

Table 5: H2-Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,201	,217		10,150	,000
	CLI	,186	,049	,413	3,789	,000

Hypothesis 3 predicted that the anticipation of customers' negative reactions in the case of their finding out about the entrepreneur's homosexuality (ACR) is related to a higher degree of commercial relatedness to the LGBT community, to a higher degree of commercial significance that the community has for the entrepreneur's business success, and to a general higher personal relatedness to the community. This hypothesis can be verified by the correlations of each construct or elements of each construct (see table 1). It shows that a more positive ACR-value is significantly related to the possibility of supporting the LGB community as a personal definition of business success (PR2). Furthermore, it is significantly related to a higher likelihood that the support of a LGB-network (CS2) or of the LGB community (CS1) in general is estimated as crucial for the entrepreneur's business success. In terms of commercial relatedness, only one significant interrelation was found: the more positive the event of the customers' knowing or finding out about the entrepreneur's homosexuality is assumed to be, the more the entrepreneur tends to advertize his or her own business with the fact that a lesbian or gay entrepreneur is running it (CR4).

For hypothesis 4, the choice of a sector of self-employment in which it is assumed to be accepted to work as a homosexual entrepreneur (SCH) is positively related to a stronger personal and commercial relatedness to the LGB-community, as well as to the higher significance the community has for the entrepreneur's business success. This Hypothesis, as H3, can also be verified by the correlations of each construct or elements of each construct (see table 1). It shows that the more the business sector was chosen because of considerations about its anticipated acceptance for homosexual entrepreneurs, the more the support of the LGB community was seen as an additional reason for self-employment (PR1). Furthermore, the individual importance of the SCH (this means a low value) is significantly related to a higher likelihood that the support of a LGB-network (CS2), of the LGB-community (CS1) and the proximity to a LGB-district (C3) is estimated as crucial for the entrepreneur's business success. The significant community relatedness of a lower SCH-value is shown in the higher efforts that are undertaken to attract LGB customers (CR1) and LGB investors (CR5), and to support LGB events (CR3).

Hypothesis 5 proposed that the more positive the anticipation of customers' reactions in the event of their finding out about the entrepreneur's homosexuality (ACR), the more likely it is that the entrepreneur will locate his or her business in an LGB district of his or her town (DIS). We regressed the ACR on the DIS and found a light but significant impact (see table 6 and 7). This means that the less the entrepreneur assumes that the finding out of his/her customers about his/her homosexuality negatively could affect his/her business success, the little more likely that he or she will locate his/her business in a LGB district.

Table 6: Model summary H5

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,235[a]	,055	,043	,382
a. Predictors: (Constant), ACR				

Table 7: H5-Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,530	,156		9,808	,000
	Einfluss 2	,110	,051	,235	2,144	,035
a. Dependent Variable: DIS						

Referring to figure 1 the results of this study are consolidated in figure 2.

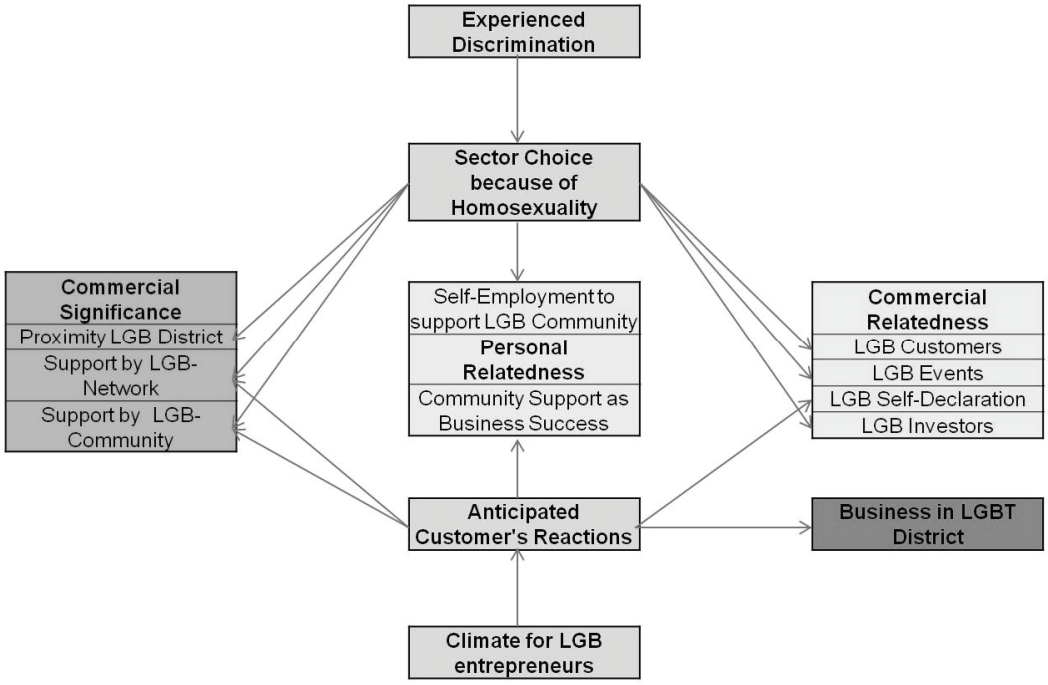


Figure 2: Itemized community interdependency model for homosexual entrepreneurs

4. Discussion

The purpose of this study was to examine the role of the LGB community for business models and the different degrees of commercial community relations of homosexual entrepreneurs. Prior research has mostly examined the importance and relevance of sexual orientation for entrepreneurship in general; we sought to go deeper and to explore the community relations of lesbian and gay entrepreneurs, and the importance of such relations for entrepreneurial success. Working on an explanatory model based on a “community as solidarity” approach, we have hypothesized and found influences of perceived discrimination, business sectors, and “LGB climate” in general on the degree of commercial-community relations, and, thus on the entrepreneurial outcome. In this sense, community relatedness represents a major factor for entrepreneurial success for a significant part of homosexual entrepreneurs. These research results are in contrast to those of prior studies, which emphasize that sexual orientation and the LGB community, as well as the location of the enterprise near to the LGB community, only have a marginal influence on the entrepreneurial success (see Schindehutte et al 2005).

5. Future research

As these research results imply that community relations and the perceived LGBT climate by homosexual entrepreneurs affect the entrepreneurial success, it may be of great interest what outing

strategies homosexual entrepreneurs apply, and in what contexts, in order to avoid harassment and discrimination. Furthermore, influencing factors for their choice of (non)outing and specific boundaries homosexual entrepreneurs are confronted with can be an important issue of future research. How to blur these boundaries in order to create an inclusive entrepreneurial climate so that homosexual entrepreneurs can apply their full capabilities and qualifications without having to fear harassment and discrimination may be a profitable area of future research.

6. Implications for entrepreneurial practice and politics

This study demonstrates that considering former perceived discrimination experiences as well as LGBT climates influences entrepreneurial success. In this sense, the study's findings suggest the need to focus more deeply on discrimination processes based on the fact that homosexual entrepreneurs do not conform to inherent heterosexual norms which constrain their identities and entrepreneurial success. Therefore, special entrepreneurial interest groups or lobbying organizations should focus on the reproduction of heterosexual norms, which discriminate homosexual entrepreneurs and keep them on the margin. In terms of politics, it would be advantageous to use all entrepreneurial capacities for the sake of a country. This means setting up governmental goals and measures, which focus on inclusive processes as regards entrepreneurship.

7. Study limitations

Although important implications for managerial practice and future research could be derived from this article, several limitations have to be considered. The first limitation is due to the fact that the data was collected via a questionnaire as self-reports. Thus, one cannot rule out the possibility of common-method variance between the different constructs that were assumed to be surveyed independently from each other. Reasons for that could be found in the motivation to respond consistently or in a socially desirable way, or in external factors that are not directly related to the survey (Podsakoff and Organ 1986). Another limitation is linked to the representativeness of the samples. It might be that certain groups of homosexual entrepreneurs are excluded from the survey, e.g. less open or older gays and lesbians. By using an online-questionnaire lesbians and gays that are less familiar with the internet are systematically excluded; this might particularly concern older entrepreneurs and partially explains why they are under-represented in the sample. The distribution of the invitation to take part in the survey was mainly done via gay and lesbian communication channels and therefore might not have reached gays and lesbians that tend not to identify themselves with the lesbian and gay "community", or generally absent themselves from it.

References

Anderson, Alistair, Parker, John and Jack, Sarah (2007) "Entrepreneurial Social Capital: Conceptualizing Social Capital in New High-tech Firms" *International Small Business Journal*, Vol 25, No. 3, pp 245-272.

Barreto, Manuela, Ellemers, Naomi and Banal, Serena. (2006) "Working undercover: Performance-related self-confidence among members of contextually devalued groups who try to pass", *European Journal of Social Psychology*, Vol 36, No. 3, pp 337-352.

Bhattacharyya, Jnanabrata (2004) "Theorizing Community Development", *Journal of the Community Development Society*, Vol 34, No. 5, pp 5-34.

Bourdieu, Pierre. (1983) „Ökonomisches Kapital - Kulturelles Kapital - Soziales Kapital", *Soziale Welt, Soziale Ungleichheiten*, Vol 2, pp 183-198.

Emery, Mary, Wall, Milan and Macke, Don (2004). "From theory to action: Energizing entrepreneurship (E2), Strategies to aid Distressed Communities grow their own". *Journal of the Community Development Society*, Vol 35, No. 1, pp 82–97.

Galloway, Laura. (2007) "Entrepreneurship and the gay minority. Why the silence?" *Entrepreneurship and Innovation*, Vol 8, No. 4, pp 271-280.

Gregory, Michele, Rene (2011) ""The faggot clause": the embodiment of homophobia in the corporate locker room", EDI, Vol 30, No. 8, pp 651-667.

Köllen, Thomas (2010) *Bemerkenswerte Vielfalt: Homosexualität und Diversity Management: betriebswirtschaftliche und sozialpsychologische Aspekte der Diversity-Dimension „sexuelle Orientierung*, Hampp Verlag, München and Mering.

Köllen, Thomas (2012) "Just a Private Affair and Irrelevant for Companies? The State of the Art in Human Resource Research Regarding "Sexual Orientation"" *German Journal of Research in Human Resource Management*, Vol 26, No 2, pp 143-166.

Hofmann, Roswitha and Steinbacher, Sabine (2011) *Forschungsbericht: Lesben vernetzt!? Vernetzung und Kooperationsstrukturen von lesbischen Frauen in Erwerbszusammenhängen*, Eigenverlag, Wien.

Schindehutte, Minet, Morris, Michael and Allen, Jeffrey. (2005) "Homosexuality and Entrepreneurship. Implications of Gay Identity for Venture-Creation Experience", *Entrepreneurship and Innovation*, Vol 6, No 1, pp 27-40.

Podsakoff, Philip M. and Organ, Dennis W. (1986) “Self-Reports In Organizational Research – Problems and Prospects”, *Journal of Management, Vol* 12, No. 4, pp 531-544.

Roberts, Simon (2011). Exploring how gay men manage their social identities in the workplace: The internal/external dimensions of identity; EDI, Vol 30, No. 8, pp 668-685.

Swinney, Jane (2008). Sponsorship, Community, and Social Capital Ressources in Indigenous Communities, *Journal Of Developmental Entrepreneurship*, Vol 13, No. 3, pp 363-379.

Tönnies, Ferdinand (1887) *Gemeinschaft und Gesellschaft*, Fues's Verlag, Leipzig.

Waldo, Craig R. (1999) “Working in a majority context: A structural model of heterosexism as minority stress in the workplace”, *Journal Of Counseling Psychology,*Vol 46, No.2, pp 218-232.

Wright, Tessa. (2011) “A “lesbian advantage”?: Analysing the intersections of gender, sexuality and class in male-dominated work”, *EDI*, Vol 30, No.8, pp 686-701.

Crowdinvesting, an Innovative Option for Start-up Financing?

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Abstract: As part of the rapid expansion of the Internet and the increasing social networking associated with it, it is now possible for project initiators to raise capital from a wide group of people, not only for charitable projects but also for new businesses. This can be done quickly and efficiently through online platforms. Crowdinvesting, a new form of crowdsourcing, is a promising and absolutely innovative method of financing a start-up company through a group of investors, each carrying in only a small proportion of the total funding. The paper deals with fundamental issues of crowdinvesting as an innovative and potential alternative to venture capital. Based on an overview of German crowdinvesting platforms, which act as intermediaries between investors and start-up companies, the crowdinvesting process is analyzed. In addition, the current situation of the German crowdinvesting market is evaluated and examples of successful start-up funding via crowdinvesting platforms are given. This paper will also provide an analysis of potential conflict situations between start-up companies, crowdinvestors and employees of crowdinvesting platforms from a principal-agent perspective. The model assumes a triangular relationship between the parties, which however can always be broken down into a one-to-one relationship. The theoretically developed findings could lead platform operators to implement missing or desirable features in the near future. Crowdinvestors and entrepreneurs could also take a look at theaddressed issues in order to strengthen their own decisions for or against crowdinvesting. Through the empirical investigation of some ideas it could be found, that some potential conflicts are already being solved or mitigated through contractual arrangements orexisting functionalities of online platforms. However, the actors themselves are responsible for ending other conflict situations. Such forms of mitigating behaviour are addressed in thispaper. Furthermore, the paper lists up some arguments why crowdinvesting platforms may increase the efficiency of transaction between entrepreneurs and investors, before, finally, an outlook into the potential future of crowdinvesting is given. This work serves as a preliminary analysis for a more extensive (quantitative and qualitative) empirical study,in order to provide information about the decision-making behaviour of investors and entrepreneurs in the context of crowdinvesting.

Keywords: crowdinvesting, crowdfunding, principal-agent theory, early-stage financing, start-up financing

1. Crowdinvesting as a solution for Seed financing: An introduction to the German crowdinvesting market

Crowdinvesting could develop into a fundamentally new option for start-up financing, as it offers enormous potential for growth and success, both for entrepreneurs and for investors. In Germany and some other countries, there has been a funding gap for some time in the Seed and Early-stage phases of various businesses (Cosh, 2005) which should not be underestimated with regard to macro economic development. At times when‘family, friends and fools’ are unable to provide sufficient support for an entrepreneur when his or her financial resources are limited, gaining any access to additional capital can be very difficult. In such situations, crowdinvesting could potentially serve as a funding bridge (see Figure1).

For start-up companies, the numbers of institutional investors willing to exchange increased risk for potential high yields are limited. Venture capitalists and business angels need to apply a tough selection process to start-up companies, so that their high expectations are met. Only a few concepts, which number in the low single digit percentage range, can meet the requirements [In the literature, the values fluctuate between 1-5%. See among others, Heister (2010), p. 137f].Many entrepreneurial ventures fail to get funds, even if they have a feasible business plan, because of such high requirements. Hence, crowdinvesting could serve as an alternative way of raising capital for such ventures.

Crowdinvesting, a form of crowdfunding, is based on the principle of crowdsourcing (Howe, 2006). A heterogeneous group, the crowd, is united by a project-specific joint interest, which thus creates a homogeneous approach. The financing and implementation of a project is the common denominator for the crowd in terms of both crowdfunding and crowdinvesting. The two forms can be distinguishedby the way they provide incentives. Crowdfunding projects tend to offer intangible rewards (e.g. an entry on the website) for the financiers, whereas crowdinvesting projects offer shares of the start-up company in exchange for the capital provided.

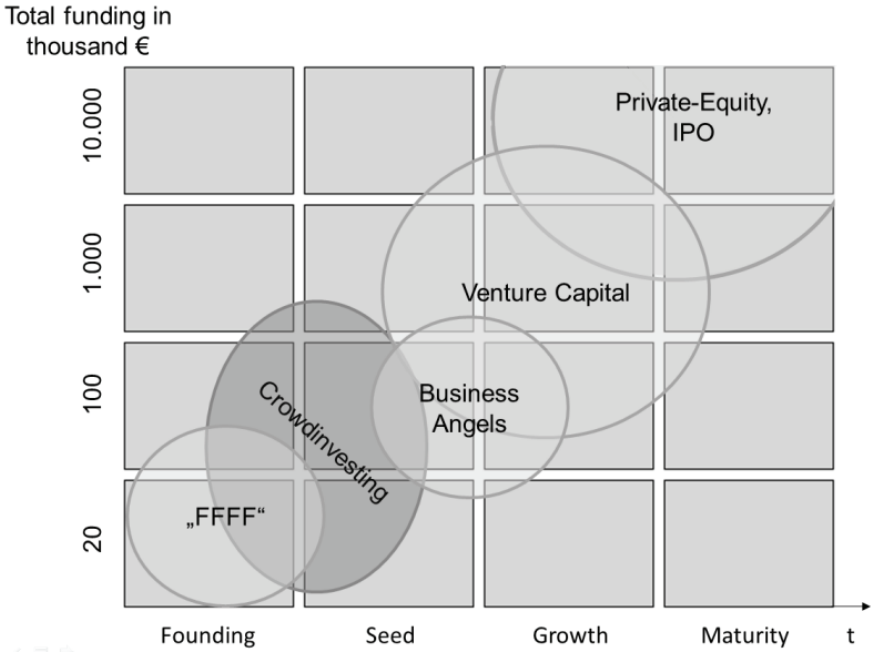


Figure 1: Classification of crowdinvesting and other forms of funding in the corporate life cycle [Own illustration based on Kaltenbeck (2011) p. 10]

The spread of the Internet and its new technological features have made crowdinvesting in today´s form possible (Lambert, 2010). By combining Web 2.0 technologies and the crowdinvesting approach, an innovative market for start-up financing could be created (A detailed description of the crowdinvesting process from both, the investor´s and start-up´s perspective could be found in the PFH Research Paper 2012/06). The new formula for success is: "Instead of a few investors get many, instead of some high funding amounts from a few get many small." In sum, the capital required is achieved and the funding gap is closed.In the case of entrepreneurial projects that cannot meet the typical high standards of institutional investors or in which autonomy and time factors play an important role, crowdinvesting can be of great value.Whether the funding problem can besolved by crowdinvesting only time will tell. However, the first signs of success can be demonstrated empirically.

2. The development of crowdinvesting in Germany to date

As shown in Figure 3, various crowdinvesting platforms (e.g. Seedmatch, Innovestment and Mashup Finance) have been established in Germany or are currently in their prelaunch phase (Devexo, Gründerplus+).The platforms mediate between capital seeking entrepreneurs (whose business concepts have previously been thoroughly examined by the platform team) and a ‘crowd’ of private investors together. In the case of ‘Innovestment', both parties agree to participate in at ypical silent partnerships, without any decision making rights for the crowdinvestors. The equity price is determined transparently and efficiently through an auction mechanism.The minimum investment for this platform is 1000 euros, while other platforms start from as little as 50 euros (Gründerplus+), 100 euros (Mashup Finance) or 250 euros (Seedmatch and Devexo).One of the major advantages of Internet-based platforms is obvious: for the widespread potential investor base, only one video ‘pitch’ takes place, so that, in contrast to having several separate meetings with institutional investors, a tremendous gain in efficiency is achieved. The business plan can also be accessed and examined online by any crowdinvestor, after receiving permission from the start-up company. The validity of the concept of this novel approach has been empirically demonstrated many times already. With a current limit of 100,000 euros maximum funding, the call for bids is between four to eight weeks. Sometimes this process may be faster. The start-up company EasyCard, which offers a simplified solution for insurance, reached the maximum funding amount at the platform Seedmatch in March 2012 in less than 90 minutes and is now crowdfunded by 143 investors with an average investment of 700 euros.

To date, fifteen start-up companies received total funding of approximately 1.5 million euros in Germany since crowdinvesting started in October 2011. Moreover, it seems that both the platforms and the crowdinvestors have no preference for internet or manufacturing companies. Although most business concepts aimed at the B2C business,B2B concepts have already been funded, too. Therefore, a large variety of business concepts are supported. However, before, during and after the crowdinvest-

ing process there are also some obstacles to overcome. For the analysis of the interplay of the three parties, the principal-agent theory is used. The theory was chosen because it assumes, in contrast to other theories, information differences of two parties and thus models the existing information gap between the parties involved in the crowdinvesting process and offers solutions to potential problems. Furthermore, the principal-agent theory describes why people act as they act and which constructs can possibly help to reconcile the principal´s and the agent´s interests.

3. The triangular relationship between entrepreneur, investor and crowdinvesting platform - a principal agent approach

Three parties are involved in the crowdinvesting process. In addition to funding seeking companies and crowdinvestors, crowdinvesting platforms (or their legal representatives)are the third party. This constellation may lead to potential principal-agent problems (Pratt, 1985).The principal tries to suppress the agent'sopportunistic behaviour, which is made possible by information asymmetry. It is necessary to clarify who is the principal and who is the agent in a particular situation between two of the three parties. Some reflections on the relationship structure between the three parties in the crowdinvesting process are illustrated in Figure 2 below:

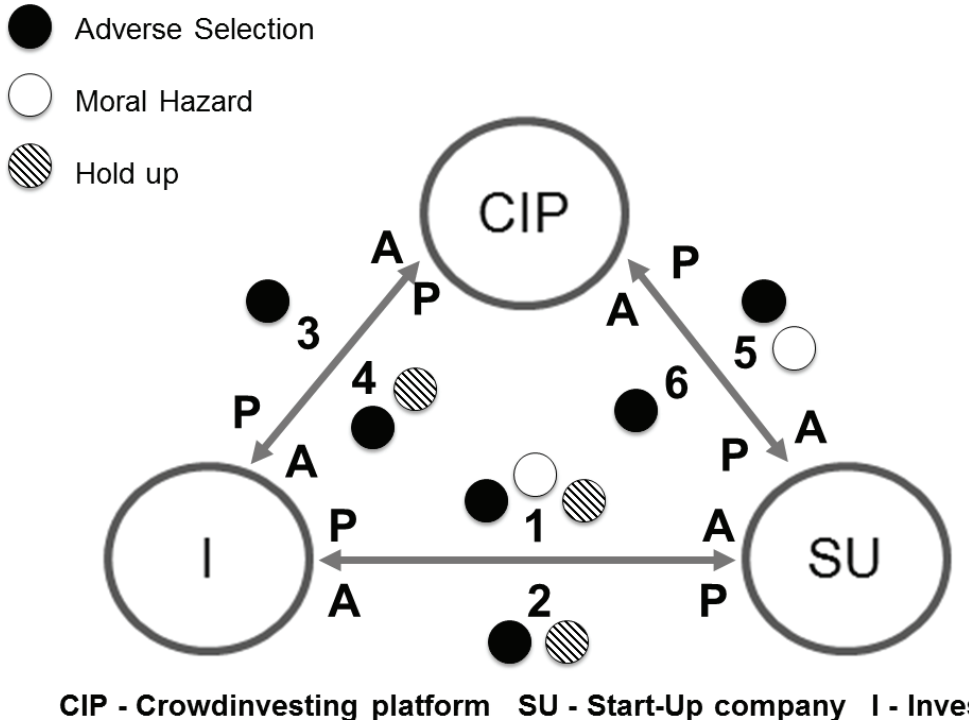


Figure 2: Agency constellation between investor, start-up company and crowdinvesting platform

Six principal-agent situations are described. Potential problems, such as adverse selection, moral hazard or hold up (Holmström, 1998) between principal (P) and agent (A) are represented by the coloured balls. A black ball presents an adverse selection problem with hidden characteristics. A white ball represents a moral hazard problem. The textual explanation explicitly distinguishes between hidden action and hidden information. A white ball with black stripes represents a hold-up problem, which arises from the hidden intentions of one party (agent).

Relationship one describes an agency relationship between the investor as principal and the start-up company as agent. Here, all three problem categories can be identified. The entrepreneurs have, before (and usually also after) entering into the partnership, more knowledge about the company than the investors. Therefore, an adverse selection problem can be diagnosed. In addition, the investor cannot be sure as to whether the business plan includes all the relevant facts or how carefully it was developed. A moral hazard may arise, because the investor is not able to monitor the entrepreneur continuously and thus progress could also be a result of "lucky" environmental influences and not the agent´s actions (hidden information). Vice versa, poor results could also have their roots in negative market developments. On-the-job consumption in form of hidden actions by the entrepreneur cannot be ruled out completely. A hold-up problem existsfor the investors, because they give their money to start-ups and get, due to a lack of authority, in dependance. They have to rely on a proper execution

of the work to their interests. Although, there is no way to renegotiate the business terms, since these are governed by standard contracts, but the entrepreneurs could see the crowdinvestors as financiers of their salary for some years (hidden intention) and secure themselves an advantage.

To solve the problems described, the parties can actively contribute (Akerlof, 1970). The entrepreneurs can reduce the investors´ lack of information by handing in detailed and verifiable business plans, and having more open communication and regular contemporary reports (signalling). The investors have a duty to actively screen the business plans of potential investments (screening) and may subsequently exercise their control rights as shareholders. In particular, the personal interaction between investor and financier is of great importance as it helps to build trust and thus affects the long term development of the company in a positive way (Dyer, 2000).In relationship two the opposite situation is represented, with the investor as agent and the company as principal. Prior to the contract, the start-up company has little information about the investor and cannot be completely sure that the investor has enough money to actually invest the required amount. However, it should be mentioned that the sums of the individual investors are relatively low and that a single failure should therefore be manageable. An investor could possibly use the platform to gather information about competitors or new business ideas, which could be very enlightening for a competitor, due to his entitlement to quarterly and annual reports. The start-up company is in a bind here. It would need to unlock data for interested investors, since it is dependent on their capital, thought he reasons for the interest would not be traceable. The solvency of the crowdinvestors could be assured by immediately transfering the appropriate amount into an escrow account after a bid. If the bidder is successful, the company would be paid from this account. Otherwise, the security deposit would be refunded. The espionage of a start-up through a crowdinvestor (hidden intention) may be less well protectable. Personal data can be obtained through the registration process, however, while an obligation to confidentiality exists, these hurdles can be bypassed relatively easy by logging in a friend who then passes on information (straw-man problem).This problem could not be solved by an authentication with an ID card or passport. Contractual confidentiality obligation and the tracking of non-compliance are possible measures to prevent wrongdoing, even though they are difficult to apply in practice. In addition to rapid implementation, technological and procedural knowledge are therefore the most effective protection for businesses against imitation.

Relationship three describes a relationship between an investor (principal) and a crowdinvesting platform (agent). The problem at hand is that an investor can only invest in companies that have been pre-selected by the staff of the platform. Therefore, a problem of adverse selection arises in that an investor will have to choose the best platform, i.e. with the most experienced and qualified staff, which pre-selects the most promising start-up companies. While investors can and should check start-ups and their management capabilities themselves, the quality of the own judgement depends on their professional skills. Inexperienced investors must rely largely on the pre-selection of crowdinvesting platforms or seek outside help. The uncertainty about the skills of crowdinvesting platform employees can be countered if the qualifications of the platform staff are communicated openly (signalling). Furthermore, by specializing in a particular industry, investors can be sure about the areas their future investments are active in and the platform staff will gain expertise in a particular industry.

Relationship four indicates similar issues to those in relationship two. For the crowdinvesting platform, the financial ability of the investor is not obvious in advance, because neither bank statements nor credit information need to be attached to the application. Solutions that work for relationship two could be applied analogously. The already mentioned straw-man problem (hidden action) might pose a risk to the crowdinvesting platform´s reputation. Without adequate protection for intellectual property, entrepreneurs would surely not be willing to disclose their business plans. They possibly do so ifthe prototype has nearly been perfected and inflowing capital would be used for marketing and growth rather than for product development. The principal-agent relationship between the crowdinvesting platform and start-up company is presented in relationship five. The crowdinvesting platform depends on applications, so that their business model can work. At the same time, an adverse selection problem arises, because the completeness and quality of the information provided by the start-up company is not guaranteed. The representatives of the crowdinvesting platform must take into account that start-ups might have embellished their forecasts. Theoretically, at worst, and especially in high-tech industries for the layman difficult to verify, a technology or business model could be a fake. On the other hand, a potential moral hazard problem of hidden information could exist between the crowdinvesting platform (principal) and the start-up (agent).Although it is in the interest of the start-up company to address as many investors as possible, for the crowdinvesting platform it is not obvious if entrepre-

neurs actively court investors, in addition to holding the obligatory conferences. Therefore, it is uncertain whether a generally positive environment would lead to the desired result or whether it is only the dedication of the entrepreneurs which can bring this about. Furthermore, the representatives of the crowdinvesting platform are in debt for themselves, but above all for the crowdinvestors,to eliminate the risk of sitting up fraudsters. Effective research and the examination of documents (screening), as far as possible in advance, are two methods of eliminating such risks. As already mentioned, this could otherwise negatively affect the reputation of the platform and investors' confidence in the abilities of the platforms´ representatives. The entrepreneurs may proof, in addition to technical skills (certificates, etc.), through award-winning business plans or patented technologies, the soundness of their project (signalling). Articles or interviews in newspapers and/or the Internet could serve as an indication of entrepreneurial commitment.

Relationship six describes an agency relationship with hidden characteristics between the start-up (principal) and the crowdinvesting platform (agent). Prior to the contract, it will not be evident whether the crowdinvesting platform can mobilize sufficient investors who can raise the necessary capital for the company or not. While no financial risk arises from a non-successful auction (no funding = no fee), the entrepreneurs are, however, deeply involved with the presentation of the company to investors and could lose mentionable time. Depending on the contract, the companies could also be limited to only one crowdinvesting platform, denying other channels of capital acquisition. The crowdinvesting platform could publish the number of registered investors and the capital available to entrepreneurs and thus show if a project is potentially fundable or not. Finally, a further problem should be addressed, which cannot be assigned directly to a particular relationship, but should be mentioned as a suggestion for reducing the uncertainties of investors:

Inexperienced investors might be deterred by high-tech business ideas, because their knowledge may not be sufficient to assess an adequate share price or they may do not want to rely solely on a by anonymous judgment formed auction price (in the case of innovestment). A disclosure of all investors with their individual technical and professional background, coupled with the possibility of sharing opinions publicly could help the investors to compare their opinion abouta start-up with the opinions of others. The possibility of discussing business ideas with start-ups is yet very limited. However, it is possible that comments are made on some German crowdinvesting platforms. Comments serve as an important form of personal feedback and comments from experts could help inexperienced investors form a complete picture of a start-up company.

4. Arguments in favor of crowdinvesting platforms from the perspective of transaction cost theory

Crowdinvesting is in both Germany and its country of origin, the United States, still in its infancy. Companies that have not been founded in the past due to lack of funding can now put their hopesin a new funding alternative. It can be seenthat crowdinvesting platforms already have a base of investors and alongside the infrastructure and social network integration, organizational groundwork (including contract templates) has already been accomplished. The social network integration, as well as the commitment of crowdinvestors (‘provestors’) to promote ‘their’ company, results in rapid publicity for the respective companies. Theoretically, investors could be globally active because all decision-relevant information is made available online.In summary it can be said that transactions become more efficient through the intermediation of the Crowdinvesting platform between start-up companies and investors. Both ex-ante transaction costs, and ex post transaction costs are reduced [For the concept of transaction costs see inter alia Williamson (1985), North (1990)]. Because several companies pitch on the platforms, the investment opportunities for investors are bundled. On the other hand, companies can present themselves on the platform to a variety of investors. Furthermore, investors can view all relevant data online, which in turn lowers their information costs. In addition, the contract costs (ex-ante transaction costs) are reduced because standard contracts are used and the company valuation is known in advance or can be formed automatically through an auction (Innovestment).Subsequent control is shifted from a continuous physical inspection to a virtual control of the quarterly and annual financial statements. But for this point, an increase in efficiency and effectiveness cannot simply be assumed. In addition, for crowdinvestors arises the opportunity to discover-companies, which they would not have been attentive to without crowdinvesting. By combining all the mentioned points, the following hypothesis can be formulated: Crowdinvesting platforms will provide an alternative way for a start-up to acquire large sums of equity (low to medium six-figure sums) in the future, if neither a business angel nor a venture capitalist wants to support the company. Thus, the funding gap between Seed / Early-stage financing and Later-Stage Financing could be closed by a

group of micro-investors. 'By the way', a new asset class with above-average return potential will be opened up for investors.

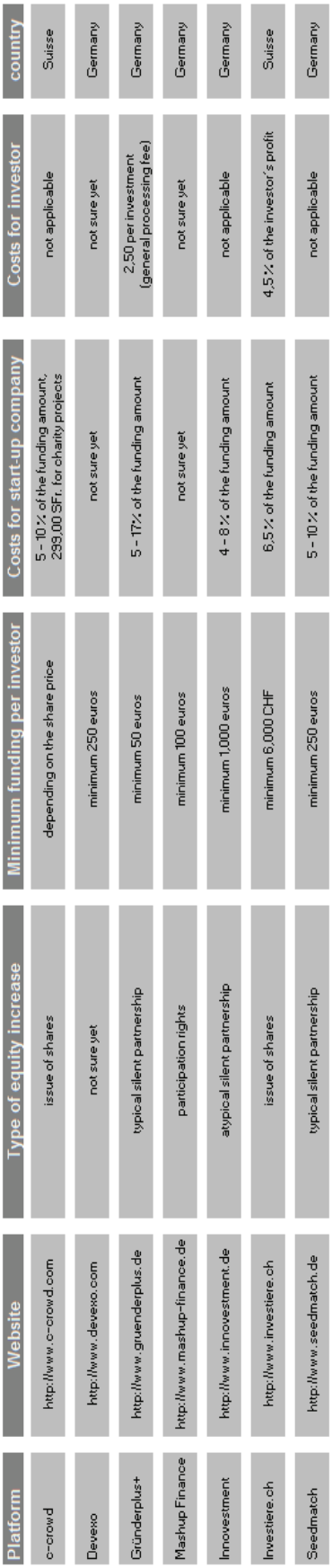
5. A look into the future of crowdinvesting

Through German crowdinvesting platforms, approximately 1.5 million euros have been collected for start-up companies so far[As of 3rd May 2012: Innovestment (476.259€), Seedmatch (949.250€), Gründerplus+ (51.470€), Mashup Finance (24.000€)]. A conservative extrapolation of the financing volume obtained in the fourth quarter of 2011 (519.250 euros),lets two and a half million euros for the full year 2012 seem more than plausible. Additional media attention, the market entry of additional platforms and start-up companies may lead to a higher financing volume (4-5 million euros). Though, even if the forecast should prove far too low, crowdinvesting as a funding instrument will still only fill a niche for years [Figure 4 gives an overview of the total venture capital invested in Germany 2011. The total crowdinvested capital in the fourth quarter 2011 (519.250 euros) equals 1,05 % of the total Early-stage (Seed and Start-up phase) venture capital invested in the fourth quarter 2011 (49.6 million euros)]. That potential is seen in this type of start-up financing is indicated by the market entries of new crowdinvesting platforms (including Devexo, Gründerplus+) in Germany. The increase in crowdinvesting platforms could, however, also lead to the dispersal of the market shares and influence the market overview negatively. Investors may also miss interesting investment opportunities, because they are only active on one or two platforms. As a result, fewer projects may eventually be successfully funded, and the media presence may abate. Otherwise, an increase in crowdinvesting platforms may lead to increased competition, as well as more specialization and focus among the platforms. First positive success stories, growing media attention and a greater number of investors lead to a larger equity supply. This, in turn, could produce favorable conditions for start-up companies and an increase in the number of companies which seek to be financed through the crowd.

In the future, crowdinvesting platforms may also function as intermediaries between sellers and buyers of company shares of companies that previously have been crowdfunded. On the one hand, this would affect the marketability of shares positively and on the other hand, it could open up an additional income stream for the crowdinvesting platforms. As already mentioned, crowdinvesting is a novelty in company funding and therefore many questions still need to be answered.

This work is intended to supply some initial insight into the topic of crowdinvesting and to point out the advantages and disadvantages of crowdinvesting platforms, as well as to identify some of the potential agency conflicts between the parties involved in the crowdinvesting process. However, in the process of writing this paper new questions arose. Why and by what criteria do crowdinvestors select companies? Do they use valuation models, or make gut calls? If there is any, what is the impact of crowdinvestors on the performance of start-up companies? These questions clearly indicate that the topic of crowdinvesting provides much room for further research.

Appendix 1



Platform	Website	Type of equity increase	Minimum funding per investor	Costs for start-up company	Costs for investor	country
c-crowd	http://www.c-crowd.com	issue of shares	depending on the share price	5 - 10 % of the funding amount, 299,00 SFr. for charity projects	not applicable	Suisse
Devewo	http://www.devewo.com	not sure yet	minimum 250 euros	not sure yet	not sure yet	Germany
Gründerplus+	http://www.gruenderplus.de	typical silent partnership	minimum 50 euros	5 - 17% of the funding amount	2,50 per investment (general processing fee)	Germany
Mashup Finance	http://www.mashup-finance.de	participation rights	minimum 100 euros	not sure yet	not sure yet	Germany
Innovestment	http://www.innovestment.de	atypical silent partnership	minimum 1,000 euros	4 - 8 % of the funding amount	not applicable	Germany
Investiere.ch	http://www.investiere.ch	issue of shares	minimum 6,000 CHF	6,5 % of the funding amount	4,5 % of the investor´s profit	Suisse
Seedmatch	http://www.seedmatch.de	typical silent partnership	minimum 250 euros	5 - 10 % of the funding amount	not applicable	Germany

Figure 3: Selected crowdinvesting platforms(as of April 2012

	1. Quartal			2. Quartal			3. Quartal			4. Quartal		
	Mio. Euro	%	Unternehmen	Mio. Euro	%	Unternehmen	Mio. Euro	%	Unternehmen	Mio. Euro	%	Unternehmen
Nach Finanzierungsanlass												
Seed	10,13	0,8	63	6,94	0,4	55	9,43	0,6	58	13,81	1,3	71
Start-up	84,83	6,4	140	129,57	6,8	148	93,03	5,7	139	82,88	7,8	125
Later stage-Venture Capital	75,28	5,7	94	80,53	4,2	83	64,28	4,0	110	36,72	3,5	116
Venture Capital insgesamt	**170,24**	**12,9**	**296**	**217,03**	**11,3**	**286**	**166,74**	**10,3**	**306**	**133,41**	**12,6**	**312**
Growth	114,26	8,6	53	190,44	9,9	50	29,25	1,8	20	171,67	16,2	49
Turnaround	9,30	0,7	5	3,79	0,2	4	35,26	2,2	7	12,19	1,2	5
Replacement Capital	13,49	1,0	5	0,03	0,0	1	8,00	0,5	2	42,50	4,0	2
Buy-Outs	1.014,38	76,8	29	1.505,70	78,5	33	1.380,92	85,2	31	698,49	66,0	27
Gesamt	**1.321,67**	**100,0**	**388**	**1.916,99**	**100,0**	**373**	**1.620,17**	**100,0**	**366**	**1.058,26**	**100,0**	**395**
Nach Branchen												
Landwirtschaft	0,00	0,0	0	0,00	0,0	0	0,00	0,0	0	0,00	0,0	0
Unternehmens-/Industrieerzeugnisse	120,98	9,2	47	628,51	32,8	45	543,15	33,5	44	329,24	31,1	69
Unternehmens-/Industriedienstleistungen	40,97	3,1	48	61,08	3,2	48	82,55	5,1	51	50,60	4,8	68
Chemie/Werkstoffe	36,37	2,8	10	228,06	11,9	11	232,63	14,4	12	3,89	0,4	12
Kommunikationstechnologie	38,49	2,9	48	309,40	16,1	61	180,10	11,1	46	104,24	9,8	51
Computer/Unterhaltungselektronik	90,27	6,8	58	66,48	3,5	55	50,91	3,1	60	134,83	12,7	61
Bauwesen	26,82	2,0	12	219,55	11,5	6	1,03	0,1	6	4,61	0,4	5
Konsumgüter/Handel	727,46	55,0	21	104,07	5,4	27	295,91	18,3	34	176,02	16,6	34
Verbraucherdienstleistungen	42,50	3,2	15	11,30	0,6	16	2,83	0,2	12	29,93	2,8	14
Energie/Umwelt	92,34	7,0	31	31,00	1,6	18	48,76	3,0	16	22,78	2,2	14
Finanzdienstleistungen	25,86	2,0	3	0,02	0,0	2	39,48	2,4	3	16,25	1,5	5
Life Sciences	69,51	5,3	76	245,69	12,8	79	75,56	4,7	72	54,29	5,1	56
Immobilien	0,20	0,0	1	5,00	0,3	1	0,00	0,0	0	0,00	0,0	0
Transportwesen	7,60	0,6	6	6,67	0,3	3	0,8	4,1	9	131,39	12,4	4
Unbekannt	2,31	0,2	12	0,15	0,0	1	0,3	0,0	1	0,19	0,0	2
Gesamt	**1.321,67**	**100,0**	**388**	**1.916,99**	**100,0**	**373**	**1.620,17**	**100,0**	**366**	**1.058,26**	**100,0**	**395**
davon Hightech	83,93	6,4	99	365,61	19,1	104	282,39	17,4	109	126,89	12,0	91
davon Cleantech	80,14	6,1	20	225,47	11,8	14	15,57	1,0	13	26,17	2,5	12

Figure 4: Venture capital in Germany 1. - 4. Quarter 2011 [see BVK (2012), p.21

References

Akerlof, G. A. (1970) The market for 'lemons': Quality uncertainty and the market mechanism, The Quarterly Journal of Economics, vol. 84, issue 3, p. 488-500.

BVK (2012) Bundesverband der Kapitalbeteiligungsgesellschaften. downloaded 15th of April 2012 from http://www.bvkap.de/media/file/417.20120227_BVK-Statistik_Das_Jahr_in_Zahlen2011_PKfinal.pdf.

Cosh, A., Cumming, D. and Hughes, A.(2005) Outside entrepreneurial capital, Economic Journal, Royal Economic Society, Vol 119(540), p.1494-1533.

Dyer J. H. and Chu, W. (2003) The role of trustworthiness in reducing transaction costs and improving performance: Empirical evidence from the United States, Japan, and Korea, Organization Science, Vol 14(1), p. 57-69.

Heister, P. (2010) Finanzierung von Social Entrepreneurship durch Venture Philanthropy und Social Venture Capital, München.

Holmström, B. and Roberts, J. (1998)The boundaries of the firm revisited, Journal of Economic Perspectives, Vol 12, No. 4, p. 73-94.

Howe, J. (2006) The rise of crowdsourcing, Wired,vol. 14, issue 6.

Jensen, M. C. and Meckling, W. H. (1976) Theory of the firm: Managerial behaviour, agency cost and ownership structure,S. 305-360.

Kaltenbeck, J. (2011)Crowdfunding und Social Payments im Anwendungskontext von Open Educational Resources, Graz.

Lambert, T. and Schwienbacher, A. (2010) An Empirical Analysis of Crowdfunding, downloaded 10th of April 2012 from http://www.crosnerlegal.com/images/47770544_An_Empirical_Analysis_of_Crowdfunding.pdf, p. 1-23.

North, D. (1990) A transaction cost theory of politics, 2 Journal of Theoretical Politics, p. 355-367.

Pratt, J. W. and Zeckhäuser, R. J. (1985)Principals and Agents: The Structure of Business,Boston, p. 2ff.

Kortleben, H. and Vollmar, B. H.(2012)Crowdinvesting als alternative Unternehmensfinanzierung für Gründungsunternehmen?, PFH Research Paper 2012/06 http://www.pfh.de/hochschule/forschung/forschungspapiere.html

Williamson, O. E. (1981) The economics of organization: The transaction cost approach, The American Journal of Sociology, Vol 87(3), p. 548-577.

Entrepreneurial Learning for Quality and Innovation – a Study in the Wellness Industry

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Abstract: The purpose of the study presented in this paper is to explore the relationship between entrepreneurial learning, innovation and quality management in the wellness industry. The theoretical framework is based on theories from quality management, organisational learning and entrepreneurship. An empirical study involving seven spa-hotels has been carried out. In-depth interviews were conducted with managers of the companies. The results indicate that innovation in the sector is closely connected to branding and that quality management largely consists of quality control of existing services. Thus, the connection between quality management and innovation is weak. Nevertheless, a network exists that might have a possibility of evolving into a learning network.

Keywords: entrepreneurship, learning, innovation, quality management, wellness

1. Introduction and purpose

Quality management has been developed as an academic field of study during the course of the last century. Originally mainly focused on manufacturing, the field has come to include services and service quality has attracted vast amounts of research in recent decades. While it is clear that in the competitive environment of ever more globalising industries both quality and innovation are critical, these two phenomena are not always seen as promoting each other. Traditional quality management might contain contradictory aspects in this regard. On the one hand, there is a strong emphasis on continuous improvement. On the other hand, the requirements for extensive documentation that certain quality management approaches (e.g. standards like ISO 9000) requires, have been accused of hindering change(Curkovic and Handfield, 1996). As a result, quality management is sometimes seen as more compatible with incremental development than with radical change. Nevertheless, in dynamic industries ground-breaking innovation may be needed in order to excel.

One way of reconciling innovation and quality management may be through organisational learning. Innovation and quality management are both related to learning in organisations. The theories of organisational learning emphasise the value of system thinking which is related to effective quality management(Hellsten and Klefsjö, 2000; Conti, 2010). In addition, features like team learning, challenging mental models and personal mastery are connected to the profound creativity which can lead to far-reaching innovation(Senge, 2006). A similar relationship can be found between entrepreneurship and quality management. Systematised quality management is rare in entrepreneurial organisations, probably due to its criticised compatibility with constant change(Lagrosen and Lagrosen, 2003). Again learning may be necessary. Entrepreneurship is closely related to innovation since one success strategy of entrepreneurship is to alter the balance of the market by inventing new products, processes, channels etc. This leads to what is called creative destruction in that the old order is destroyed in the process that something new and more effective is created(Schumpeter, 1934). Thus, entrepreneurial learning may be useful. However, the learning must be profound, leading to altered patterns of thinking rather than just the acquisition of new factual knowledge. Consequently it should be characterised by profound organisational learning adapted to entrepreneurial needs.

In order to explore these connections, we are carrying out an empirical study. We have chosen the wellness industry as our empirical field. This is an industry which is developing rapidly in many parts of the world. At the same time it is highly dependent on service innovation as new treatments and other offers are needed to attract customers. Systematised quality management is rarely used but service quality is more and more in the focus. In addition most companies in the sector are highly entrepreneurial and driven by committed individuals. Thus, it should be an interesting setting for studying connections between learning, innovation and quality.

In consequence, the purpose of the study is to explore the relationship between entrepreneurial learning, innovation and quality management in the wellness industry.

2. Quality management in services

Systematised quality management methods were first employed around the turn of the last century (late 19th and early 20th century). The early quality management approaches focused mainly on inspection (Lagrosen and Lagrosen, 2009). Next stage came to be the development of statistical tools for quality control. After the Second World War the development was led by Japan with the aid of the American scholars W. Edvards Deming and Joseph J. Juran. This resulted in quality management being developed into an advanced framework for continuous improvement, employee motivation and leadership (Ishikawa, 1985; Deming, 1986; Juran, 1989). Today, quality management can be viewed as an integrated system consisting of managerial values, techniques and tools (Hellsten and Klefsjö, 2000). Research has found that the methods included, and in particular the values, are effective for achieving well-functioning quality management in companies from all sectors (Lagrosen and Lagrosen, 2005).

Traditional quality management was developed in the industrial manufacturing sector. In a separate development, marketing emerged as an academic discipline. It started as an offspring of economics but advanced into a number of different schools during the first half of the 19th century. From the early 1960s, the discipline came to be dominated by the managerial school containing practical and concrete methods for marketing management (Lagrosen and Svensson, 2006). Starting from the late 1970s this dominance came to be challenged by two different strands: industrial marketing and services marketing. The latter came from the realisation that marketing services was different from traditional marketing which made the managerial school of marketing lack relevance. The field expanded rapidly during the 1980s and 1990s aided by the fact that global deregulation led to substantial changes taking place in many service sectors. Some general models for service quality that were presented quite early had a large impact and they are still referred to (see e.g. Parasuraman et al., 1985; Grönroos, 1990) . In addition, related methods for quality measurement such as the SERVQUAL (Zeithaml et al., 1990) has continued to be popular in spite of later criticism. More recently service quality has expanded its scope in different directions, coming to include important aspects such as the role of feelings (Edvardsson, 2005). In addition, the importance of relationships has been emphasised. In this way, service marketing together with industrial marketing formed a basis for the emergence of relationship marketing (Gummesson, 1999).

Regarding the health sector Lagrosen & Lagrosen(2007) have specifically studied customer quality dimensions and found them to be physical change, mental change and pleasure.

3. Organisational and entrepreneurial learning

Organisational learning is a theoretical field that has been formed based on the ambition to promote sustainable success in organisations. Thus, it is meant to counter reductionist approaches and provide a more holistic view. Its basis is systems thinking and consequently it draws it roots to general systems thinking as formulated by von Bertalanffy(1950) and its later developments in organisational theory. Seeing organisations as systems implies that shifts in processes, strategies, practices and systems must be based on inner shifts in people's values, aspirations and behaviour (Senge, 1999). This resembles the view of quality management as a system of different components presented above. Thus, quality initiatives, in order to be effective must be based on profound organisational learning, which is often not the case (Argyris, 1999).

Profound learning in an organisation requires an influence on its core values (Argyris, 1993; Argyris and Schön, 1996). Often organisational change is attempted through changes in organisational structure, ways of working, technology, communication etc. However, these changes will only be effective if they are related to changes in principles and values of the employees (Schneider et al., 1996). Often, there is a difference between the values that an organisation officially promotes, the espoused values (Schein, 1992) and what it actually does, the theories in use. Although much research has indicated inconsistencies between these two, not enough is known about how to handle these inconsistencies (Argyris, 1999). There are often hidden attitudes that need to be brought to surface for continuous learning to be possible (Senge, 1999).

Learning in organisations often involves tacit knowledge (Polanyi, 1967) and actions that are skilful are usually based on tacit knowledge that have been transformed into manageable routines (Argyris, 1999). Methods of transforming tacit knowledge to explicit knowledge and vice versa are therefore

particularly useful (Nonaka and Takeuchi, 1995). Therefore, our studies will contain qualitative methodologies aimed at understanding subtle aspects such as values and tacit knowledge.

Although, organisational learning usually deals with separate organisations its scope should go beyond the individual organisation. Current business is becoming ever more interconnected and value is usually created in networks. Ideally, learning networks can be created (Garcia, 2006).

4. Entrepreneurship and innovation

The term entrepreneurship derives from the French words "entre" (between) and "prendre" (to take). Thus, literally, an entrepreneur is someone who takes a position between a supplier and a customer. According to the French economist JB Say, an entrepreneur is a person who "shifts economic resources from an area of low productivity into an area of higher productivity and greater yield"(Chaston, 2000). This definition would probably cover most activities of business but entrepreneurship has developed into a concept including elements of risk taking and innovation. Entrepreneurial marketing is different from traditional marketing management, business marketers act differently, and thus their behaviour enriches the understanding of the possibilities of marketing(Hills and Hultman, 2006). In many cases, entrepreneurship is used to describe the activities of smaller firms. Yet not all small businesses are entrepreneurial. On the contrary, many conduct marketing in a very traditional way. For them to be considered entrepreneurial there must also be some innovation and creativity in the way they act. In addition, entrepreneurial marketing, may also be applicable in large firms, given the turbulence, risks and uncertainties surrounding today's markets (Hills and Hultman, 2006).

Moreover, entrepreneurial thinking is making its way into other areas than the industry with implications for innovation. For example, social entrepreneurship is used to describe business activity in the social field as a complement or alternative to traditional welfare systems(Thompson et al., 2000). Similarly, cultural entrepreneurs are individuals or companies who act in an entrepreneurial way in the cultural sphere (Wilson and Stokes, 2002).

Several researchers have noted characteristics or personal tendencies that are common among entrepreneurs, which distinguish them from other managers. Some examples of such properties that are particularly relevant in this case are(Lamping and Kuehl, 1997):

- *A passion for business*. This should include both personal and emotional commitment.
- *Confidence*. Entrepreneurs often have profound knowledge of their products and markets which makes them confident in themselves.
- *Management of risk*. Entrepreneurial activities usually contain an element of risk taking. Nevertheless, many entrepreneurs manage risks very carefully.
- *Changes are opportunities*. Entrepreneurs are not frightened by change. Rather, they search for it and exploit it. They have a capacity to master change to their own advantage.

There is an obvious connection between organisational learning and entrepreneurship, which benefits from entrepreneurs having in-depth knowledge, and thus entrepreneurial learning needs to be active,leading to the acquisition of entrepreneurial patterns rather than just experiences and skills (Wing Yan Man, 2006).

5. Methodology

Since the purpose of the study is explorative, we chose to carry out a qualitative study. Seven leading Swedish spa-hotels have been contacted and agreed to participate. In-depth interviews (Patton, 1990) with managers were performed. The spa-hotels and the person interviewed are listed in Table 1.

The interviews were conversional to their nature. No fixed questionnaire was used. Instead the respondents were encouraged to speak freely about their situation, their problems and their visions for the future. Follow-up questions were asked by the researchers but every effort was made not to influence the respondents in any direction. Each interview lasted for about an hour and they were carried out in the premises of the respective companies.

Table 1: The spa-hotels that participated in the study

Spa-hotel	Comments	Person interviewed	Date
Sankt Jörgen Park Resort	Spa-hotel in Gothenburg with many day guests an integrated golf course	Resort Manager	23 Feb. 2012
Stenungsbaden Yacht Club	Spa-hotel with a relaxed American east coast image	Hotel Manager	9 Mar. 2012
YstadsSaltsjöbad	A seaside spa-hotel on the south coast	Spa-manager	12 Mar. 2012
VarbergsKurort	A seaside spa-hotel with a focus on traditional Swedish treatments	Spa-manager	13 Mar. 2012
Hotel Tylösand	A seaside spa-hotel with focus on art and music	Hotel manager	13 Mar. 2012
Hotel Skansen	A spa-hotel by the main court in the tennis town Båstad	Hotel manager	20 Mar. 2012
BokenäsHav Spa Möten	A spa-hotel in a serene rural coastal setting	Hotel manager	23 Mar. 2012

The interviews were analysed by methods inspired by the constant comparative method from the grounded theory approach(Glaser and Strauss, 1967; Glaser, 1992). It should, however, be noted that this study is not in its entirety a grounded theory study since it is built on a theoretical framework. Nevertheless, the use of the constant comparative method for analysing empirical data has proved to be useful also in this context.

6. Findings

When the data from the in-depth interviews were analysed, the following four categories emerged.

6.1 Trends for innovation

In the wellness industry trends are highly important. The products are very abstract. The customers can easily feel the immediate pleasure of treatments. On the other hand, their long term health effects are usually difficult to gauge. Therefore, customers tend to be rather trend-sensitive. In addition, trends often develop internationally. Regarding trends there seems to be three viable strategies. The first is to completely ignore trends and focus on one's own core products. A second option is to be a fast follower, spotting international trends early and following them quickly. This requires an effective market information system. The third strategy entails trying to create trends oneself. This requires not only excellent innovation skills but also a capacity for spreading the word and persuading markets of the usefulness of the new offers.

The managers usually found the changing nature of the business fascinating. They were curious and interested rather than fearful of international trends. They are also open for collaboration with each other although they are competitors and they are all active members in the organisation *Swedish SPA-Hotels.*

6.2 The brand

Since products are abstract, the brands of the different companies become especially important. One question in this regard is how far to take positioning. Currently, the profiles of the studied companies are not particularly different. There are differences as outlined in the table above. Nevertheless, when it comes to the core services, the companies are more similar than different.

One aspect along which the companies try to position themselves is the health dimension. Some companies are more oriented towards creating better health for their customers. Others focus less on health and more on the immediate pleasure of the treatments as well as the entire stay. In addition, those companies that focus more on health may chose different directions. One of the companies has chosen to collaborate with traditional health care in rehabilitating patients with recognised health problems while another offers more treatments from the field of alternative medicine. Some of the companies also have thoughts of engaging in medispa activities which may involve beauty operations and other treatments of that kind. A related aspect concerns how much they should invest in their gym and other training facilities.

The companies realise that the expectations of the customers are important and they all say that their objective is to surpass the expectations.

In their quest for strengthening their brand all the spa-hotels have started to use social media and blogs although the extent to which they use them varies.

6.3 Needs and wants of customers

The companies are aware that their success hinges on their ability to fulfil the needs and wants of their customers. However, knowing the customers' needs and wants is difficult since the products are abstract and the long term effects of them are often unknown. Therefore, branding is exceptionally important, as discussed above.

In order to study customers' needs and wants, the companies usually use customer questionnaires. They also try to be observant of international trends and developments. However, this is often done in a rather anecdotal manner and systematised marketing intelligence systems do not seem to be used.

As questionnaires are not really well suited for giving an in-depth understanding of customers, the companies are often insecure regarding the customers' inner thoughts, needs and wants.

6.4 Quality management

The companies are anxious to provide services of high quality. Nonetheless, the intangibility of their products make traditional quality control complex. Their main focus is ensuring that the customers are satisfied. For this purpose, all the companies use questionnaires delivered to customers after their visit. Either they use questionnaires that they have developed themselves or they use outside providers. One of the quality managers also calls customers herself in order to have direct feedback and deeper understanding of the customers' experiences.

Most of the companies use quality development groups with representatives from different departments for quality control and continuous improvement. Nevertheless, these groups are not really used for innovation.

7. Discussion

The managers show several of the traits that according to Lamping and Kuehl (1997) characterise entrepreneurs:

- *A passion for business*. Several of the managers are themselves passionate about their own training, fitness and general health.
- *Confidence*. The managers are often personally engaged in health and fitness activities as well as having substantial theoretical knowledge of anatomy, nutrition etc. This gives them a firm knowledge base for their management.
- *Management of risk*. Several activities in the health and fitness sector require substantial investment which contributes to an element of risk.
- *Changes are opportunities*. The wellness sector is characterised by fast changes in that new treatments and training methods quickly come in and out of fashion. Handling this requires entrepreneurial ability.

Notwithstanding the entrepreneurial character of this industry, innovation is rather special. Due to the intangibility and abstract nature of the services offered, their quality and value cannot readily be measured with objective measures. This highlights the importance of branding. Innovation in the industry concerns brand development of companies and products to an equally important extent as the development of actually innovative products.

Although the companies work diligently with quality control, in-depth understanding of customer quality experiences is difficult due to the abstract nature of the services. In addition, the companies in this industry, as in most industries, have little connection between quality management and innovation. Thus, quality management mainly takes the form of quality control of current offers while innovation takes place elsewhere. On the other hand, the companies have understood the importance of expectations and its connection to branding.

Regarding positioning, they are uncertain of how far they should take it and in many ways the companies are quite similar. The positions they have taken may be related to Lagrosen andLagrosen's (2007) dimensions of *mental change, physical change* and *pleasure* with each company having a slightly different focus regarding the dimensions. Overall, the dimension of *pleasure* seems, however, to be most emphasised.

The abstract nature of the services in the industry highlights the value of organisational learning. The services are often based on tacit knowledge (Polanyi, 1967) and so methods for making it more explicit should be useful (Nonaka and Takeuchi, 1995). Organisational learning may be a way of stimulating more innovation in the industry – an innovation that goes beyond branding and creates real differences. The network that the companies are engaged in has certain characteristics of a learning network (Garcia, 2006).

A learning network could allow the participating companies to engage in more in-depth marketing research in order to specify the dimensions of quality that apply in this specific industry. The dimensions that Lagrosen and Lagrosen (2007) suggest are of a general nature on a high level of abstraction. As such they are valuable for the scientific understanding of customer behaviour in the health and fitness industry. Nevertheless, for individual companies as well as for networks of companies, more concrete and detailed knowledge of the customers' quality preferences are needed. Thus through the use of qualitative methods like focus group interviews in connection with quantitative questionnaires, they could examine the quality influence of actual treatments, exercises, facilities, equipment etc.

8. Conclusions

The purpose of the paper was to explore the relationship between entrepreneurial learning, innovation and quality management in the wellness industry. The study has shown that innovation is tightly connected to branding in this sector. Innovation often more concerns image of firms and products than concrete radical changes. Quality management is carried out rather traditionally. The relationship between quality management and innovation is thus rather weak. A possibility to overcome this weakness may lie in entrepreneurial learning and the association that the companies are active in might have the potential of constituting a network for learning. If so, this could provide an arena for integrating quality management and innovation. Further research into such networks should be valuable. This research could address questions regarding the possibility of quality management evolving into incorporating more of quality development. Moreover, the role of learning from others concerning quality development in networks of collaborating companies could be a valuable part of this research.

References

Argyris, C. (1993). Knowledge for Action, A Guide to Overcoming Barriers to Organizational Change. San Francisco, Jossey-Bass Publishers.

Argyris, C. (1999). On Organisational Learning. Singapore, Blackwell Publishing.

Argyris, C. and Schön, D. A. (1996). Organizational Learning II, Theory, Method, and Practice. Reading, Addison-Wesley Publishing Company.

Chaston, I. (2000). Entrepreneurial marketing: competing by challenging conventions. Basingstoke, MacMillan.

Conti, T. (2010). "Systems thinking in quality management." The TQM Journal Vol. 22 No. 4: pp. 352-368.

Curkovic, S. and Handfield, R. (1996). "Use of ISO 9000 and Baldrige Award criteria in supplier quality evaluation." International Journal of Purchasing and Materials Management Vol. 32 No. 2: pp. 2-11.

Deming, W. E. (1986). Out of the Crisis. Cambridge, Cambridge University Press.

Edvardsson, B. (2005). "Service quality: beyond cognitive assessment." Managing Service Quality Vol. 15 No. 2: pp. 127-131.

Garcia, B. C. (2006). "Learning conversations: knowledge, meanings and learning networks in Greater Manchester." Journal of Knowledge Management Vol. 10 No. 5: pp. 99-109.

Glaser, B. G. (1992). Basics of Grounded Theory Analysis. Mill Valley, Ca., Sociology Press.

Glaser, B. G. and Strauss, A. L. (1967). The Discovery of Grounded Theory, Strategies for Qualitative Research. Chicago Il., Aldine Publishing Company.

Grönroos, C. (1990). Service management and marketing: managing the moment of truth in service competition. Singapore, Maxwell Macmillan.

Gummesson, E. (1999). Total Relationship Marketing. London, Butterworth-Heinemann.

Hellsten, U. and Klefsjö, B. (2000). "TQM as a management system consisting of values, techniques and tools." The TQM-Magazine Vol. 12 No. 4: pp. 238-244.

Hills, G. E. and Hultman, C. M. (2006). "Entrepreneurial Marketing".In Marketing - Broadening the Horizons. Lagrosen, S. and Svensson, G. Lund, Studentlitteratur.

Ishikawa, K. (1985). What is Total Quality Control, the Japanese Way? Eaglewood Cliffs, NJ, Prentice Hall Inc.
Juran, J. M. (1989). Juran on Leadership for Quality - an Executive Handbook. New York, The Free Press.
Lagrosen, S. and Lagrosen, Y. (2003). "Quality Configurations - a Contingency Approach to Quality Management." International Journal of Quality and Reliability Management Vol. 20 No. 7: pp. 759-773.
Lagrosen, S. and Lagrosen, Y. (2007). "Exploring quality in the health and fitness industry." Managing Service Quality Vol. 17 No. 1: pp. 41-53.
Lagrosen, S. and Lagrosen, Y. (2009). Mänsklig kvalitetsutveckling. Lund, Studentlitteratur.
Lagrosen, S. and Svensson, G. (2006). "A seminal framework of marketing schools revisited and updated." Journal of Management History Vol. 12 No. 4: pp. 369-384.
Lagrosen, Y. and Lagrosen, S. (2005). "The effects of quality management - a survey of Swedish quality professionals." International Journal of Operations and Production Management Vol. 25 No. 10: pp. 940-952.
Lamping, P. and Kuehl, C. (1997). Entrepreneurship. Upper Saddle River, Prentice Hall.
Nonaka, I. and Takeuchi, H. (1995). The Knowledge Creating Company - How Japanese Companies Create the Dynamics of Innovation. Oxford, Oxford University Press.
Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1985). "A Conceptual Model of Service Quality and its Implications for Future Research." Journal of Marketing Vol. 49 No. Fall: pp. 41-50.
Patton, M. Q. (1990). Qualitative Evaluation Methods. Newbury Park Ca., Sage Publications.
Polanyi, M. (1967). The Tacit dimension. London, Routledge.
Schein, V. H. (1992). Organizational Culture and Leadership. San Francisco, Jossey-Bass Publishers.
Schneider, B., Brief, A. P. and Guzzo, R. A. (1996). "Creating a climate and culture for sustainable organizational change." Organisational Dynamics Vol. 24 No. 4: pp. 7-19.
Schumpeter, J. A. (1934). The Theory of Economic Development. Boston, Harvard University Press.
Senge, P. M. (1999). The dance of change : the challenges of sustaining momentum in learning organizations London, Nicholas Brealey.
Senge, P. M. (2006). The Fifth Discipline: The Art and Practice of the Learning Organization. New York, Currency Doubleday.
Thompson, J., Alvy, G. and Lees, A. (2000). "Social entrepreneurship - a new look at the people and the potential." Management Decision Vol. 38 No. 5: pp. 328-338.
Wilson, N. and Stokes, D. (2002). "Cultural entrepreneurs and creating exchange." Journal of Research in Marketing & Entrepreneurship Vol. 4 No. 2: pp. 37-52.
Wing Yan Man, T. (2006). "Exploring the behavioural patterns of entrepreneurial learning, a competency approach." Education and Training Vol. 48 No. 5: pp. 309-321.
von Bertalanffy, L. (1950). "An Outline of General Systems Theory." British Journal of the Philosophy of Science Vol. 1 No.: pp. 139-164.
Zeithaml, V. A., Parasuraman, A. and Berry, L. L. (1990). Delivering quality service: balancing customer perceptions and expectations. New York, The Free Press.

Innovation and Entrepreneurship Studies: One or two Fields of Research?

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Abstract: Innovation and industrial dynamics have grown in importance over the last 40-50 years as we have moved towards a more knowledge intensive society. In an effort to understand these developments in society new research fields have emerged such as innovation and entrepreneurship studies. In general, these two research fields are regarded as rather closely interlinked. In this study we elaborate on the question: Should innovation and entrepreneurship be seen as one or two fields of research? We have taken a cognitive approach in which we analyze the knowledge platforms in innovation and entrepreneurship studies. We use a methodology in which we have built a unique database consisting of all references in twelve "state-of-the-art" books in entrepreneurship. The chapters in these "state-of-the-art" books are written by experts within the field, and it can be assumed that the most frequently cited references in these chapters represent "core knowledge" in entrepreneurship research. We have analyzed the references cited in these chapters in order to identify core contributors and core works within entrepreneurship research. In addition, we have compared our results with a similar study conducted by Fagerberg et al. (2012) on the knowledge basis in the field of innovation studies. The study shows that we are talking about two more or less separate fields of research. Despite common roots in Schumpeter and some interrelated works, the two fields seem to have drifted apart over the last decades. However, there seems to be some elements of overlaps, for example, in the interest in the evolutionary approaches, and in the interest in topics such as innovation management (corporate entrepreneurship) and in technology-based ventures.

Keywords: innovation studies, entrepreneurship studies, new research fields, knowledge base

1. Introduction

Innovation and entrepreneurship are often regarded as tightly interlinked concepts and areas of interest. For example, innovation and entrepreneurship are often seen as necessary and integrated ingredients in creating growth and industrial renewal in society (Braunerhjelm et al., 2009), and both concepts are often included together in the title of conferences (e.g. European Conference on Innovation and Entrepreneurship 2012), journals (e.g. *Journal of Innovation and Entrepreneurship* and *International Journal of Entrepreneurship and Innovation Management*), and in academic courses – indicating that we are talking about one field of research.

However, we can also argue in the opposite direction, that we are talking about two different fields. For example, we need to bear in mind that not all new ventures can be regarded as innovative, and not all new knowledge generate viable business opportunities. In addition, when we use of the concepts "innovation" and "entrepreneurship" in daily speech, people often interpret the concepts in different ways. When asking people in general to define innovation, concepts such as "inventions", "newness", "new technologies", "R&D" and "creativity" often will be expressed, whereas when asking about entrepreneurship people will often mention concepts such as "start-ups", "commercialization", "business ideas" and "the entrepreneur as an individual".

In this paper we will elaborate on the relationship between innovation and entrepreneurship by taking a cognitive approach and analyzing the knowledge platforms in innovation and entrepreneurship studies. We will ask the questions: Who are the leading knowledge producers in innovation and entrepreneurship research? and What core works can be identified in innovation and entrepreneurship research? In addition, to give an understanding to which extent innovation and entrepreneurship research can be regarded to be a part of a single broader scientific field which share and contribute to the same knowledge base, we will compare the core scholars and core works within the fields of innovation and entrepreneurship research.

In the study we are using a unique database consisting of all references included in twelve "state-of-the-art" books or "handbooks" published within the field of entrepreneurship since the 1980s. The chapters in these "state-of-the-art" books are written by experts and prominent scholars within the field, and it can be assumed that the most frequently cited references in these surveys represent the "core literature" of entrepreneurship research. In our analysis we will compare our results on the core scholars and core works in entrepreneurship studies with a similar study conducted by Fagerberg et al. (2012) on the knowledge basis in innovation studies.

Our analysis shows that there are very few overlaps in the knowledge platforms in innovation and entrepreneurship research, indicating that we are talking about more or less two separate fields of research. Although innovation and entrepreneurship studies both have common roots in Schumpeter and some interrelated works, the two fields seem to have drifted apart over the last decades. However, some overlaps can be found in evolutionary approaches, and in the interest in innovation management (corporate entrepreneurship) and in technology-based ventures.

The rest of the paper consists of three sections. In section 2 we will elaborate in more details on the methodology we have used in the study. Section 3 consists of a description of the historical evolution of innovation and entrepreneurship research. Finally, in section 4 a comparison is made with regards core scholars and core works in innovation and entrepreneurship research, and a discussion regarding innovation and entrepreneurship seen as one or two fields of research.

2. Methodology

2.1 Bibliometric analysis – problems when analyzing emerging fields of research

Bibliometric analysis is based on the assumption that if a researcher cites a work he/she has found it useful in some way, and therefore the more frequently a work is cited, the greater its role in the scholarly community (Garfield, 1972). This leads to the reinforcement and institutionalization of certain opinions and, as a consequence, individual researchers end up playing a substantial role in the development of a research field (Crane, 1972). However, bibliometric analysis is not without limitations. For example, there are limitations in the databases typically used for bibliometric analysis (Watkins, 2005) such as the Social Science Citation Index (SSCI) using the Web of Science. Although the SSCI is a wonderful resource for citation analysis, the literature indexed in the databases consists primarily of scholarly journals (although we know that in emerging fields of research "books" play a significant role for the intellectual development of the field), the databases covers primarily English language journals, and not least, it takes time for journals in emerging fields to be included in the SSCI databases and as a consequence emerging fields like innovation and entrepreneurship are significantly less well-covered than more mature fields of research. Thus, citation databases such as SSCI have limitations when analyzing emerging fields such as innovation and entrepreneurship research.

2.2 Methodological approach in this study

In an attempt to eliminate some of the major disadvantages of using generally available databases in bibliometric analysis, in this study we exploit the fact that a number of authoritative contributions aimed at surveying the evolution of innovation and entrepreneurship research already exist, i.e. a tradition of publishing "handbooks" or "state-of-the-art books" on innovation and entrepreneurship. Such handbooks are usually edited by senior academics in the field, and the purpose of these books is to introduce readers to the most important scholarly work on a topic within the broader area covered in the handbooks. Therefore, it is reasonable to assume that the references in these handbooks will include the most important contributions of relevance for the topic, as the authors of the handbook chapters normally are experts on the topics they survey. In these handbooks some contributions will be referred to in many different chapters simply because they are generally considered to be of significant importance by the collective body of authors involved in the handbooks. This subset of highly cited contributions is referred to as the "core works" within the fields of innovation and entrepreneurship.

In this study we have used a databasis that we have conducted on entrepreneurship research covering twelve "state-of-the-art" books within the field (see Landström et al., 2012 for a more detailed presentation of the methodology and the results), and we have compared our results with a similar study conducted by Fagerberg et al. (2012) including eleven "state-of-the-art" books on innovation

research. The handbooks that are included in our study and the study by Fagerberg et al. (2012) are presented in Table 1.

Table 1: List of handbooks included in the analysis

INNOVATION						ENTREPRENEURSHIP					
No	Author(s)	Title	Year	No of chapt	No of ref	No	Author(s)	Title	Year	No of chapt	No of ref
1	Cozijnsen & Vrakking	Handbook of Innovation Management	1993	9	280	1	Kent, Sexton & Vesper	Encyclopedia of Entrepreneurship	1982	18	630
2	Dodgson & Rothwell	Handbook of Industrial Innovation	1994	35	1247	2	Sexton & Smilor	The Art and Science of Entrepreneurship	1986	11	381
3	Stoneman	Handbook of the Economics of Innovation and Technological Change	1995	13	1630	3	Sexton & Kasarda	The State of the Art of Entrepreneurship	1992	22	1547
4	Shavinina	International Handbook on Innovation	2003	71	4303	4	Katz & Brockhaus	Advances in Entrepreneurship, Firm Emergence, and Growth, Vol. 1	1993	5	335
5	Fagerberg, Mowery & Nelson	The Oxford Handbook of Innovation	2004	22	1688	5	Katz & Brockhaus	Advances in Entrepreneurship, Firm Emergence, and Growth, Vol. 2	1995	8	657
6	Poole & Van de Ven	Handbook of Organizational Change and Innovation	2004	13	1958	6	Katz & Brockhaus	Advances in Entrepreneurship, Firm Emergence, and Growth, Vol. 3	1997	7	852
7	Karlsson	Handbook of Research on Innovation and Clusters	2008	24	1465	7	Sexton & Smilor	Entrepreneurship 2000	1997	18	907
8	Shane	Handbook of Technology and Innovation Management	2008	16	1494	8	Sexton & Landström	The Blackwell Handbook of Entrepreneurship	2000	22	1427
9	Lundvall, Joseph & Chaminade	Handbook of Innovation Systems and Developing Countries	2009	13	974	9	Acs & Audretsch	Handbook of Entrepreneurship Research	2003	19	1687

10	Hall & Rosenberg	Handbook of the Economics of Innovation	2010	29	4518	10	Alvarez, Agarwal & Sorenson	Handbook of Entrepreneurship Research: Disciplinary Perspectives	2005	11	652
INNOVATION						ENTREPRENEURSHIP					
11	Gallouj & Djellal	The Handbook of Innovation and Services	2010	32	1756	11	Casson, Yeung, Basu & Wadeson	Oxford Handbook of Entrepreneurship	2006	27	2079
						12	Parker	The Life Cycle of Entrepreneurial Ventures	2006	17	1627
				277	21313					185	12781

In the study made by Fagerberg et al. (2012) on innovation and our own study on entrepreneurship a total of 21,313 references in innovation research and 12,781 references in entrepreneurship research were used. To ensure a fair comparison of the number of references and taking into account when the work was published, we calculated and used an age-adjusted J-index – the index reflects how important a work is perceived to be within the field of innovation and entrepreneurship respectively (as judged by experts within the field):

(1) $$J = \frac{A * 100}{M}$$

where M = the maximum citation for any work as one citation per chapter in any handbook published at least one year after the publication of the work in question.

A = the actual number of citation for the work in question.

In order to select approximately the top one per cent of works in innovation and entrepreneurship research, the threshold level for core works in innovation were set to the J-index of 3.25, i.e. works cited less than once per thirty chapters (of those chapters that could potentially have cited it), giving a set of 130 core works in innovation, and in entrepreneurship the J-index of 4.0 gave 135 core works in entrepreneurship.

3. The evolution of innovation and entrepreneurship studies

3.1 The "take-off" and growth of innovation and entrepreneurship studies

As society has moved towards a "knowledge society", innovation and entrepreneurship as scholarly fields have grown in importance over the last 40-50 years. In spite of some early contributions in the 19th century and early 20th century (Landström, 2010), for example, by scholars such as Joseph Schumpeter (1912/1934) and Frank Knight (1921) that provided important theoretical building blocks for later works on innovation and entrepreneurship, a broader knowledge base within the area began to emerge after the Second World War, first in the field of innovation and somewhat later in entrepreneurship. Despite early contributions by Schumpeter (1912/1934, 1942) the interest in innovation studies did not really exist as an identifiable research field until the late 1960s, largely confined to researchers in the two leading industrial powers of the time, the US and the UK, and particularly emerging in two disciplines, economics and sociology. In this respect, three organizations outside academia, RAND Corporation (a think-thank for the US Department of Defense), the Federation of British Industry in the UK, and the OECD based in Paris, came to play a crucial role in providing necessary resources as well as influencing the research agenda of the emerging group of scholars that showed an interest in the area. Entrepreneurship as a field of research emerged somewhat later, in the 1980s, mainly driven by the economic and political changes occurring in society during the 1960s and 1970s – a period in which new technologies were gaining ground, changes were taking place in industrial structure, and attitudes toward entrepreneurship were evolving – and in the 1980s supported by politicians such as Ronal Reagan in the US and Margaret

Thatcher in the UK. Against this background, innovation as well as entrepreneurship gained more attention in society as well as in academia (Fagerberg et al., 2012b).

Since the "take-off phase" of innovation and entrepreneurship research, the fields of innovation and entrepreneurship have grown significantly over the last decades. As shown in Figure 1, which illustrate the evolution of core literature in innovation and entrepreneurship over time (based on the databases in the two studies on which this paper are based), we can find that the two fields developed relatively slowly until the 1970s when literature on innovation studies started to grow more rapidly, and somewhat later the growth of literature on entrepreneurship (in the 1980s).

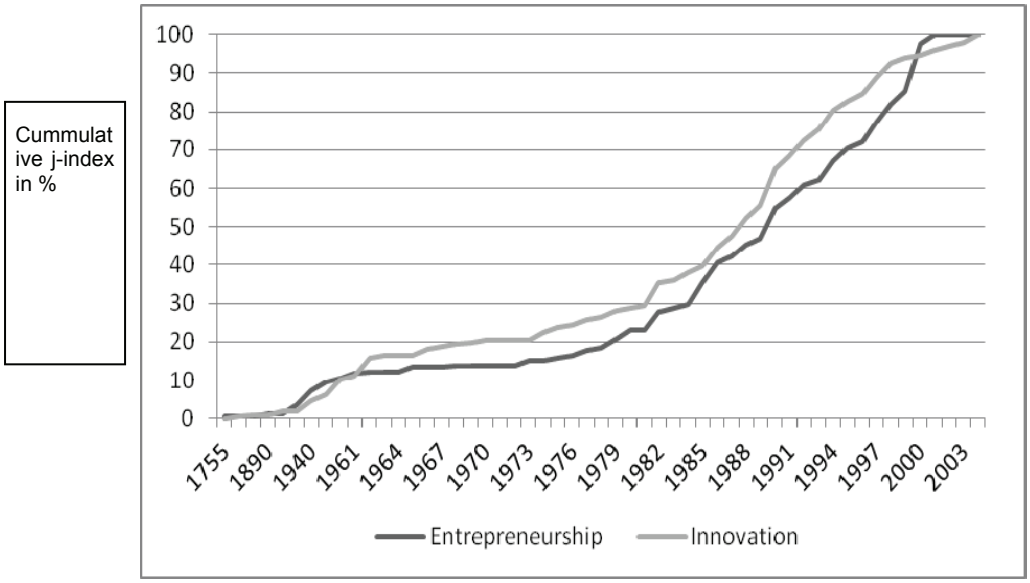


Figure 1: The evolution of the core literature in innovation and entrepreneurship studies

3.2 Innovation studies

Following the description made by Fagerberg et al. (2012a, b), the emergence of innovation study as a research field was heavily influenced by the establishment of the British research institute Science Policy Research Unit (SPRU), which was set up in 1966 at the recently founded University of Sussex with Christopher Freeman as the Director. The research at SPRU could be characterized as problem-oriented (rather than disciplinary-oriented), it took a system approach on R&D and innovation, and the research at the centre was to a high extent multi- and cross-disciplinary. SPRU quickly became a global hub for research on innovation, with a large number of scholars from all over the world visiting the centre. Many new centres on innovation studies emerged around the world which took inspirations from SPRU and Freeman. In addition the leading journal on innovation studies, *Research Policy*, was started in 1971 with Freeman as the head editor.

Some significant theoretical and empirical contributions were published in the 1970s and 1980s. For example, Freeman published his book *The Economics of Industrial Innovation* in 1974 which contained a synthesis of the available knowledge within the field at that time, and the book proved very influential within the field over the next decades. In 1982 Richard Nelson and Sidney Winter published *An Evolutionary Theory of Economic Change* in which they tried to develop formal models of economic evolution and describe how firms and industries change over time. Influential works were also published with regards differences in innovation across industries and sectors (Pavitt, 1984), and the role of innovation and learning at a firm-level of analysis (Cohen and Levinthal, 1990), but also by economic historians such as Nathan Rosenberg (1976, 1982) on technological and institutional changes over time.

Innovation studies as a research field grew significantly in the 1980s and 1990s, with scholars from many different disciplinary backgrounds, and several new journals within the field were launched as well as the establishment of professional associations (e.g. International Joseph Schumpeter Society, the Technology and Innovation Management (TIM) Division within the (American) Academy of Management, and DRUID). From a cognitive perspective, the evolution of innovation research took a new twist after the 1980s. Earlier works had mainly been focused on firms and industries, but

attention now shifted towards the role of innovation in the entire economy, and how institutions and policies could adjust in order to benefit from innovation and its diffusion, i.e. studies in "national systems of innovation" (Freeman, 1987; Lundvall, 1992) quickly attracted a lot of attention among researchers and policy-makers. Another major development in innovation studies was an increased interest among scholars in business and management, initiated by Porter (1990) and followed by, for example, Teece et al. (1997).

Today, the field of innovation studies is quite large, international and diverse in terms of research interests and disciplinary backgrounds (Fagerberg and Verspagen, 2009). According to Fagerberg et al. (2012a) there are now two large issues of interest within the field, one oriented towards economic, social and political issues, and the other associated with the rapidly growing field of business and management, but there are no common theory, publication channel or meeting place that bind these two issues together.

Finally, we could ask the questions: Who are the core scholars within the field of innovation studies? and Which are the core works published within the field? Based on the analysis made by Fagerberg et al. (2012a) the core scholars and works in innovation studies are summarized in Table 2.

Table 2: Core scholars and core works in innovation studies

CORE SCHOLARS			CORE WORKS					
Rank	Scholar	Total J-index	Rank	Author(s)	Title	Type	Year	J-index
1	Richard Nelson	37.6	1	Nelson & Winter	An evolutionary theory of economic change	Book	1982	18.8
2	Christopher Freeman	35.5	2	Nelson	National innovation systems	Book	1993	15.7
3	Nathan Rosenberg	33.4	3	Porter	The competitive advantage of nations	Book	1990	14.4
4	Joseph Schumpeter	27.4	4	Schumpeter	The theory of economic development	Book	1934	14.1
5	Michael Porter	24.9	5	Rogers	Diffusion of innovations	Book	1962	14.1
6	Zvi Griliches	24.2	6	Lundvall	National innovation systems. Towards a theory of innovation and interactive learning	Book	1992	13.4
7	Eric von Hippel	20.2	7	Freeman	The economics of industrial innovation	Book	1974	12.6
8	Bengt-Åke Lundvall	19.1	8	Cohen & Levinthal	Absorptive capacity: A new perspective on learning and innovation	Article	1990	11.9
9	Keith Pavitt	15.5	9	Pavitt	Sectoral patterns of technical change	Article	1984	11.6
10	Alfred Chandler	14.8	10	Arrow	Economic welfare and allocation of resources for	Book chapt.	1962	10

					invention			.5
CORE SCHOLARS			CORE WORKS					
11	Everett Rogers	14.1	11	Saxenian	Regional advantage	Book	1994	9.9
12	David Teece	12.8	12	Freeman	Technology policy and economic performance: Lessons from Japan	Book	1987	9.7
13	Sid Winter	12.5	13	von Hippel	The source of innovation	Book	1988	9.7
14	Wesley Cohen	12.4	14	Christensen	The innovator's dilemma	Book	1997	9.5
15	Paul Romer	12.3	15	Teece	Profiting from technological innovation	Article	1986	9.4
16	Giovanni Dosi	11.9	16	Kline & Rosenberg	An overview of innovation	Book chapt.	1986	9.4
17	Kenneth Arrow	10.5	17	Henderson & Clark	Architectural innovation	Article	1990	9.4
18	Adam Jaffe	10.3	18	Rosenberg	Inside the black box	Book	1982	9.0
19	AnnaLee Saxenian	9.9	19	Schumpeter	Capitalism, socialism and democracy	Book	1942	7.9
20	Edward Mansfield	9.9	20	Tidd, Bessant & Pavitt	Managing innovation	Book	1997	7.7

3.3 Entrepreneurship studies

In accordance with the analysis made by Landström and Benner (2010), the emerging interest in entrepreneurship studies was mainly driven by the "creative destruction" that could be identified in many western societies during the 1960s and 1970s and which made entrepreneurship and industrial dynamics a prominent theme among politicians and policy-makers. In this respect, the seminal work by David Birch *The Job Generation Process* published 1979 played an influential role in making the phenomenon of entrepreneurship and small businesses "visible". In the report Birch showed that the majority of new jobs in the US were created by new and small firms – not large established companies. The report provided an intellectual foundation for the incorporation of entrepreneurship and small businesses into the analyses of economic development, and as a consequence, many scholars from different fields, not least management studies, rushed into this promising field of research. The research community at this point in time could be characterized as fragmented and individualistic, but rather early many initiatives were taken to stimulate communication within this group of scholars – academic conferences were launched (e.g. the Babson Conference in the US, the RENT Conference in Europe, the Small Firms Policy and Research Conference in the UK), professional organizations were created (e.g. an interest group on entrepreneurship was created within the (American) Academy of Management while the European Council of Small Business was formed on the European scene), and scientific journals were established such as the *Journal of Business Venturing*, *Entrepreneurship and Regional Development* and *Small Business Economics*.

Since the early 1990s there has been an enormous growth in entrepreneurship research, which is obvious irrespectively of the measurement employed. In a cognitive sense the field was characterized by a large scale migration of scholars into the field, but also a high degree of mobility of scholars in and out of the field. The research within the field showed a strong empirical focus in which scholars tried to understand the phenomenon from many different angles. Taken together, this made the field of entrepreneurship research very fragmented. On the other hand, the 1990s was to a very large extent characterized by the building of a strong infrastructure within academia in terms of new chairs that were established at different universities around the world, new journals and conferences were

launched, and there was an increase in the number of courses and education programs in entrepreneurship and related topics.

Entrepreneurship studies in the 2000s could be characterized in term of a "search for maturity", in which the article by Shane and Venkataraman (2000) in the *Academy of Management Review* could be regarded as the trigger for an intense debate regarding the domain of entrepreneurship research, but also initiating an increased interest in research on opportunity recognition and a renewed interest among entrepreneurship scholars in the Austrian School of Economics. In addition, over time, the research issues and the research community involved in entrepreneurship have become more heterogeneous in character, and various different subgroups of scholars have emerged. Today, it appears that the field of entrepreneurship research continues to search for an identity of its own, founded on concepts and theories that can play a "boundary-defining" role (Landström, 2010).

Finally, who have been the core scholars in entrepreneurship studies and what core works could be identified within the field? According to the analysis made by Landström et al. (2012) the core scholars and works are summarized in Table 3.

Table 3: Core scholars and core works in entrepreneurship studies

CORE SCHOLARS			CORE WORKS					
Rank	Scholar	Total J-index	Rank	Author(s)	Title	Type	Year	J-index
1	Joseph Schumpeter	47.0	1	Schumpeter	Theory of economic development	Book	1934	33.5
2	William Gartner	29.5	2	Shane & Venkataraman	The promise of entrepreneurship as a field of research	Article	2000	23.0
3	Israel Kirzner	29.3	3	Shane	Prior knowledge and the discovery of entrepreneurial opportunities	Article	2000	16.2
4	Howard Aldrich	29.2	4	Knight	Risk, uncertainty and profit	Book	1921	15.7
5	Scott Shane	27.7	5	Schumpeter	Capitalism, socialism and democracy	Book	1942	13.5
6	Sankaran Venkataraman	21.9	6	Gartner	Who is an entrepreneur? Is the wrong question	Article	1988	12.8
7	William Baumol	17.1	7	Bhidé	The origin and evolution of new businesses	Book	2000	12.2
8	David Audretsch	16.6	8	Kirzner	Competition and entrepreneurship	Book	1973	11.9
9	Frank Knight	15.7	9	McClelland	The achieving society	Book	1961	11.9
10	David Birch	14.6	10	Storey	Understanding the small business sector	Book	1994	11.6
11	Amarnath Bhidé	12.2	11	Kirzner	Entrepreneurial discovery and the competitive market process	Article	1997	11.5
12	David Blanchflower	11.9	12	Casson	The entrepreneur: An economic theory	Book	1982	11.4
13	David McClelland	11.9	13	Aldrich & Zimmer	Entrepreneurship through social networks	Book chapt.	1986	10.9
14	David Storey	11.6	14	Saxenian	Regional advantage: Culture and competition in Silicon Valley and Route 128	Book	1994	10.8
15	Mark Casson	11.4	15	Venkataraman	The distinctive domain of entrepreneurship	Book chapt.	1997	10.4
16	Jay Barney	11.1	16	Stinchcombe	Social structure and organizations	Book chapt.	1965	9.7
17	Michael Porter	11.0	17	Penrose	Theory of the growth of the firm	Book	1959	9.7
18	Josh Lerner	10.9	18	Nelson & Winter	An evolutionary theory of economic change	Book	1982	9.6

19	David Evans	10.9	19	Hamilton	Does entrepreneurship pay? An empirical analysis of the returns to self-employment	Article	2000	9.5
CORE SCHOLARS			CORE WORKS					
20	AnnaLee Saxenian	10.8	20	Aldrich	Organizations evolving	Book	1999	9.4

4. One or two fields?

The aim of this study is to analyze the knowledge platforms in innovation and entrepreneurship studies, in order to give an understanding to which extent the two fields of research can be regarded to be a part of a single broader scientific field. To become a part of broader scientific field, one would expect that the core literature of the two fields overlap to some extent. However, if we make an analysis from a cognitive approach it appears that this is not the case with regards innovation and entrepreneurship studies. In Table 4 (based on Fagerberg et al., 2012b) the overlap between innovation and entrepreneurship studies is shown. The analysis is based on the top-100 works in each of the two fields. In the analysis it is shown that twelve out of the top-100 most important works in innovation and entrepreneurship overlap both fields. However, few works are included in the top-20 of both fields (Schumpeter, 1934, 1942; Nelson & Winter, 1982; Saxenian, 1994).

Table 4: Overlap between innovation and entrepreneurship studies (among the top-100 works in each field)

Work	Rank in innovation studies	Rank in entrepreneurship studies
Nelson & Winter (1982): An evolutionary theory of economic change	1	18
Schumpeter (1934): The theory of economic development	4	1
Cohen & Levinthal (1990) Absorptive capacity: A new perspective on learning and innovation	8	35
Saxenian (1994): Regional advantage: Culture and competition in Silicon Valley and Route 128	11	14
Schumpeter (1942): Capitalism, socialism and democracy	19	5
Marshall (1890): Principles of economics	26	47
Penrose (1959): The theory of the growth of the firm	69	17
Audretsch & Feldman (1996): Spillovers and the geography of innovation and production	78	67
Aldrich (1999): Organizations evolving	80	20
Williamson (1985): The economic institutions of capitalism	88	89
Krugman (1991): Geography and trade	94	99
Teece, Pisano & Shuen (1997): Dynamic capabilities and strategic management	98	64

Our conclusion is that despite common roots in Schumpeter and some interrelated works there are few overlaps in the knowledge platforms, and the major conclusion to be made is that we are talking about two more or less separated fields of research. However, there are some interesting connections between the fields. For example, evolutionary aspects seem to be important elements in the overlap between the two fields, which could be applied in the contributions by Schumpeter, Nelson and Winter, but also the works by Penrose, Aldrich and Cohen and Levinthal. Another connection that can be found is the common interests in topics such as innovation management (corporate entrepreneurship) and an interest in new technology-based firms.

Our argument that we are talking about two separate fields of research is supported by Bhupatiraju et al. (2012) and Persson (2010). Their studies confirm that there are rather little interactions, as measured by cross-citations, between the fields – most of the cross-citations are internal to the two fields – indicating that the division between the fields is relatively clear-cut. In addition, the analysis by Bhupatiraju et al. (2012) indicates that the boundaries between the fields were less clear a few decades ago than they are today, i.e. the two fields seem to have drifted apart more and more over the last decades. Thus, the overlap appears to have more to do with the basic theoretical foundations (or "roots") of the two fields than with the more recent contributions to the two fields. Their conclusion is that the two fields, although they share some research themes, have evolved largely on their own and in relative isolation from each other.

Major explanations that might explain the differences between the fields are the disciplinary roots of the fields, and accordingly, the level of analysis in innovation and entrepreneurship studies. Innovation studies seem to be rooted in economics and sociology with a focus on more aggregated levels of analysis, whereas entrepreneurship studies are rooted in management studies with a focus on the firm and individual levels of analysis.

In this paper we have taken a cognitive approach of the two fields. Of course, we can analyze the fields from other perspectives, and the results show more or less similar conclusions:

- From a network perspective, the two fields also seem to develop in different directions, with their own separate meeting places (e.g. conferences and professional associations). For example, Gartner et al. (2006), based on an analysis of membership of the (American) Academy of Management, show that scholars in innovation and entrepreneurship belongs to different "divisions" of the organization.
- From a publication channels perspective, it seems that scholars in innovation and entrepreneurship publish their contributions in different outlets. For example, Fagerberg et al. (2012a) and Landström et al. (2012) shows that among the top-ten journals in the two fields, only one journal appear in both analyses, namely *Research Policy*.
- From an organizational perspective the two fields seem to have more in common, and scholars in innovation and entrepreneurship tend to be attached to the same local research organizations (Clausen et al., 2012).
- From a policy perspective, Lindholm-Dahlstrand and Stevenson (2007) argue that innovation policy and entrepreneurship/small business policy are rarely integrated in policy interventions by governments.

In the evolution of innovation and entrepreneurship research we have seen that the fields tend to drift apart and pursue different trajectories, i.e. innovation and entrepreneurship can more and more be regarded as two separate fields of research, and the same holds true for different parts within both fields, i.e. the fields become more diverse thematically as well as methodologically. The evolution of the fields may have negative consequences for scientific progress, but also creates new possibilities for new forms of integrations between the two fields.

References

Braunerhjelm, P., Acs, Z.J., Audretsch, D.B. and Carlsson, B. (2009) "The missing link: knowledge diffusion and entrepreneurship in endogenous growth", *Small Business Economics*, Vol 34, No. 2, pp 105-25

Bhupatiraju, S., Nomaler, Ö., Triulzi, G. and Verspagen, B. (2012) "Knowledge flows – analyzing the core literature of Innovation, Entrepreneurship, and Science and Technology Studies", *Research Policy*, Vol 41, No. 7, pp 1205-18.

Clausen, T.H., Fagerberg, J. and Gulbrandsen, M. (2012) "Mobilizing for change: a study of research units in emerging scientific fields", *Research Policy*, Vol 41, No. 7, pp 1249-61.

Crane, D. (1972) *Invisible colleges. Diffusion of knowledge in scientific communities*, University of Chicago Press, Chicago, Ill.

Fagerberg, J., Fosaas, M. and Sapprasert, K. (2012a) "Innovation: exploring the knowledge base", *Research Policy*, Vol 41, No. 7, pp 1132-53.

Fagerberg, J., Landström, H. and Martin, B. (2012b) "Exploring the emerging knowledge base of the knowledge society", *Research Policy*, Vol 41, No. 7, pp 1121-31.

Fagerberg, J. and Verspagen, B. (2009) "Innovation Studies – the emerging structure of a new scientific field", *Research Policy*, Vol 38, pp 218-33.

Garfield, E. (1972) "Citation analysis as a tool in journal evaluation", Science, Vol 178, pp 471-79.

Gartner, W.B., Davidsson, P. and Zahra, S.A. (2006) "Are you talking to me? The nature of community in entrepreneurship scholarship", *Entrepreneurship Theory and Practice*, May, pp 321-31.

Landström, H. (2010) *Pioneers in entrepreneurship and small business research*, Springer, New York.

Landström, H. and Benner, M. (2010) "Entrepreneurship research: A history of scholarly migration", in Landström, H. and Lohrke, F. (eds.) *Historical Foundations of Entrepreneurship Research*, Edward Elgar, Cheltenham, pp 15-45.

Landström, H., Harirchi, G. and Åström, F. (2012) "Entrepreneurship: exploring the knowledge base", *Research Policy*, Vol 41, No. 7, pp 1154-81.

Lindholm-Dahlstrand, A. and Stevenson, L. (2007) "Linking innovation and entrepreneurship policy", Working Paper, IPREG, Stockholm.

Persson, O. (2010) "Networks of papers in entrepreneurship, innovation, and science & technology studies", paper presented at the EXPLORE Workshop, CIRCLE, Lund University, December.

Watkins, D. (2005) "Identifying trends in entrepreneurship research: textual analysis revisited", paper presented at the Academy of Management Meeting, Honolulu, Hawaii, August.

Exploring Regulatory Focus, Entrepreneurial Intention, Self-Efficacy and Entrepreneurial Skills Among Malaysian Higher Learning Institution Students

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Abstract: Specifying factors affecting students to choose entrepreneurship as their future career path and step into the challenging process of a new venture creation has been one of the main concerns of entrepreneurship researchers, educators and policy makers. However, our knowledge is limited about the factors that enable students to become entrepreneurs. This study aims to explore the level of regulatory focus, entrepreneurial intention, entrepreneurial self-efficacy and entrepreneurial skills among students in Malaysian private higher education institutions. Participants were 391 students from private higher education institutions in Klang Valley, Malaysia where most of the private institutions of higher education are located. Of all the participants, 242 were male (62%) and 148 (38%) were female. The students were from a multicultural background and different countries. Data were collected via a questionnaire consisting of 50 items. The questionnaire is divided into five subsections including: 1. demographic information, 2. regulatory focus, 3. entrepreneurial intention, 4. entrepreneurial self-efficacy and 5. entrepreneurial skills. The students were asked to respond on a 5 point Likert scale, anchored from 1 denoting strongly disagree to 5 strongly agree. Analysis of the data indicates the majority of the students (71%) intend to become an entrepreneur and about 74% of them agreed that their immediate family will support them to become an entrepreneur. Although, most of the students (76%) had no business experiences and 68% of them had never taken any entrepreneurship courses, the majority of them (81%) believed that students should learn entrepreneurship. Moreover, the students scored moderate in all dimensions of the entrepreneurial capabilities including self-regulatory focus (mean = 3.22), entrepreneurial self-efficacy (mean= 3.21), entrepreneurial intention (mean=3.13) and entrepreneurial skills (mean=3.49). Analysis of the data regarding gender of the participants shows that scores for male students are quite higher than their female counterparts in all dimensions of entrepreneurial capabilities. Implications of the findings for entrepreneurship education and practice are discussed in this paper.

Keywords: entrepreneurship education, self-regulatory focus, entrepreneurial intention, entrepreneurial self-efficacy, entrepreneurial skills

1. Introduction

Specifying factors affecting students to choose entrepreneurship as their future career path and step into the challenging process of a new venture creation has been one of the main concerns of entrepreneurship researchers, educators and policy makers. This is because entrepreneurship only happens if there is an individual who has the inspiration and capability to burden the challenges and responsibilities of a new venture creation. Many researchers raised the question of what makes entrepreneurs different from other people or those who are just self-employed (Gu¨rol and Atsan 2006; Kuratko 2005; Mueller and Thomas 2000). To answer the question, researchers examined the innate characteristics that entrepreneurs are endowed with such as “locus of control”, “need for achievement” (Hansemark 1998; McClelland 1961) and “tolerance for ambiguity” (Teoh and Foo 1997). The contradictory research findings and relatively static nature of entrepreneurs’ personal characteristics has led researchers to look at the entrepreneurial qualities that have long-term effects on one’s behavior and action and can be acquired and improved by education and training (Kundu and Rani 2008; Bryant 2006; Krueger et al. 2000, Mueller and Thomas 2000; Chen et al. 1998; Ajzen 1991). However, there is an ongoing debate among scholars on which characteristics of entrepreneurs can be taught (Klein and Bullock 2006; Henry et al. 2005) and which of the qualities enable students to step into the challenging process of entrepreneurship (Wilson et al. 2007). This study aimed to narrow the gap in literature and empirical research through exploring the level of regulatory focus, entrepreneurial intention, entrepreneurial self-efficacy and entrepreneurial skills as a set of personal factors motivating and enabling entrepreneurial behavior and action among students. This study seeks to contribute to entrepreneurship education theory development by exploring the

main factors enabling students to successfully establish and run a new venture. The findings also enhance our understanding of entrepreneurial capacity among Malaysian higher education institutions particularly in private universities. The next section presents the theoretical foundations of the research in relation to entrepreneurship education. The following section describes the research methodology and the findings. Finally, this paper discusses the findings in light of their implications for entrepreneurship education and research.

2. Theoretical background

Entrepreneurship research has been criticized for lacking robust theoretical foundations for education and practice (Man and Yu 2007; Fayolle et al. 2006; Heinonen and Poikkijoki 2006; Kuratko 2005). Various theories have been used to describe different aspects of entrepreneurial behaviors (Trevelyan 2011) but research in the factors enabling students to become an entrepreneur has mostly focused on three theories including Self-regulatory theory (Higgins 1998), theory of Planed Behavior (Ajzen 1991) and Social Cognitive theory (Bandura 1997) which construct the theoretical framework of this study and are explained in the following sections.

2.1 Theory of self-regulation

The theory of self-regulation explains human action as a social and cognitive process through which individuals set personal goals and regulate their behaviors to achieve their goals (Higgins 1998). At the heart of this process lies the personal capability to organize and structure knowledge, thoughts and behaviors in order to achieve the goals based on past experiences of success or failure. In regulating ones' thoughts and behaviors despite the presence of environmental impediments, individuals act based on their promotion or prevention focus to satisfy their accomplishment needs or avoid failures (Higgins et al. 2001). If they are more promotion focused, they are motivated by their needs for success and achievement, have a high tendency to act, use different means, develop various strategies and put whatever it takes to achieve their goals. In contrast, prevention focused individuals avoid errors and losses in order to be in a safe and secured zone and refuse to take actions that may end in failures (Bryant 2006; Brockner et al. 2004). Therefore, people differ in terms of their self-regulatory orientation based on their cognitive abilities and situations (Trevelyan 2011; Bryant 2007).

Self-regulation theory has recently been used to explain different aspects of entrepreneurs' behavior and performance from their selection into entrepreneurship to task performance and success. Some scholars believe that a combination of promotion and prevention focus orients entrepreneurs' task performances through and across different stages of entrepreneurship process (Brockner et al. 2004). While others argue that entrepreneurs are more promotion focused and require one aspect of self-regulation in performing some tasks and another aspect in carrying out other tasks (Brockner and Higgins 2001). In particular, promotion focus guides entrepreneurs to successfully perform the tasks which require innovativeness and creativity such as exploring or generating new venture ideas and prevention focus enables them to avoid risky and uncertain tasks such as entering a new industry or market (Trevelyan 2011). Recently, researchers highlighted the prominent role that self-regulation theory can play in improving entrepreneurship education and consequently developing entrepreneurial knowledge and skills in students (Bryant 2006), though based on the findings of the research on entrepreneurs. Therefore, there is an urgent need to explore the level and pattern of self-regulatory focus among students in order to design more effective entrepreneurship education.

2.2 Theory of planed behavior

The theory of planed behaviour (TPB) has been applied in different disciplines as the theoretical framework to explain human volitional behaviors (Ajzen 1991). According to the theory, human decision to adopt behavior occurs as a result of interactions between three main motivational and enabling factors including control over behavior, attitude towards behavior and subjective and social norms. Control over behavior is one's perceived abilities and skills to perform a specific action. Attitude towards behavior reflects the degree to which a person is aware of the importance of a behavior and evaluates it as positive or negative. Finally, subjective and social norms are one's perceptions toward how significant others in the family, friends and people in the community think about and support a particular behavior.

Theory of planed behavior has been applied in entrepreneurship research to explain the intention to become an entrepreneur specifically among students because selection into a new venture creation is

a deliberate and planed behavior that can be improved by education and training. Accordingly, researchers and educators attempted to improve students' entrepreneurial intention through developing their entrepreneurial skills, highlighting the merits and benefits of entrepreneurship for personal and social development and providing support for students to experience entrepreneurship (Souitaris et al. 2007; Segal et al. 2005; Liñán et al. 2005; Ajzen 2002; Krueger et al. 2000). Enormous research efforts have been directed to examining the impacts of entrepreneurship education on students' intention to choose entrepreneurship as their future career path (Wu and Wu 2008; Fayolle et al. 2006; Peterman and Kennedy 2003). The majority of the research shows a significant association between entrepreneurship education and students' entrepreneurial intention. However, there still remain many unaddressed questions about students' level of entrepreneurial intention specifically in terms of the value of entrepreneurial activities for students, their family, friends, colleagues and people in the community.

2.3 Theory of social cognition

Social cognitive theory defines human action as a function of the interplay between personal, behavioral, and environmental factors (Bandura 1997). One of the main components of the theory is self-efficacy. Self-efficacy is the personal cognitive evaluation of one's abilities to successfully perform a specific task. Applying this definition to entrepreneurship domain, Chen et al. (1998) defined entrepreneurial self-efficacy as the strength of beliefs in one's capabilities to successfully perform the roles and tasks of an entrepreneur. Self-efficacy improves individuals' desire to choose entrepreneurship as their career path despite the presence of other alternatives (Boyd and Vozikis 1994). Entrepreneurial self-efficacy has also been considered as one of the personal traits which motivates entrepreneurial intention and behavior (DePillis and Reardon 2007; Segal et al. 2005; DeNoble et al. 1999; Chen et al. 1998) and enables entrepreneurs to cope with uncertainties, ambiguities, and challenges of the whole entrepreneurship processes (Kumar 2007; Wilson et al. 2007; Zhao et al. 2005; Shane et al. 2003).

Importantly, entrepreneurial self-efficacy can be enhanced by education and experience (Baum and Locke 2004; Rae and Carswell 2000). To develop different aspects of entrepreneurial self-efficacy in students, entrepreneurship education involves them in various learning opportunities including mastery experience, modeling, social persuasion, and judgment of psychological state. To experience mastery of entrepreneurial tasks, students develop business plans and/or run simulated or real businesses. Case studies and work with an entrepreneur on course projects introduce role models to students and improve their entrepreneurial self-efficacy. Students are persuaded and supported by positive encouragement and mentoring from their instructors or professors. Finally, students' assessment about their psychological state is enhanced by studying lifestyle or work style of successful entrepreneurs or listening to successful entrepreneurs' lectures. Being involved in these activities shape students' perception and view about their entrepreneurial capabilities and enhance their motivation to get involved in entrepreneurial behaviors (Wilson et al. 2007; Fayolle et al. 2006; Zhao et al. 2005; Erikson 2003). However, providing purposeful education and training based on students' strengths and weaknesses in different aspects of their entrepreneurial self-efficacy requires appropriate assessment of this quality among students (Chen et al. 1998). Drawing upon the theoretical foundations described above, this study attempts to explore the level and pattern of regulatory focus, entrepreneurial intention, self efficacy and entrepreneurial skills among students of Malaysian private higher leaning institutions.

3. Methodology

This study utilizes a descriptive research design to determine level and pattern of self-regulation focus, entrepreneurial self-efficacy, intention and skills. Data were collected via a questionnaire consisting of 50 items. The questionnaire is divided into five subsections including: 1. demographic information (such as age, gender, field of study and experience in business), 2. regulatory orientation (promotion and prevention focus) 3. entrepreneurial intention (entrepreneurial activities and social valuation), 4. entrepreneurial self-efficacy (in marketing, accounting, organizing and personnel and production management) and 5. entrepreneurial skills (opportunity recognition, creativity, problem solving, leadership and communication skills, development of new products and services, networking skills). The section of the questionnaire on self-regulation included both aspects of the construct which are: promotion focus and prevention focus. These aspects were measured by using the Regulatory Focus questionnaire developed by Grant and Higgins (2003). This instrument has been shown to have strong construct validity and reliability in a number of studies. Entrepreneurial self-

efficacy was measured by using an instrument called Self-Efficacy Skills developed by Scherer et al. (1989). Finally entrepreneurial intention was measured by an instrument developed by Ajzen (1980), Krueger (2000) and Hassan (2007). The students were asked to respond on a 5 point Likert scale, anchored from 1 denoting strongly disagree to 5 strongly agree. 400 questionnaires were distributed. 391 students completely filled up the questionnaire with a response rate of 97.5%. The students were from two private learning institutions in Klang Valley, Malaysia where most of the private institutions of higher education are located.

4. Findings

Analysis of the data shows that 242 (62%) of the respondents were male and 149 (38%) were female (Table 1). The students were from a multicultural background and different countries. About 74% of the students stated that their immediate family will support them to become an entrepreneur. Although, most of the students (76%) had no business experiences and 68% of them had never taken any entrepreneurship courses, the majority of them (71%) intend to become an entrepreneur and (81%) of them believed that students should learn entrepreneurship.

Table 1: Demographic information of the participants

Gender	F	%
Male	242	62
Female	149	38
Country		
Malaysian	244	62
International	147	38
Specialization		
Business Administration	97	26.9
Information Technology	85	23.5
Others	179	49.6
Want to be an entrepreneur?		
Yes	277	71
No	114	29
Support from family?		
Yes	289	74
No	102	26
Students need to learn entrepreneurship?		
Yes	315	81
No	76	19
Business experience		
Yes	85	24
No	306	76
Had taken any entrepreneurship courses?		
Yes	120	32
No	271	68

Table 2 illustrates that students scored higher on entrepreneurial skills (mean=3.48) compared to regulatory focus (mean=3.20), entrepreneurial intention (mean=3.09) and self-efficacy (3.21).

Table 2: Mean scores of students' entrepreneurial capability

Study variables	Cronbach's Alpha	Mean	SD
1. Regulatory Focus	.671	3.20	.49
a). Promotion Pride	.479	2.73	.46
b). Prevention Pride	.455	3.25	.58
Entrepreneurial intention	.855	3.09	.52
Entrepreneurial activities		3.12	.55
Social valuation		3.01	.57
Self-Efficacy	.814	3.21	.71
Entrepreneurial Skills	.864	3.48	.80

Results of t-test on different constructs under this investigation based on students' gender illustrate that scores for male students are quite higher than their female counterparts in all dimensions (Table 3). Specifically, male students scored higher in regulatory focus (t=.39), promotion focus (t=.24), prevention focus (t=.63), self-efficacy (t=.96), entrepreneurial intention (t=.96), entrepreneurial activities (t=.78), social valuation (t=.86) and entrepreneurial skills (t=.25). However, the differences are not significant.

Table 3: t-test results based on gender

Gender		Mean	SD	t-value	Sig
Regulatory Focus	Male Female	3.21 3.19	.52 .44	.39	.69
Promotion Focus	Male Female	2.7 2.72	.48 .43	.24	.81
Prevention Focus	Male	3.26	.62	.63	.53
	Female	3.23	.51		
Self Efficacy	Male Female	3.22 3.18	.75 .64	.58	.56
Entrepreneurial Intention	Male Female	3.11 3.06	.55 .48	.96	.33
Entrepreneurial Activity	Male Female	3.14 3.10	.59 .50	.78	.43
Social Valuation	Male Female	3.03 2.98	.59 .54	.86	.38
Entrepreneurial Skills	Male Female	3.48 3.46	.84 .73	.25	.79

Note: interpretation of mean score: (1-2.33) low, (2.34-3.67) moderate, (3.68-5) high.

Table 4 indicates that students scored moderate in all items related to entrepreneurial skills. The highest mean score is related to *problem solving skills* and the lowest is related to *recognition of opportunity.*

Table 4: Mean scores on students entrepreneurial skills

Entrepreneurial skills	Mean	SD	Level
Recognition of opportunity	3.40	1.06	Moderate
Creativity	3.46	1.02	Moderate
Problem solving skills	3.56	.96	Moderate
Leadership and communication skills	3.54	1.04	Moderate
Development of new products and services	3.47	.99	Moderate
Networking skills, and making professional contacts	3.49	1.12	Moderate

Note: interpretation of mean score: (1-2.33) low, (2.34-3.67) moderate, (3.68-5) high.

Table 5 shows the mean score in students' perceptions toward entrepreneurial activity. The highest mean score (mean= 3.66) is for the item The reader only knows that there were 391 respondents but doesn´t know what is the relevance in terms of response rate. Regarding social value of entrepreneurship, students scored moderate in all items as illustrated in table 6. That means students perceive a moderate support for entrepreneurial activities in their immediate family, friends, colleagues and country.

Table 5: Mean scores on students perceptions toward entrepreneurial activity

Items	Mean	SD	Level
Starting a firm and keeping it viable would be easy for me	2.96	.97	Moderate
A career as an entrepreneur is totally unattractive to me	2.50	1.15	Moderate
My friends would approve of my decision to start a business	3.30	.97	Moderate
I am ready to do anything to be an entrepreneur	3.21	1.11	Moderate
I will make every effort to start and run my own business	3.44	1.08	Moderate
I am able to control the creation process of a new business	3.36	.99	Moderate
My immediate family would approve of my decision to start a business	3.47	1.05	Moderate
I have serious doubts about ever starting my own business	3.01	1.07	Moderate
If I had the opportunity and resources, I would love to start a business	3.66	1.05	Moderate
My colleagues would approve of my decision to start a business	3.34	.97	Moderate
Amongst various options, I would rather be anything but an entrepreneur	2.87	1.09	Moderate
I am determined to create a business venture in the future	3.40	1.01	Moderate
If I tried to start a business, I would have a high chance of being successful	3.36	.92	Moderate
Being an entrepreneur would give me great satisfaction	3.45	1.02	Moderate
It would be very difficult for me to develop a business idea	2.91	1.05	Moderate
My professional goal is to be an entrepreneur	3.25	1.11	Moderate

Items	Mean	SD	Level
Being an entrepreneur implies more advantages than disadvantages to me	3.40	1.01	Moderate
I have a very low intention of ever starting a business	2.66	1.11	Moderate
I know all about the practical details needed to start a business	3.02	.98	Moderate
I believe I would be completely unable to start a business	2.58	1.14	Moderate

Note: interpretation of mean score: (1-2.33) low, (2.34-3.67) moderate, (3.68-5) high.

Table 6: Mean scores of students' perceptions toward social value of entrepreneurial activities

Items	Mean	SD	Level
My immediate family values entrepreneurial activity above other activities and career	3.09	1.00	Moderate
The culture in my country is highly favorable towards the entrepreneurial activity	3.16	.99	Moderate
The entrepreneur's role in the economy is generally undervalued in my country	2.97	.98	Moderate
My friends value entrepreneurial activity above other activities and careers	3.08	.85	Moderate
Most people in my country consider it unacceptable to be an entrepreneur	2.60	1.07	Moderate
In my country, entrepreneurial activity is considered to be worthwhile, despite the risks	3.22	.88	Moderate
My colleagues value entrepreneurial activity above other activities and careers	3.09	.84	Moderate
It is commonly thought in my country that entrepreneurs take advantage of others	3.12	.94	Moderate

Note: interpretation of mean score: (1-2.33) low, (2.34-3.67) moderate, (3.68-5) high.

5. Discussion

The main purpose of this study was to determine the level and pattern of self-regulation focus, entrepreneurial intention, self-efficacy and skills among students of Malaysian private higher education institutions. The findings revealed that the majority of the students intend to become an entrepreneur however they had never taken any entrepreneurship courses and had no business experiences. Moreover, most of the participants believed that students should learn entrepreneurship. This indicates students are aware of the importance of learning entrepreneurship and have the desire to establish their own ventures. Since awareness is the first block in learning entrepreneurial skills (Fuchs et al. 2008; Hannon 2006; Smith et al. 2006), entrepreneurship educators may need to provide students with the courses and programs to learn entrepreneurship specifically in private higher learning institutions and for students undertaking business administration and information technology majors. Furthermore, the results show that regarding self-regulatory orientation the students are more prevention focused. That means they tend to avoid the uncertainties and risks inherited in entrepreneurial activities and they may not use the means and opportunities required to learn entrepreneurship (Brockner et al. 2004; Higgins et al. 2001). This finding confirms Lin et al. (in press) assertion that prevention focus regulates behavior when the perceived risk is high. Therefore, students need to be more exposed to entrepreneurial education and training because promotion focus is found to be positively related to most reasons for entrepreneurial career choices (Brockner et al. 2004). Scholars believe that promotion focus is related to the past success or failure experiences and family (Trevelyan, 2011; Bryant, 2009, 2006).

The majority of the students reported their family supports them to become an entrepreneur. Therefore their prevention focus might be a reflection of a past experience failure in their previous studies that weakens their promotion focus. This necessitates educators to review and improve the objectives, content and pedagogical methods of the programs which contain business components in the early stages of Malaysian students' education such as "Life skills" and provide students the chance to experience success and achievement in business related tasks and activities. Promotion focus is also highly related to knowledge cognition, the individuals' ability to evaluate and construct knowledge (Bryant 2006). To enhance students' promotion focus and consequently increase the number of entrepreneurs and the probability of their success in running a new venture, educators can engage students in learning opportunities and entrepreneurial activities in the university where they can experience success in real tasks of an entrepreneur with less risk (Fuchs et al. 2008; Pittaway and Cope 2007; Hannon 2006).

This study also showed that the level of entrepreneurial self-efficacy and skills is moderate among the students under this investigation. Therefore, the students may not have the motivation and skills required for successfully running a new business (Chen et al. 1998). To improve students' entrepreneurial self-efficacy and skills, educators need to engage them in various learning

opportunities such as running simulated or real businesses, case studies and working with an entrepreneur (Wilson et al. 2007; Fayolle et al. 2006; Zhao et al. 2005; Erikson 2003). This study provides a clearer picture of the level and pattern of entrepreneurial capacity among students of private higher education initiations in Malaysia. It contributes to the few studies that related self-regulation theory to entrepreneurship education (Bryant 2006). It also provides empirical evidence for employing the theory of self-regulation, self-efficacy and theory of planed behavior in exploring entrepreneurial qualities among students. However, there are some limitations that should be noted. We focused on measuring entrepreneurial capabilities among university students. Future studies should investigate different aspects of the constructs in this study with more diverse samples and different education levels. Moreover, this study only involved private institutions of higher education in one area of Malaysia (Klang Valley). Research need to be done including both private and public universities to better demonstrate entrepreneurial capabilities among Malaysian students. Research can also be undertaken to develop a theory and a model for entrepreneurial capacity among students based on the constructs examined in this study.

References

Ajzen, I. (2002) "Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior", *Journal of Applied Social Psychology*, Vol 32, pp 1-20.

Ajzen, I. (1991) "The theory of planned behaviour" *Organizational Behavior and Human Decision Processes*, Vol 50, pp 179-211.

Ajzen, I. and Fishbein, M. (1980) "*Understanding attitudes and predicting social behavior*", Englewood Cliffs, NJ, Prentice Hall.

Bandura, A. (1997) "*Self-efficacy: the Exercise of Control*", W.H.Freeman and Company, New York.

Baum, J.R. and Locke, E.A. (2004) "The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth", *Journal of Applied Psychology* Vol 89, pp 587–598.

Boyd, N.G. and Vozikis, G.S. (1994) "The influence of self-efficacy on the development of entrepreneurial intentions and actions", *Entrepreneurship Theory and Practice* Vol18, pp 63–90.

Brockner, J., Higgins, E.T. and Low, M.B. (2004) "Regulatory focus theory and the entrepreneurial process", *Journal of Business Venturing* Vol 19, No. 2, pp 203–220.

Brockner, J. and Higgins, E.T. (2001) "Regulatory Focus Theory: Implications for the Study of Emotions at Work", *Organizational Behavior and Human Decision Processes* Vol 86, No. 1, pp 35-66.

Bryant, P. (2009) "Self-regulation and moral awareness among entrepreneurs", *Journal of Business Venturing* Vol 24, pp 505–518.

Bryant, P. (2007) "Self-regulation and decision heuristics in entrepreneurial opportunity evaluation and exploitation", *Management Decision* Vol 45, No. 4, pp 732–748.

Bryant, P. (2006), "*Improving entrepreneurial education through self-regulatory skills*", The NCIIA, 279-289.

Chen, C., Greene, P. and Crick, A. (1998) "Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?" *Journal of Business Venturing* Vol 13, pp 295-316.

DeNoble, A.F., Jung, D. and Ehrlich, S.B. (1999) "*Entrepreneurial self-efficacy: The development of a measure and its relationship to entrepreneurial action*", Waltham, MA, P&R Publications Inc., pp 73-87.

DePillis, E. and Reardon, K. K. (2007) "The influence of personality traits and persuasive messages on entrepreneurial intention, A cross-cultural comparison", *Career Development International* Vol 12, No. 4, pp 382-396.

Erikson, T. (2003) "Towards a taxonomy of entrepreneurial learning experiences among potential entrepreneurs", *Journal of Small Business and Enterprise Development* Vol 10, No. 1, pp 106-112.

Fayolle, A., Gailly, B. and Lassas-Clerc, N. (2006), "Assessing the impact of entrepreneurship education programmes: a new methodology", *Journal of European Industrial Training* Vol 30, No. 9, pp 701-720.

Fuchs, K., Werner, A. and Wallau, F. (2008), "Entrepreneurship education in Germany and Sweden: What role do different school systems play?" *Journal of Small Business and Enterprise Development* Vol 15, No. 2, pp 365-381.

Grant, H. and Higgins, E.T. (2003), "Optimism, Promotion Pride, and Prevention Pride as Predictors of Quality of Life", *Personality & Social Psychology Bulletin* Vol 29, No. 12, pp 1521-1532.

Gu¨ rol, Y. and Atsan, N. (2006) "Entrepreneurial characteristics amongst university students: Some insights for entrepreneurship education and training in Turkey", *Education + Training* Vol 48, No.1,pp.25-38.

Hannon, P. D. (2006) "Teaching pigeons to dance: sense and meaning in entrepreneurship education", *Education + Training* Vol 48, No. 5, pp 296-308.

Hansemark, O.C. (1998) "The effects of an entrepreneurship program on need for achievement and locus of control of reinforcement", *International Journal of Entrepreneurial Behaviour & Research* Vol 14, No. 1, pp 28-50.

Hassan, H. (2007*) "Hubungan faktor terpilih dengan tekad keusahawanan mengikut persepsi pelajar*", Unpublish Master Thesis, Universiti Putra Malaysia.

Heinonen, J. and Poikkijoki, S.A. (2006) "An entrepreneurial-directed approach to entrepreneurship education: mission impossible?" *Journal of Management Development* Vol 25, No. 1, pp 80-94.

Henry, C., Hill, F. and Leitch, C. (2005) "Entrepreneurship education and training: Can entrepreneurship be taught?" *Education + Training* Vol. 47, No. 2, pp 98-111.

Higgins, E.T., Friedman, R.S., Harlow, R.E., Idson, L.C., Ayduk O.N. and Taylor. A. (2001). "Achievement orientations from subjective histories of success: Promotion pride versus prevention pride", *European Journal of Social Psychology* Vol 31, No. 1, pp 3-23.

Higgins, E.T. (1998) "Promotion and Prevention: Regulatory Focus as a Motivational Principle", *Advances in Experimental Social Psychology* Vol 30, pp 1-46.

Klein, P.G. and Bullock, J.B. (2006) "Can Entrepreneurship Be Taught?" *Journal of Agricultural and Applied Economics* Vol 38, No. 2, pp 429-439.

Krueger Jr, N. F., Reilly, M. D. and Carsrud, A. L. (2000) "Competing models of entrepreneurial intentions", *Journal of Business Venturing* Vol 15, No. 5/6, pp 411-432.

Kumar, M. (2007) "Explaining entrepreneurial success: A conceptual model", *Academy of Entrepreneurship Journal* Vol 13, No. 1, pp 57-77.

Kundu, S. C. and Rani, S. (2008) "Human resources' entrepreneurial attitude orientation by gender and background: a study of Indian Air Force trainees", *Int. J. Management and Enterprise Development* Vol 5, No. 1, pp 77-101.

Kuratko, D.F. (2005) "The emergence of entrepreneurship education: Development, trends, and challenges", *Entrepreneurship Theory and Practice* Vol 29, No. 5, pp 577-597.

Liñán, F., Rodríguez, J. C. and Rueda-Cantuche, J. M. "*Factors affecting entrepreneurial intention levels*", 45th Congress of the European Regional Science Association, Amsterdam, 23-27 August 2005.

Lin, Y.C., Chang, C.C. Angela and Lin, Y.F. (in press) "Self-construal and regulatory focus influences on persuasion: The moderating role of perceived risk", *Journal of Business Research*.

Man, T.W.Y. and Yu, C.W.M. (2007) "Social interaction and adolescent's learning in enterprise education: An empirical study", *Education + Training* Vol 49, No. 8/9, pp 620-633.

McClelland, D.C. (1961) "*The Achieving Society*", Van Nostrand, Princeton, NJ.

Mueller, S. L. and Thomas, A. S. (2000) "Culture and entrepreneurial potential: A nine country study of locus of control and innovativeness", *Journal of Business Venturing* Vol16, pp 51–75.

Peterman, N. E. and Kennedy, J. (2003) "Enterprise Education: influencing students' perceptions of entrepreneurship", *Entrepreneurship Theory and Practice* Vol 28, No. 2, pp 129-145.

Pittaway, L. and Cope, J. (2007) "Entrepreneurship education: A systematic review of the evidence", *International Small Business Journal* Vol 25, No. 5, pp 479–510.

Rae, D. and Carswell, M. (2000) "Using a life-story approach in entrepreneurial learning: the development of a conceptual model and its implications in the design of learning experiences", *Education + Training* Vol 42, No. 4/5, pp 220-227.

Scherer, R.F., Adams, J.S., Carley, S.S. and Wiebe, F.A. (1989) "Role model performance effects on development of entrepreneurial career preference", *Entrepreneurship Theory and Practice* Vol 13*,* No. 3*,* pp 53–71.

Segal, G., Borgia, D. and Schoenfeld, J. (2005) "The motivation to become an entrepreneur", *International Journal of Entrepreneurial Behaviour and Research* Vol 11, No. 1, pp 42-57.

Shane, S., Locke, E.A. and Collins, C.J. (2003) "Entrepreneurial motivation", *Human Resource Management Review* Vol 13, pp 257–279.

Smith, A.J., Collins, L.A. and Hannon, P.D. (2006) "Embedding new entrepreneurship programmes in UK higher education institutions, challenges and considerations", *Education + Training* Vol 48, No. 8/9, pp 555-567.

Souitaris, V., Zerbinati, S. and Al-Laham, A. (2007) "Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources", *Journal of Business Venturing* Vol 22, pp 566–591.

Teoh, H.Y. and Foo, S.L. (1997) "Moderating effects of tolerance for ambiguity and risk taking propensity on the role conflict-perceived performance relationship: evidence from Singaporean entrepreneurs", *Journal of Business Venturing* Vol 12, pp 67-81.

Trevelyan, R. (2011) "Self-regulation and effort in entrepreneurial tasks", *International Journal of Entrepreneurial Behaviour & Research* Vol. 17, pp 39 – 63.

Wilson, F., Kickul, J. and Marlino, D. (2007) "Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education", *Entrepreneurship Theory and Practice* Vol 31, No. 3, pp 387-401.

Wu, S. and Wu, L. (2008) "The impact of higher education on entrepreneurial intentions of university students in China", *Journal of Small Business and Enterprise Development* Vol 15, No. 4, pp 752-774.

Zhao, H., Seibert S. E. and Hills, G. E. (2005) "The mediating role of self-efficacy in the development of entrepreneurial intentions", *Journal of Applied Psychology* Vol 90, No. 6, pp 1265–1272.

The Size of an Enterprise and Enhancing Innovation Potential

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Abstract: The recession has affected many countries in the world. It is also becoming a challenge for the enterprise sphere. It is telling practitioners and theoreticians to look for appropriate methods and management tools and also to check the idea concepts, which incline acceptable directions of further development. Despite the size of the enterprise sphere in the Czech Republic (EU), the article tries to put emphasis on questions of new innovation aspects in selected enterprises. It concerns the assessment of knowledge capital expansion and knowledge work expansion. This direction looks like a radical change in the productive powers of an enterprise. The question is, whether and to what extent it is noticeable in particular conditions. In case an enterprise focuses on realization of technical innovations, it can implement offensive or defensive innovation strategies. An enterprise, which implements offensive strategies, often dictates the direction of technical development to the whole branch. Typically it concerns market leaders or second tier firms in a certain industry branch, which offer a product of a highest level for a certain target audience. On the other hand, a company that implements defensive strategy uses the results of technical development and realizes its growing. This strategy is typically implemented by firms, which do not posses their own research and development or their level is low. They offer a product of an average technical level for a broad range of customers. Existential problems force enterprises to do quick and often short term steps, for instance reducing the costs, limiting the production capacities, relying on the size of an enterprise etc. How one can focus in such conditions and at the same time realize long term innovations? How do the enterprises deal with the question of asymmetry between the current situation and further development? Does a company have to be of a certain size? These are the questions, to which the authors of the article try to contribute to. To do this, they use several methods. The starting point for this is the analysis of changes in the size structure of an enterprise sphere in the Czech Republic (with regard to the EU development). The analysis is considered to be the scope for further reflections, the description and the intellectual development model, which concerns the innovation potential questions within an enterprise and its forms of enhancing, or rather managing. The selection of particular enterprises takes place and the elements of knowledge innovation model are monitored and analyzed. The work deals with both the official data (Czech Statistical Office, or rather Eurostat) and expert and experimental data.

Keywords: enterprise, enterprise size, innovation potential, Innovative activities, innovation strategies

1. Introduction

Everyday reality brings us many challenges. They relate not only to the questions of enterprises survivor in the era of turbulences and crises. It also concerns their further development. There are no changes in the size structure without reasons. We can observe the once ponderous firms getting thinner. They transform into smaller and more flexible units. They are better at making a use of business opportunities. They lay off their employees to paradoxically hire them partially back as firms without employees or micro-firms. We are witnessing the process of growing of enterprises, either by their own growth, or in other ways (merging, acquisition etc.) Aside from this, there are other forms of cooperation based on different kinds of alliances, clusters, and networked business structures. There is strong pressure to reduce expanses caused by existential problems of an enterprise. Using innovations from within and outside of the enterprise looks like as a perspective way out of it. The result of it can be qualitatively a new development phase, where knowledge-based amplification factor takes place. It can be suggested that size of the enterprise can play a role there.

Within the framework above a little research team aims to check on statistical and real data the size composition of enterprises in the Czech Republic in the context of the EU countries. The team consists of 5 students of master´s and doctoral studies (Faculty of Economics, VSB-Technical University of Ostrava). The team is methodically led by 2 tutors. It also monitors to what extend the large enterprises are different from the small ones during assessing the innovation potential. The results of the analyses are then confronted with the remarks from the particular enterprises.

2. Changes of the entrepreneurial environment, the size of an enterprise and innovation

2.1 Changes in an enterprise and entrepreneurial environment

The present business world changes a lot of its perspectives that are more and more linked to the new, scientific findings, their applications and quick transfers of technologies in the global scale. The enterprises are forced to enterprise in chaos environment (Kotler, 2009). The previous works (Gibson, 1998), (Kiernan, 1998) show that this century will be successful for such enterprises, which will be able to change the world and not to react to it. Besides others, three emerging social-economic tendencies during a period from 2005 till 2006 (i.e. Mikolas, 2007) can be observed within the Czech Republic environment.

The influence of globalization and highly globalizing conditions: The process of globalization displays intensively or even aggressively in the entrepreneurial and enterprise sphere in concrete localities. Economical, social, political and other processes of global character bear hard, selecting principles. The transnational firms can claim the results of their entrepreneurship anywhere in the world. There are questions linked to that, how to make a use of effects that are derived from global entrepreneurship, and how to eliminate their possible destructive consequences.

Intellectualization of the processes: There is an evident shift towards the subject that possesses inventions and knowledge. More and more emphasis is on brain work (usually, the corporate research and development is concentrated according to the decisions made by parent firms). Its quality decides about the development of the companies. The development cycle “idea-invention-innovation-imitation” gets shorter. The matter (“substance”) is taking a role of a necessary material bearer of the realized inventions. The development is enhanced by knowledge and intelligence structures. Little enterprises can be the initiators of new innovations, whose improvement and global expansion is a domain of big enterprises (mostly owned by foreign subjects).

Coexistence of cultures: There are no boundaries in entrepreneurship. Fundamental questions emerge, concerning different entrepreneurial environments and management cultures, marketing and entrepreneurship. Dealing with relationship of majority and minority groups, solving a dispute between civic democracy and monopoly impacts of the big entrepreneurial corporations belong here. It includes reaction to a shift from representative to participatory democracy, from centralization to decentralization etc., (in this respect there is a lot of practical experience, for example big foreign investments in the Czech Republic). Satisfactory solutions are a prerequisite and a new impulse for entrepreneurship development in global scale in terms of the Czech Republic.

2.2 Enterprise size

The term “enterprise size” is relevant, it has historically evolved. It was changing and it is changing (Jirásek, 2006). In a hundred years time the scale of assessing a large enterprise has greatly changed (from approx. 1 billion USD at the beginning of the 20th century to 200 billion USD at the end of the present one). Increasing the size of the enterprise is associated with the possibility to better linking and combining of technology, capital and people. It gives a chance to deal with partial and temporary loses in a better way. At present, it is associated with more efficient controlling of the global market. It deals with preparations and realization of new and complex products. The set-up of fundamental innovations belongs here. It is an opportunity to gain highly specialized and skilled people for leading and creative functions in an enterprise etc. If we take a look at global entrepreneurial environment, we will find out that about 50.000 enterprises take part in global operations (Economist 2001). Dominant firms create roughly one fifth of them. They are remarkable for their exceptional size or superior intellectual and innovation performance.

The size and growth of an enterprise has its economic reason. Greater repeatability of production unit produces cheaper production. Large scale production and trade are more favourable as far as price and profit are concerned (Modern organizations of production in large transnational corporations solve a question of individual customer wishes. Production technologies, based on economy of scope, are implemented and improved. Mass production is concentrated on the repetitive elements of products and their production. Finalizing a product is on customers´ request). Despite that fact, the smallest,

small and medium sized enterprises form the vast majority in the size structure of all enterprises (approx. 60%).

Small enterprises offer an opportunity for self-realization of people in the productive process. They represent local ownership relations. The effects from the entrepreneurship mostly stay within the region to which they are much more closely related to. Their environment knows them and they are publicly controlled. They create the urbanism of towns and villages, and improve the surroundings (Veber, 2005). Their characteristic trait is the ability to adjust to the changing conditions. They try to comply with individual wishes. Usually they are the bearers of tiny innovations

There is a sort of a gap opening between small and large enterprises. Usually, small enterprises cannot invest into advanced technologies as the large enterprises do. They cannot start up huge projects. They also cannot stand aside from enterprise-innovation changes. It leads many of them to become subcontractors of larger enterprises.

2.3 Innovations

In the 1930ies, J.A. Schumpeter was dealing with the dynamics of economic changes and found out that to enterprise means to invest. An entrepreneur is an investor, who develops untested techniques. According to him, big enterprises are real implementers of innovations and economy movers are big enterprises. They have resources and capital for investments to research and develop. Great emphasis is put on the composition of capital in the productive process.

Time examines these ideas in the world today and those who "do not innovate will not survive" (Kiernan, 1998). The development is not uniform, and economic time is not the same everywhere. The economic movement is accelerating. Time and space are rather relative and bring extraordinary effects in global and local context to those who can work with them. Innovation activities determine the future viability of the enterprise. Invention and innovation potential become the essence of the knowledge society.

Innovation may relate to product services, manufacturing plant, technology, materials, training of engineers, workers, managers, business organizations, the relationship among companies, market etc. Innovation should not be an end in itself, but it should contain itself the development charge and should lead to more advanced performance, yield and utility properties. Innovation has its own life, which is bearing fruit. Sooner or later it will dissipate. A new (permanent) innovation effort is needed, new investments, or near extinction is to happen.

Increasing interest in innovation is growing. Not every innovation, however, has the same income. We meet the innovation simply and easily applicable. Significantly different characters are disruptive innovations that significantly change the current practice (Jirásek, 2008). This is done usually by exponentiation knowledge of enterprise potential. In further development, an increasingly important role likely will be the knowledge, intellectual, originality, science supported elements of production and trade.

There are more points of view on innovations for example F. Valenta. In the 60´s and 70´s, statistical surveys according to F. Valenta methodology were carried out in the corporate sector of the CSSR. An unique collection of empiric data was put together. His recent valuable notion is concerned with new stem of revolutionary innovations (Valenta, 2000) in the microtechnology domain (genetic engineering, nanotechnology etc.).

There are more views on innovations. It can be a novelty aspect of innovation, the aspect of participation of subjects in the creation of innovation, innovation aspect, the aspect of gaining market, methodology aspect of innovation etc. At present, innovations are being monitored by the EU statistical sample survey (In relation to the second edition of the Oslo Manual). The purpose is to provide internationally comparable data on innovation environment and innovations in enterprises. They monitor technological innovations (product and process) and non-technological innovations (marketing and organizational). The purpose of statistics is to map the area of innovation activities by companies' decisions to innovate through necessary resources, partners, own innovation to economic benefits arising from the introduction of innovation.

3. The size structure and innovation activities of enterprises in the Czech Republic

3.1 The size structure of enterprises

There are more than 1.1 million entrepreneurially active businesses (in 2011) in the Czech Republic. This means that one company gets a share of 10 residents. Over the past five years (2007-2011), the number of active entrepreneurial subjects has increased by almost 24%. The statistical distribution of enterprises by size groups is very uneven (see Table 1). The biggest number is represented by micro-enterprises (nearly 95%). Small enterprises (10-49 employees) represent about 4%, medium-sized enterprises 1%. Only two enterprises out of a thousand belong to the group of large enterprises. Over the past five years, the most noticeable growth has been seen in the group of micro-enterprises (more than 25%), within which enterprises without employees have been on the increase (an increase of 33%). The remaining groups more or less have stayed the same in numbers.

A group of micro, small and medium-sized enterprises, known as SMEs, represents 99.8% of all enterprises in the country. In addition to its significant abundance and diversity it has special features. It is significant in terms of employment in the corporate sector. It produces about 60% of employment. In value added, as an important indicator of economic activity, it is involved in approximately 54%, in performance 50% performance, 50% in exports etc.

Large enterprises, which numerically create only 0.2%, realise the remaining "half" of the Czech economy. They decisively influence real economic and corporate events. It could be said they form a substantially different business world. This applies particularly in companies that are affiliates of large transnational corporations.

Similar relationships among large enterprises and SMEs are characteristic for the EU countries with regard to some of the specifics of their development.

Table 1: The development of quantity of enterprises by size groups

Enterprises by size		Number of enterprises in particular years [1]				
		2007	2008	2009	2010	2011
Micro enterprises	0 – 9 employees	862 171	999 377	1 031 711	1 059 092	1 082 453
Small enterprises	10 – 49 employees	46 239	47 692	46 790	45 966	45 341
Medium enterprises	50 – 249 employees	11 709	12 088	11 658	11 656	11 548
Large enterprises	250 and more employees	2 143	2 181	2 063	2 160	2 220
The Czech Republic in total		**922 262**	**1 061 338**	**1 092 222**	**1 118 874**	**1 141 562**

1) Active enterprises which demonstrated their size in the number of employees

Source: Own processing based on the statistical data of Czech Statistical Office

3.2 Innovative activities of enterprises

What about innovation activities in the corporate sector in the Czech Republic? Innovation Statistics Office conducts a selective investigation in two-year cycles. The Czech Republic in the harmonization process in 2002 joined the EU-wide statistical survey on innovation. Within the EU the first innovation survey was in 1993. Over the years there have been some changes in the trace. Last survey was conducted for the period 2008-2010. Interesting findings result from them.

Between 2004 and 2010 the share of innovative enterprises in all enterprises is around 50%, which means that every other enterprise innovated (see Figure 1). The period 2006-2008 appears to be favourable for innovations, in the next period there is a decrease in innovative activity. In enterprises that were developing innovations by an activity, the dominant were the non-technical innovations. The

period 2008-2010 there were about 42% of non-technical innovations and technical innovations were implemented in 35% of companies.

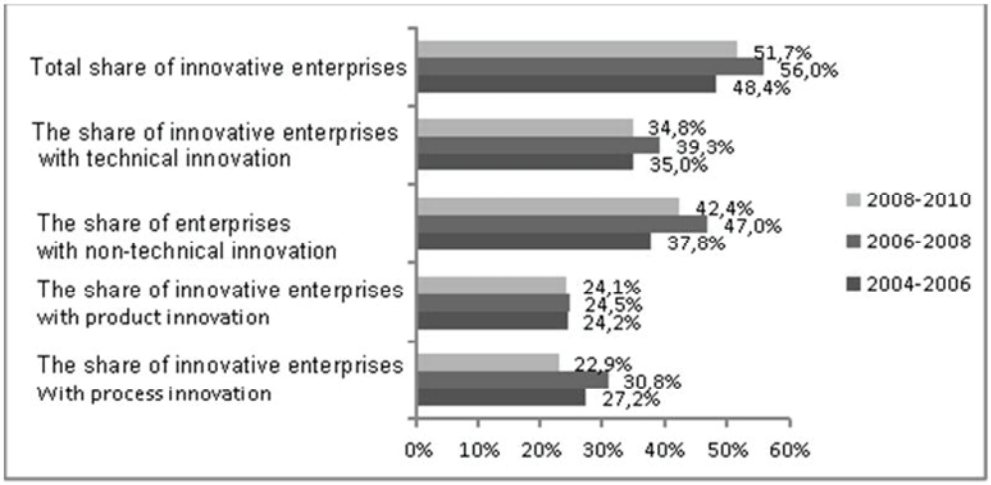


Figure 1: Enterprise's innovative activities 2004-2010, Innovation Statistics, Czech Statistical Office, 2011

If we compare the Czech enterprises with the EU enterprises by Eurostat (see Figure 2) then enterprises in the CR in terms of scale innovations are slightly above the European average. In terms of the extent of innovations, the best enterprises are in Germany (approx. 80%). The lowest tendencies for innovations on the other side of the European rankings were recorded in Latvia, Poland and Hungary (below 30%).

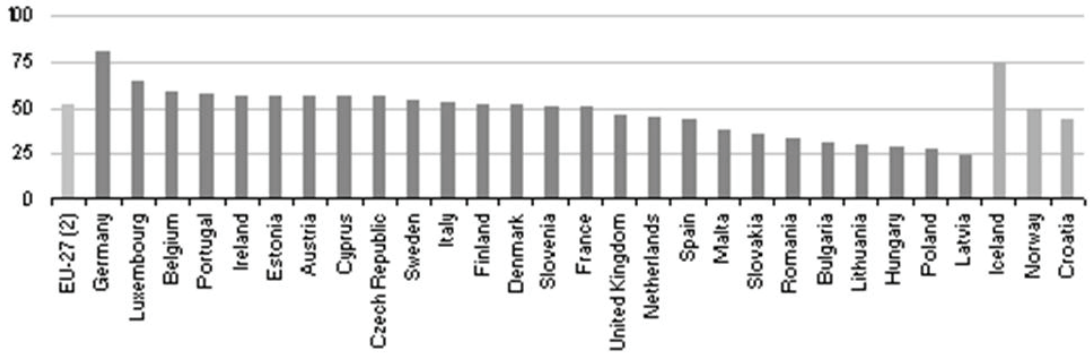


Figure 2: Proportion of innovative enterprises, 2008 (% of all enterprises), Eurostat (inn_cis6_type) http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Innovation_statistics

If we look at innovation activity by the size of an enterprise, it is clear, that large enterprises tend to innovate more than small and medium enterprises (see Table 2). For large enterprises, eight out of ten innovate. Technical and non-technical innovations in large firms are well represented as a percentage (66%). In small enterprises the percentage ratios of non-technical innovation are higher.

Table 2: Enterprises with technical and non-technical innovations between 2008-2010

Enterprises by size	Enterprises with innovative activities	Out of this	
		Enterprises with technical innovations	Enterprises with non-technical innovations
Small (10-49 employees)	46,7%	29,5%	38,4%
Medium (50-249 employees)	64,0%	46,5%	51,6%
Large (250 and more employees)	78,6%	66,2%	66,0%
The Czech Republic in total	**51,7%**	**34,8%**	**42,4%**

Source: Innovation Statistics, Czech Statistical Office, 2011

To come up with innovations and promote them to the market is not easy. The fact clearly indicates another indicator of the proportion of sales of innovative products. New or significantly improved products contributed with a relatively small share to total sales of innovative companies. In 2010 it was only 15% of the sales (see Table 3). Well established products are the key in sales.

Table 3: The sales of innovative products for technically innovative enterprises with product innovation in 2010

Enterprises by size	Sales of new products on the market	Sales of products new for the enterprise	Sales of products unchanged or slightly modified
Small (10-49 employees)	19,7%	18,4%	61,9%
Medium (50-249 employees)	10,9%	14,7%	74,4%
Large (250 and more employees)	15,7%	16,0%	68,3%
The Czech Republic in total	**15,1%**	**15,9%**	**69,0%**

Source: Innovation Statistics, Czech Statistical Office, 2011

Very interesting results are provided by an indicator of geographical novelty products. The crucial market for the Czech Republic enterprises is the market (one third), then the European countries (about 11%) - see Table 4. Large enterprises (250 or more employees) are more likely to bring innovative products to the Czech and foreign markets.

Table 4: Geographic novelty of innovative products for technically innovative enterprises with product innovation between 2008 - 2010

Enterprises by size	Innovated products or services were first listed within:		
	The Czech Republic	Europe	Worldwide
Small (10-49 employees)	30,5%	7,8%	4,9%
Medium (50-249 employees)	35,9%	15,5%	5,9%
Large (250 and more employees)	45,8%	21,5%	13,0%
The Czech Republic in total	**33,7%**	**11,5%**	**6,1%**

Source: Innovation Statistics, Czech Statistical Office, 2011

A brief look at development of the size structure and innovativeness of companies suggests many. First, it is the numerical growth of the smallest and most vulnerable enterprises. Large enterprises are dominant in innovative activities. Based on this overall framework and the facts, let's have a look at the two selected enterprises that belong to the large Czech firms with an interesting and innovative production profile.

4. Innovation activities in selected companies

To assess innovation activities two enterprises were chosen. By the number of employees they belong to a group of large enterprises. Selected enterprises have transnational and in some ways even global scope. The first one is a firm Linet one of the innovative leaders in the market of hospital beds. Linet in its essence represents an international holding company Linet Group SE with 12 subsidiaries. Second one is Kofola a firm belonging among the innovative leaders in the market of soft drinks. Kofola actually is an international holding company Kofola Holding, Inc. with 8 subsidiaries. Both firms excel in the field of technical product innovations - Linet in the lifting system of hospital beds, Kofola in the production of Cole-like soft drinks.

4.1 Characteristics of innovative entrepreneurial activities of Linet

Linet is a manufacturer of adjustable hospital beds and other equipment intended for hospitals, retirement homes or home care. In the field of hospital beds production the firm occupied first place in

Europe, one of the three largest companies worldwide. The company was established in 1990, in 1992 Linet made its first major contracts and in 1994 built its own development department. By extending the production hall in 1998 the firm was able to produce 10,000 pieces of products. In 1999 the company developed a new system lifting system for hospital beds, which was already applied during the production of new types of beds ELEGANZA and Multicare in 2000. In twenty years of its existence, the firm managed to multiply the invested capital 6,000 times in terms of cumulative profit after taxation, multiply 15,000 times the invested capital in terms of current market value (current market value is CZK 6 billion) and 200 times increase revenues to 2000 billion CZK (the revenues reached the level of CZK 10 million in 1991). The company owns more than 50 patent solutions. It produces annually 43 000 beds and exports to 93 countries. The export share of the sales is 88%.

The company carries out an offensive innovation strategy focused on the clinical added value. It takes into account aspects related to the nature of the industry. The hospital beds are designed so that they prevent patients from bedsores and nosocomial infections. They Improve operation function for nurses and increase self-service function for patients. This also saves time and reduces costs for operators of health care.

To demonstrate the life cycle of innovation activities of Linet, we focused our attention on the hospital bed Eleganza series, which production currently accounts for almost 50% of the volume of the entire company. To compare it, we included total sales of the enterprise (see Figure 3). Given the fact that the firm is constantly innovating its production, we chose to illustrate the product innovation cycle Eleganza ICU. This product belongs to the most important product lines of ELEGANZA. Despite the low share of production volume (only 2% of the total production of the Eleganza range), this product contributes 32% of sales from the product line of Eleganza.) Launching the product took place in the same year as the introduction of the whole line of ELEGANZA products). As the chart shows, the development of sales increased to 2007.

In 2001, the development of ELEGANZA XC was completed, which is an improved line of the product Eleganza ICU. Therefore, the production of the original product was completed in 2009. Currently, an innovative variant ELEGANZA XC is delivered to the market. 23,000 types of such products were manufactured in 2010.Their share in the production is more than 46%.

The sales curve we can see on the life cycle chart of product innovations illustrates the various procedural steps in improving the product segments ELEGANZA. During the first entry on the market (1999), product innovations of Linet were based primarily on basic research findings, later the firm ran into the knowledge limit concerning the lifting system (2007). Qualitatively, a new research solution resulted in shifting the product line to the improved product ELEGENZA XC (2009 - present).

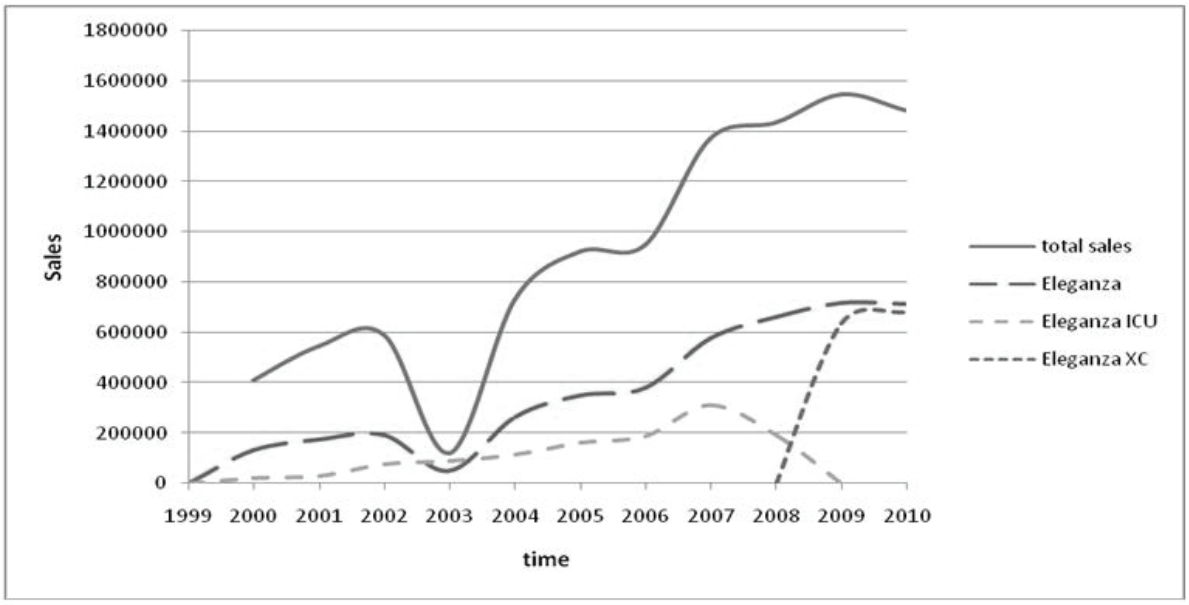


Figure 3: Life curve of product innovations of Linet - sales development, Adapted from the publication (Peterková and Gruberová, 2012)

4.2 Characteristics of innovative entrepreneurial activities of the firm Kofola

Kofola, originally a small family firm, turned into a major regional player in a course of 17 years. Kofola Group is one of the largest producers of soft drinks in Central Europe, with seven production plants. It operates on five national markets of Central and Eastern Europe. On the European markets, the firm is facing strong competition. Here belong global manufacturers of soft drinks such as Coca-Cola Company, Pepsi, Dr. Pepper Snapple Company. In the Czech Republic, the three companies control 46% of the market, 43% in Poland and 35% in Slovakia.

The company was established in 1993 in Krnov by buying soda factory and began producing carbonated beverages. The year of 1996 is considered the official formation of the company. The sales of the firm in 2011 were CZK 7.9 billion and profit after taxation was CZK 160 billion. The management of Kofola still allows for the implementation of product growth strategy and regional growth strategy. The product growth strategy was supported by investing in traditional recipes, introducing new brands, penetrating into new categories of drinks and acquisitions. Regional growth strategy was focused on regions without significant cultural and language barriers in the form of regional product niches.

In assessing the innovative activities of the firm Kofola, we focused on Cola-like (the share of sales of Cola-like beverage in total sales of the firm is around 10%), specifically Kofola, CITROCOLA and RC COLA. KOFOLA drink is very important in the production program, which is reflected in the development of sales (see Figure 4).

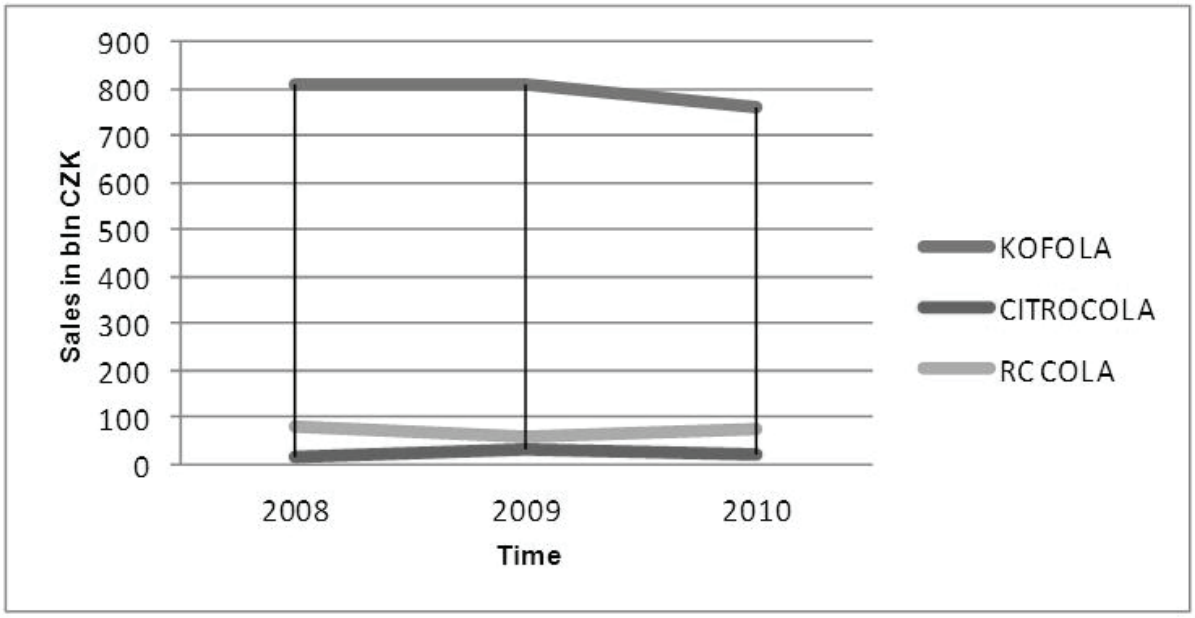


Figure 4: Sales of Cola-like beverages in the firm Kofola in recent years, Own processing based on business information

The establishment of the Kofo syrup has been associated with the firm Galena since 1957.The development of the syrup lasted for two years and is based on herbal and fruit extract containing caffeine. The top in sales are considered the seventieth of the 20th century. The stagnation of production and sales occurred at the turn of the 80´s and 90´s, because of the entry of foreign producers of Cola-like beverages on the Czech market. KOFOLA lost its popularity then and sales went down as well. The turn came in the late 90´s. The new era of KOFOLA was associated with the entrepreneurial activities of the new owner. In 2000, the beverage KOFOLA resumed its production. It met a massive success. In 2002 the company carried out the purchase of the registered trademark and original recipe of the beverage KOFOLA. The growth in sales is implemented by many successful advertising campaigns and product modification in a packaging form, and in 2004 even by modification of taste. Another innovation came in 2008, when sugar-free Kofola saw the daylight. The company has been producing limited Christmas editions since 2007. In the winter months Kofola Cinnamon, Kofola “Barborková” and Kofola “Hvězdičková” hit the market. In 2011, another innovation is implemented with a new drink Kofola Extra herb. In 2012 there is another innovation, with partial substitution of artificial dyes with natural dyes.

From both examples it is clear that the life cycle of products has its limits. Firms development, which then reflects in sales, is not possible without the involvement of research and development activities both in an enterprise and in other external involvement and innovative sources.

5. Conclusion

In the conditions of the Czech Republic we can record changes in the size structure of enterprises and in the structure of innovative activities. Over the past five years, the number of micro-enterprises (0-9 employees) has risen significantly and in particular those without employees (sole traders), which are very vulnerable and weak in its economic potential. On the other hand, there is a relatively stable number of large enterprises that dominate.

Based on analysis of available statistical data it can be suggested, that the dominant companies in the Czech economy incorporate innovations into their productive mechanism significantly more than small and medium sized firms. It is both in dominant firms economic power possibilities and the consequence of central decision-making by parent companies. Large firms pay attention to balanced technical and non-technical innovations. Despite this new or significantly improved products represent in the business sector of the Czech Republic relatively small percentage of total sales.

The realized probe into entrepreneurial activities of chosen large firms demonstrated, that the presented enterprises implement mostly technical innovations of products. With regard to their important position in the market, they apply offensive strategy towards their competition. Linet sets the direction of technical development in the market of hospital beds. Kofola uses the latest findings from the technological process of production of beverages in the modification of its products. Practical examples of successful enterprises show that the development of new products and further and higher innovation require higher growing costs on research, development and design phase, but these firms are able to successfully increase the embedded resources.

The developmental trend shows difficulties in innovations among small, e.g. micro firms. Creation of specific entrepreneurial alliances or clusters in cooperation with research and development labs can provide a solution to this situation. At the present time small companies focus more on survival. Worsening situation of their cash flow and rising distrust within entrepreneurial relations (late payments, corruption in governmental and municipal contracts, low law enforcement etc.). Those negative factors strongly influence direction of development. Comparison and analysis of statistical data of innovation domain of EU countries with CZ entrepreneurial sphere indicate moderate above-average incline toward innovations, but it is harder to exploit them to bring better economic effect.

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References

Annual report of firm Linet (2010), [online], https://or.justice.cz/ias/ui/vypis-sl?subjektId=isor%3a800009011&klic=MvekhroiijyuyJOqjug83g%3d%3d.

Annual report of firm Kofola (2010), [online], https://or.justice.cz/ias/ui/vypis-sl?subjektId=isor%3a800009011&klic=MvekhroiijyuyJOqjug83g%3d%3d.

Gibson, R. (1998) *Rethinking the Future: Rethinking Business,* Principles, Competition, Control & Complexity, Leadership, Markets and the World, Nicholas Brealey Publishing Limited, London.

Innovation Statistics, Czech Statiscical Office (2011), [online], http://www.czso.cz/csu/katalog.nsf/hledat?SearchView&count=20&searchmax=10000&searchorder=1&searchfuzzy=1&query=((inovační%20AND%20aktivity))&database=all&kraje=all&skupiny=all&start=1.

Jirásek, J. A. (2006*) Agenda příštích let*, Professional Publishing, Praha.

Jirásek, J. A. (2008) *Management budoucnosti*, Professional Publishing, Praha.

Kiernan, M. J. (1995) *Get Innovative Or Get Dead!: Building Competitive Companies For The 21st Century*, Douglas & McIntyre, Toronto.

Kotler, P. and Caslione, J. A. (2009) *Chaotics: The Business of Managing and Marketing in the Age of Turbulence*, American Management Association, New York.

Mikoláš, Z., Hučka, M., Macurová, P. et al. (2007) "Praktické projevy globalizace a nových trendů podnikové ekonomiky a managementu v soudobých podmínkách Moravskoslezského kraje", *Ekonomická revue*, Vol. 10, No. 2/3, pp 126-148.

Peterkova, J. and Gruberová, V. (2012) "Proactive Innovative Strategy", *China-USA Business Review*, Vol. 11, No. 2, pp 225-236.

Valenta, F. (2000) "Inovace. Od Schumpetera k nové ekonomice", VSE, [online], http://fph.vse.cz/valenta.htm.

Veber, J., Srpová, J. and et al. (2005) *Podnikání malé a střední firmy*, Grada Publishing, Praha.

Innovation as Value key in Enterprises: The Spanish Case

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Abstract: In the new knowledge economy, innovation is a fundamental tool in order to obtain competitive advantages. In this sense, we present a unique research in the area where we use data published by Spanish National Institute of Statistics and we discover a positive relationship between innovation results and external information received in enterprises by market agents (exclude customers). Enterprises around the world should incorporate innovation management in their strategies if they want to achieve success and survival. However, innovation management in organizations is difficult because innovation is an intangible active and for the same reason, empirical studies are difficult in this area, thus there is an interest in developing works with information about the topic. The relationship between results and information sources in innovation shows the interest of Spanish enterprises in external information in order to improve their innovation results. These innovation results are really important for the development of organizations competitiveness. Therefore the cooperation of the economy agents (not customers because sensitivity tests conducted to theexclusion of this variable) involved in the value chain and the cooperation between competitors is essential with the purpose of maximize competitive advantages. As a result, with this research we want to help to enterprises in their decision making process related with innovation activity and amplifying the available information in the area at the moment. Moreover this research contributes to academic world highlighting a fundamental relationship in the innovation area across the Spanish case.

Keywords: innovation, market agents, competitiveness, causal relationship, external sources

1. Introduction

In the new knowledge economy, innovation is a fundamental tool in order to obtain competitive advantages. In this sense, there is a positive relationship between innovation and the economy growth (Chen and Dahlman, 2004). Economy theory (Solow, 1957; Romer, 1986) shows that the technological progress is the best resource in order to increase productivity, and an efficient innovation system is essential for society advance. For innovation system we understand institutions networks, rules and procedures that increase knowledge acquisition, creation and use (Chen and Dahlman, 2004).

In this sense, the aim of this paper is identify the relationship between the external sources of information and the innovation results in businesses. This relationship is essential for the enterprises that they want to improve their innovation results using external sources like customers, suppliers, competitors and consultants (customers are excluded in this research because sensitivity tests conducted to theexclusion of this variable). As consequently, we present a unique research in the area where we use Spanish data in order to present a start point in innovation area.

We structure the paper as follows: first we offer a first approach about innovation concept, analyzing its interest in present society and its value for the organizations across a bibliographic review. In the next section, we present the methodology used for the empirical analysis, the sample, the years and the selected variables. In the next section we present the empirical results and we show like innovation results are related with external information provides by market agents. In the same section, we develop the empirical results and finally, the last section includes the principal conclusions about the research, the importance in innovation area and the future researches.

2. Theoretical background

Sawhney*et al.*define business innovation as “the creation of substantial new value for customers and the firm by creatively changing one or more dimensions of the business system” (2011, p. 28). For business innovation, enterprises need innovation capability that is defined like the use of interesting knowledge in order to implement creative ideas in the organization (Zhao *et al.,* 2005).

Innovation is linked with strategy in enterprises, because if there is not it, innovation success is not possible (Lawson and Samson, 2001). In this sense, strategy is necessary in order to put resources, products, process and systems, and all of them are connected with innovation activity (Akman and Yilman, 2008).Enterprises need innovations if they want to growth and improve their performance in a dynamic and changing environment as the current, so innovation is a strategic tool for businesses (Gardaker*et al.,* 1998).

Innovation is linked with some factors and one of them is the external resources because organizations need different sources of information for innovation (Crespi*et al.,* 2008). Some studies have identified innovation success with businesses that use more heterogeneous knowledge (Ahuja and Lampert, 2001; Ahuja and Katila, 2004; Katila and Ahuja, 2002). This heterogeneous knowledge is linked with different information sources like, for example, with external sources like customers and suppliers that can affect to the innovation results (Rosenkopf and Nerkar, 2001; Ahuja and Katila, 2001; Laursen and Salter, 2006; Veugelers and Cassiman, 1999). Managers and organizations can learn about the technology from outsiders like customers, suppliers, competitors and consultants (Wang, 2009).

On one hand, customer collaboration is essential in order to improve the products and services in organizations (Lusch*et al.,* 2007). In this sense customers are an interesting source of information and businesses should incorporate their proposals in organizations during the course of their innovation activities (Blazevic and Lievens, 2008) in order to improve their performance. In this sense, customer and enterprise relationship is an output that is called as *coproduction*, where the degree to which customers and companies create new knowledge with their interaction (Lusch*et al.,* 2007).

Some studies show that customer participation in businesses have had a positive effect for innovation activities particularly (Chesbrough, 2003; Laursen and Salter, 2006; Lichtenthaler, 2008), and for companies in general (Blazevic and Lievens, 2008) like for example Bowners*et al.* (1990), who linked customer participation with a lower cost, Lovelock and Young (1979) who linked it with increase the efficiency, and Meuter*et al*.,(2000) who linked it with customer satisfaction. As consequently, we propose this hypothesis:

H.1. *There is a positive relationship between information by the customers and innovation results in businesses.*

Another external source provides by the suppliers. Although the suppliers have not been researched intensively, they are linked with the innovation process (Gassmann*et al.,* 2010). Following Hagedoorn (1993, 2002), when the suppliers participate into the first phases in innovation process, the innovation performance could be increase. In addition, organizations linked with suppliers that have strategic learning goals in the contract, will have a positive effect in their internal competencies (Nordberg *et al.,* 2003). In this sense and about suppliers highlight, we propose the follow hypothesis:

H.2. *There is a positive relationship between information by the suppliers and innovation results in businesses.*

Another external source is competitors. In general, economic theory has related competition with a better performance and good management practices (like for example, Nickell, 1996; Okada, 2005). In the case of innovation, competition connects with technological best practices (Boldrin*et al.,* 2011). This point is linked with competitor orientation, that it can be defined like ability of firm to define and analyze its competitors´ activities and to response them (Gatignon and Xuereb, 1997). In this sense, we propose the follow hypothesis:

H.3. *There is a positive relationship between information by the competitors and innovation results in businesses.*

Finally, literature identifies another external source in order to improve their innovation results: consultants (Wang, 2009). Related with this point, we propose the follow hypothesis:

H.4. *There is a positive relationship between information by the consultants and innovation results in businesses.*

Based on this information, and in general, we propose the follow hypothesis, understanding external sources like customers, competitors, suppliers and consultants.

H.5. *There is a positive relationship between external sources and innovation results in businesses.*

All of these external sources (customers, suppliers, competitors and consultants) are related with that we know such as relational capital. Relational capital, also called like relational proximity, is connected with synergies, cooperation and sharing same values (Aydalot, 1986) between individuals and following Capello (2002), who define relational capital like "*a stock of relations that a firm can entertain with other firms, institutions, research centers, measure med through the intensity of cooperation among local actors"* (2002: abstract), identify a relationship between relational capital and innovation activity in business.

Also external sources of innovation activity are linked with the value chain. Managers identify innovation process such an integrated flow, and it is linked with the Michael Porter´s value chain that it is defined like a system of interdependent activities (Porter, 1985). In this sense, organizations generate and select ideas, and after these ideas will be spread across the value chain (Hansen and Birkinshaw, 2007).

Enterprises´ competitiveness is affected by the linkages within the organization´s own value chain activities and also by the value chain linkages between customers and suppliers. As consequently, a network is identified (Nordberg *et al.,* 2003) and the value chain is the base of these relationships.

3. Research methodology

3.1 Database and sample

We realize the empirical analysis with the results of the questionnaires about innovation in enterprises in the year 2010 in Spain. They are published by the National Statistics Institute from Spain (INE), and we have accessed to the database in January 2012. This database distributes objective information about Spanish characteristics in general, and specifically we use innovation data in Spanish businesses. We select the year 2010 because it was the more recently year published by the institute when we accessed to the data.

The sample is composed by two parts: on one hand, it is composed by enterprises that can develop research and development (R+D) activities with more than 200 workers and on the other hand, another random sample extracted by Central Directory of Enterprises (DIRCE). As consequently, final sample is composed by more than 40.000 firms.

Following INE website, the method of collection is a mixed system that includes the completion of mailings and the involvement of interviewers, with telephone support.

Our research focuses in how do Spanish Businesses manage innovation using external sources, therefore it includes all of activity sectors according to National Classification of Economic Activities code (NACE 2009), except *NACE 72 Research and Development Services (R+D Services)*. We have not included *NACE 72* because the principal activity of these businesses is innovation and innovation is the aim of our paper. In consequently, if we include *NACE 72 R+D services*, the results of the empirical analysis could be distorted.

3.2 Description of variables

In the proposed model, variables have been selected across their relationship with innovation results and information sources, because both of them are linked with our hypothesis. Following Williams *et al.* (1989), we have positioned first the constructs and second the explanatory variables inorder to reduce any effect implicit in respondents and mitigate the problem of common variance.

On one hand, we identify the construct *Economic impact of innovations in turnover.* It tries to explain the percentage in the total turnover of the revenue due to innovative activities and it includes two variables: (1) *Percentage in the total turnover due to goods and services that have been introduced in the time 2008-2010 new in the enterprise* and (2) *Percentage in the total turnover due to goods and services that have been introduced in the time 2008-2010.*

On the other hand, we identify the construct *Extern sources for innovation activities.* It tries to explain what were the sources of information used by companies to make decisions in innovation activities and it includes four variables: (1) *Information provided by suppliers of equipment, components or software*, (2) *Information provided by customers*, (3) *Information provided by competitors or another enterprises in the same industry* and (4) *Information provided by R+D consultants, commercial laboratories or private institutes.* We have not considered control variables because the number of cases is near of the minimum, so their application would not contribute with significant information.

Table 1 includes a summary table with the relationships and the codes in the analysis.

3.3 Research method

We use Structural Equation Modeling (SEM) technique for this research. SEM technique allows studying the causal relationships between directly observable data across the proposing the type and direction of the expected relationships, and subsequent parameter estimation specifies by the relationships in the theory (Barret, 2006). As consequently, SEM is called confirmatory analysis, because its aim is confirm across the analysis of the sample the relationships (Jöreskog, 1979).

We use SPSS (Statistical Package for the Social Sciences) and more specifically the AMOS application (version 19) in order to test our hypothesis. First, we check the validity of the model analyzing the normality (uni and multivariate) and reliability scale. After these checks, the analysis per se includes two phases: (1) evaluation of measure model and (2) evaluation of structural model (Barclay *et al.,* 1995)

Table 1: Summary about the relationships and the codes

Construct		Explanatory variable	
Code	Description	Code	Description
CNIN	Economic impact of innovations in turnover	CNNEMPR	Percentage in the total turnover due to goods and services that have been introduced in the time 2008-2010 new in the enterprise
		CNNMERC	Percentage in the total turnover due to goods and services that have been introduced in the time 2008-2010
INFEX	Extern sources for innovation activities	INFPROV	Information provided by suppliers of equipment, components or software
		INFCLIEN	Information provided by customers
		INFCOOP	Information provided by competitors or another enterprises in the same industry
		INFCTEC	Information provided by R+D consultants, commercial laboratories or private institutes

4. Results and interpretation

4.1 Sensitivity analysis

The table of descriptive statistics informs about the univariate normality of the data (see Table 2). Results show univariate normality of the data, with less than I3,00Iasymmetry and also less than I8,00I kurtosis in observed variables (Bollen and Long,1993). In relation to the multivariate normality, we calculate Mardia coefficient. Such as Mardia coefficient is less than $p(p+2)$, where p is the number of observed variables in the model, we identify multivariate normality (Bollen, 1989) because the value is 23,527.

We use the Cronbach alpha in order to check validity and reliability of observed variables. The results show 0,711 for variables in construct *economic impact of innovations in turnover* and 0,869 for variables in construct *extern sources for innovation activities*. The minimum of the value for Cronbach alpha is 0,7, so model data is reliable and valid (Nunnally, 1978). As consequently, results show the suitability of the method of maximum likelihood estimation (ML) analysis.

Table2: Descriptive statistics and validity and reliability checks

			Asymmetry		Kurtosis	
	Average	**Standard deviation**	**Statist**	**Standard error**	**Statist**	**Standard error**
CNNEMPR	14,6038	5,96586	0,335	0,365	-0,463	0,717
CNNMERC	11,7431	8,21916	1,059	0,365	0,63	0,717
INFPROV	8,3986	4,30343	0,708	0,365	-0,287	0,717
INFCLIEN	8,1388	7,24574	1,215	0,365	0,383	0,717
INFCOOP	3,9429	3,5204	2,088	0,369	4,872	0,724
INFCTEC	3,275	2,68058	1,623	0,365	3,029	0,717

Cronbach alpha					
Value	**All variables**	**Value**	**Econ. Impact variables**	**Value**	**Extern sources variables**
0,82	6	0,711	2	0,869	4

4.2 Phase 1: Measurement model

In the model, we check if explanatory variables are appropriate for constructs. These models are based in covariance structures, therefore they have indexes to evaluate the components of the factor structure of the model and it requires factor loadings between 0,5 and 1 (Schumacker & Lomax, 2004). We check this condition (see Table 3), and all of the variables except INFCLIEN satisfy the condition. As consequently, we delete the variable INFCLIEN, because it is not explain the construct.

Table 3: Standardized regression weights

			Estimate
CNNEMPR	<---	CNIN	,764
CNNMERC	<---	CNIN	,759
INFPROV	<---	INFEX	,757
INFCTEC	<---	INFEX	,787
INFCOOP	<---	INFEX	,863
INFCLIEN	<---	INFEX	1,015

We realize the analysis of availability and reliability again without the rejected variable because the models change. In this sense, we use again Cronbach alpha for each group of variables (see Table 4). The results show a Cronbach´s alpha of 0,711 for the construct *Economic impact of innovations in turnover,* and a Cronbach´s alpha of0,826 of the construct *Extern sources for innovation activities.* Therefore data in the model are available and reliable.

We check again without INFCLIEN the loading factors (see Table 5) and we identify the model like correct. The explanatory variables have highlight loading factors, therefore they explain significantly the constructs.

Table 4: Validity and reliability check

Cronbach alpha	Value	All variables	Value	Econ. impact variables	Value	Extern sources variables
	,727	5	,711	2	,826	3

Table 5: Standardized regression weights without INFCLIEN

			Estimate
CNNEMPR	<---	CNIN	,805
CNNMERC	<---	CNIN	,720
INFPROV	<---	INFEX	,789
INFCTEC	<---	INFEX	,946
INFCOOP	<---	INFEX	,731

And as result, the final model is represented in Figure 1, where we can see the correlation value between the constructs.In this sense, we identify a moderate correlation (around 0,48) between use extern sources for innovation activities and the economic impact of innovations in turnover.

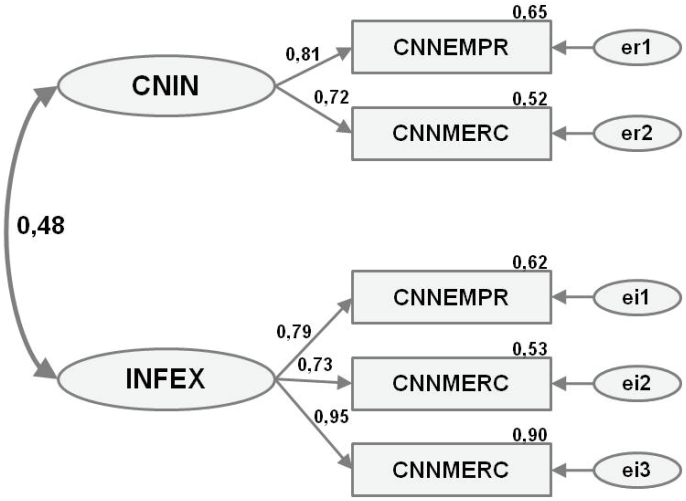


Figure 1: Equation structural relation between economic impact of innovations in turnover and Extern sources for innovation activities

4.3 Phase 2: Structural model

In this section, we recognize the measures of global adjustment in order to identify how the model predicts the initial data matrix. This adjustment will be perfect when there was a perfect correspondence between the matrix reproduced by the model and the matrix of observations. For this, we propose absolute measures of fit in order to evaluate the goodness of fit considering sample size and number of indicators (Schumacker and Lomax, 2004). Meanwhile incremental adjustment measures or descriptive are based on model comparison, and they compare proposed model with the worst model. In this sense, this offers information about the degree of reality of the model. Finally, parsimony adjustment measures is the degree to which the model fit achieve the adjustment for each estimated coefficient. Table 6 contains the indicators and their recommend values.

Table 6: Global adjustment indexes

Index	Measure	Shorthand	Acceptable fit
Absolute adjustment	Chi-square	□□	≤ 5
	Root Mean Square Error of Approximation	RMSEA	< 0,06
	Standardized Root Mean Squared Residuals	SRMR	≤ 0,08
	Goodness of fit index	GFI	≥ 0,95; ≤ 1
Incremental adjustment	Non-Normed Fit Index	NNFI	≥ 0,97; ≤ 1
	Normed Fit Index	NFI	≥ 0,95; ≤ 1
	Relative Fit Index	RFI	≥ 0,90
	Comparative Fit Index	CFI	≥ 0,97; ≤ 1
	Incremental Fit Index	IFI	≥ 0,90
Parsimony adjustment	Parsimony adjusted-NFI	PNFI	Next to 1
	Parsimony adjusted-CFI	PCFI	Next to 1
	Minimum value of the discrepancy/Degrees of Freedom	CMIN/DF	≥ 1; ≤ 5
	Hoelter critical N in the output path for α = 0,01	Holter.01	≥ 200

The model is recursive and it has five items for two endogenous constructs (dimensions). Degrees of freedom are four and the number of estimate parameters is sixteen. In general, the model presents good fits, with exception of two parsimony indicators (see Table 7).

4.4 Results

First model presents a loading factor more than 1 for INFCLIEN variable;therefore it has been excluded as explanatory variable in INFEX construct. As consequently, we cannot verify or refute hypothesis 1. Like customer´s information is very important for organizations (Chesbrough, 2003; Laursen and Salter, 2006; Lichtenthaler, 2008), this variable and its impact in innovation results should be analyze alone in future researches.

Table 7: Adjustment of the model

Absolute adjustment			Incremental adjustment			Parsimony adjustment		
Measure	Value	Acceptability	Measure	Value	Acceptability	Measure	Value	Acceptability
Chi-square	4,58	Good	NNFI	0,97	Very good	PNFI	0,25	Bad
RMSEA	0,05	Very good	NFI	0,95	Good	PCFI	0,27	Bad
SRMR	0,01	Very good	RFI	0,80	Marginal	CMIN/DF	1,14	Good
GFI	0,95	Very good	CFI	0,99	Very good	Holter.01	122,00	Marginal
			IFI	0,99	Very good			

On the other hand, INFPROV, INFCT and INFCOOP show high loadings factor, thus the explain quality of the construct is high too and we can confirm hypothesis 2, hypothesis 3 and hypothesis 4. In this sense, we highlight the information remitted by suppliers, consultants and competitors in order to improve the innovation activity in organizations.

The case of INFCOOP variable is very interesting. It is linked with competitors and, as consequently, it is linked with *coopetition* theory (cooperation + competition). *Coopetition* theory identifies cooperation with competitors like an essential factor in order to improve their competitiveness, especially in the case of small and medium enterprises because across the *coopetition* they can overcome the barriers that they have in some aspects such as innovation and internalization. Therefore, cooperation with competitors is a key question in a model based in sustainable and competitive innovation (Larrea, 2010). In future researches, we could explore more about this interesting relationship.

The principal result is our finding about the moderate correlation between use extern sources for innovation activities and the economic impact of innovations in turnover, because it highlights the importance of the relational capital and the relationship between the agents of the value chain. This discovers suppose a contribution in innovation area and a start point for future researches. In relation to model adjustment, the accuracy of the model gives very good results, a fact which is repeated with incremental adjustment measures. This means that proposed model is approximated to reality and, as consequently, hypothesis 5 is confirmed (excluding customers in external agents).

However, parsimony adjustment is far from recommended values, so we cannot affirm that the behaviour of the model will be the same with another sample. In this sense, in a future research we can reply the analysis for other samples, in order to compare the situations and obtain more conclusions about the topic.

5. Conclusions

In our global world, where innovation is a fundamental source in order to obtain competitive advantages, relevant information sources are essential in decision making process for managers in businesses.

In this sense, we present a measurement model with highlight loadings factors in constructs based in the case of Spanish firms where the variables explain the content of the constructs. The study shows a moderate correlation between use extern sources (exclude customers) for innovation activities and the economic impact of innovations in turnover that highlights the importance of information by external agents in innovation. This means that enterprises focused on the market (not only with customers) and this finding is linked with relational capital and the relationships in value chain, both of them are interesting topics for empirical analysis in future researches.

The research reveals that in Spain the best external information sources in business are competitors and other enterprises in the same industry. As consequently the use of *coopetition* (cooperation + competition) is an interesting factor because it could be a source of competitive advantages.

In addition, we identify a relationship between information provided by economic agents (not customers) and turnover from innovation activities (positive effect) if managers incorporates this information to decision making process. However, the results of parsimony analysis show that this analysis is effective with this Spanish data, but we cannot to know what happen if we repeat this analysis with another data. So in future researches we want to replicate this analysis with another

sample like for example, sectors of high and medium technology in order to validate our model. Also, we could analyze the variable INFCLIEN separate in order to accept or reject hypothesis 1.

As a result, with this research we want to help to enterprises in their decision making process related with innovation activity and amplifying the available information in the area at the moment. Moreover this research contributes to academic world highlighting a fundamental relationship in the innovation area across the Spanish case.

References

Ahuja, G. and Katila, R. (2001) "Technological acquisitions andthe innovation performance of acquiring firms: a longitudinal study",*Strategic Management Journal,*Vol22, No. 3,pp. 197–220.

Ahuja, G. and Katila, R. (2004) "Where do resources come from?The role of idiosyncratic situations", *Strategic Management Journal*, August–September, Special Issue 25, pp. 887–907.

Ahuja, G. andLampert, C.M. (2001)"Entrepreneurship in the large corporation: a longitudinal study of howestablished firms create breakthrough inventions",*Strategic Management Journal,* June–July SpecialIssue 22, pp. 521–543.

Akman, G. and Yilmaz, C. (2008) "Innovative capability, innovation strategy and market orientation: An empirical analysis in Turkish software industry", *International Journal of Innovation Management,* Vol 12, No. 1, pp. 69-111.

Aydalot, P.H. (1986) MilieuxInnovateurs en Europe, GREMI, Paris.

Barclay, D., Higgins, C. and Thompson, R. (1995) "The partial least squares (PLS) approach to causal modelling: personal computer adoption and use as an illustration", *Technology Studies,* Vol 2, No. 1, pp. 285-324.

Barret, P. (2006) "Structural equation modeling: adjudging model fit", *Personality and Individual Differences,* Vol 24, pp. 815-824.

Blazevic, V. and Lievens, A. (2008) "Managing innovation through customer coproduced knowledge in electronic services: An exploratory study", *Journal of the Academy of Marketing Science*, Vol 36, pp. 138-151.

Boldrin, M., Correa-Allamand, J., Levine, D.K. and Organhi, C. (2011) "Competition and innovation", *Cato Papers on Public Policy*, Vol. 1, pp. 2-62.

Bollen, K. (1989) *Structural equations with latent variables,* Wiley & Sons, New York, NY.

Bollen, K. and Long, J. (1993) *Testins structural equation models,* Sage, Newbury Park: CA.

Capello, R. (2002) "Spatial and Sectoral Characteristics of Relational Capital in Innovation Activity", *European Planning Studies,* Vol. 10, no. 2, pp. 177-200.

Chen, D.H.C. and Dahlman, C.J. (2004) "Knowledge and development: A cross-section approach", *World Bank Policy Research,* Working paper #3366.

Chesbrough, H. (2003) *Open Innovation,* Harvard University Press, Cambridge, MA.

Crespi, G., Criscuolo, C. and Haskel, J. (2008) "Productivity, Exporting, and the Learning-by-Exporting Hypothesis: Direct Evidence from UK Firms", *Canadian Journal of Economics,* Vol41, No. 2, pp. 619-37.

Gardaker, G., Ahmed, P.K. and Graham, G. (1998) "An integrated response towards the pursuit of fast time to market of NPD in European manufacturing organizations", European Business Review, Vol 98, No. 3, pp. 172–177.

Gassmann, O., Enkel, E., and Chesbrough, H. (2010) *"The future of open innovation", R &D Management,* Vol 40, No. 3, pp. 213-221.

Gatignon, H. and Xuereb, J.M. (1997) "Strategic orientation of the firm and new product performance", *Journal of Marketing Research*, Vol 34, No. 1, pp. 77–79.

Hagedoorn, J. (1993) "Understanding the rationale of strategic technology partnering: inter-organizational modes of cooperation and sectorial diferences", *Strategic Management Journal,* Vol 14, No. 5, pp. 371-385.

Hagedoorn, J. (2002) "Inter-firm R&D partnerships: An overview of major trends and patterns since 1960", *Research Policy,*Vol 31, No. 4, pp.477-492.

Hansen, M.T. and Birkinshaw, J. (2007) "The innovation value chain", *Harvard Business Review,* Vol. 85, June, pp. 121-130.

INE, available at: www.ine.es, [Accesed 15 february 2012].

Jöreskog, K. (1979) "A general approach to confirmatory maximum likelihood factor analysis with addendum", in *Advances in factor analysis and structural equation model,* Ed. E. Sörbom, Abt Books, Cambridge.

Katila, R. and Ahuja, G. (2002) "Something old, something new: a longitudinal study of search behavior and new project introduction", *Academy of Management Journal*, Vol 45, pp. 1183–1194.

Larrea, J. (2010) *Teoría (imperfecta) de la innovación. Toda apariencia de perfección es sospechosa*, Pirámide, Madrid.

Laursen, K. and Salter, A.J. (2006) "Open for innovation: The role of openness in explaining innovative performance among UK manufacturing firms", Strategic Management Journal, Vol 27, No. 2, pp. 131–150.

Laursen. K. and Salter, A. (2006) "Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms", *Strategic Management Journal*, Vol 27, No. 2, pp. 131–150.

Lawson, B. and Samson, D. (2001) "Developing innovation capability in organizations: A dynamic capabilities approach", *International Journal of Innovation Management*, Vol 5, No. 3, pp. 1–23.

Lichtenthaler, U. (2008) "Open innovation in practice: An analysis of strategic approaches to technology transactions", *IEEE Trans. Engrg. Management,*Vol 55, No. 1, pp. 148–157.

Lovelock, C.H. and Young, R.F. (1979) “Look to consumers to increase productivity”, *Harvard Business Review*, Vol 57, No. 3,pp. 168–178.
Lusch, R.F., Vargo, S.L. and O’Brien, M. (2007) “Competing through service: Insights from service-dominant logic”, *Journal of Retailing*, Vol 83, No. 1.
Meuter, M.L., Ostrom, A.L, Roundtree, R.I. and Bitner, M.J. (2000) “Self-service technologies: Understanding customer satisfaction with technology-based service encounters”, *Journal of Marketing*, Vol 64, No. 3, pp. 50–64.
Nickell, S.J. (1996) “Competition and Corporate Performance”, *Journal of Political Economy*, Vol. 104, pp. 724-746.
Nordberg, M., Campbell, A. and Verbeke, A. (2003) “Using customer relationships to acquire technological innovation: A value-chain analysis of supplier contracts with scientific research institutions”, *Journal of Business Research,* Vol. 56, pp. 711-719.
Nunnally, J. (1978) *Physhometric theory, 2nd ed.,* McGraw-Hill, New York, NY.
Okada, Y. (2005) “Competition and Productivity in Japanese Manufacturing Industrie”,' NBER *Working Paper No. 11540*.
Porter, M.E. (1985) *Competitive advantage,* Free Press, New York.
Romer, P.M. (1986) “Increasing returns and long-run growth”, *Journal of Political Economy,* Vol94, pp. 1002-37.
Rosenkopf, L. and Nerkar, A.(2001) “Beyond local search: boundary-spanning, exploration, and impact in the optical disk industry”, *Strategic Management Journal,*Vol 22, No. 4, pp.287–306.
Sawhney, M., Wolcott, R.C., and Arroniz, I. (2011) “The 12 different ways for companies to innovate”, *Sloan Management Review*, Winter, pp. 28-34.
Schumacker, R. and Lomax, R. (2004). *A begginer´s guide to structural equation modeling, 2nd ed.,* Lawrence Eribaum Sociates, Mahwah.
Solow, R.M. (1957) “Technical Change and the Aggregate Production Function”, *Review of Economics and Statistics,* Vol39, pp. 312-320.
Veugelers, R. and Cassiman, B. (1999) “Make and buy in innovation strategies: evidence from Belgian manufacturing firms”, *Research Policy*, Vol 28, No. 1, pp. 63–80.
Wang, P. (2009) "Popular Concepts Beyond Organizations: Exploring New Dimensions of Information Technology Innovations”, *Journal of the Association for Information Systems,* Vol 10, No.2, pp. 1-30.
Williams, L., Cote, J. and Buckley, M. (1989) “Lack of method variance in self-reported affect and perceptions at work: Reality or artefact?”, *Journal of Applied Psychology,* Vol 74, No. 3, pp. 462-468.
Zhao, H., Tong, X., Wong, P.K. and Zhu, J. (2005).“Types of technology sourcing and innovative capability: An exploratory study of Singapore manufacturing firms”, *Journal of High Technology Management Research*, Vol 16, pp. 209–224.