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Dr. Chammy Lau PhD

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Research Proposal

Management of Complexity: The Mediating Effects of Complexity and

Authentic Leadership

on the

Successful Delivery of International Projects

John Mortensen

Student ID No.:2134211

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Introduction

Projects are an integral aspect of social development. Projects exist on multiple levels across all sectors of society and have been critical in the development of culture and society. Increasingly, projects have become more complex as they have become both technically more sophisticated in terms of design, construction and functional requirements, and organizationally projects have become more complex as the increased technological challenges demand bigger networks of specialists to design build and operate the buildings. Globalization and the rapid growth in wealth of developing countries has increased the demand for sophisticated building projects internationally. Hospitals, airports, infrastructure, education and research facilities for example, require specific specialisms in design and construction which demand the input of international specialists.(Müller and Turner 2007)

In addition to the technical complexity of international projects is the expansive nature of the temporary organizations which are formed to undertake international projects. Many of the projects in developing countries are government funded which introduces layers of federal and provincial bureaucracy. Government officials may not have a business interest in the project, but they are none the less highly influential. In the case of the Juilliard School of Music for example, which was the motivation for this study, the First Lady of China, Peng Li Yuan, was directly involved in meetings with the Juilliard School as the Government of China worked to attract Juilliard to develop a branch campus. Although the First Lady had no direct involvement in the project, her influence informed decisions made on scheduling the opening of the school and her attention to the project introduced an unexpected level of pressure on local staff.

Managing the amorphous network organization of stakeholders, is the job of the Project Manager. A role which has historically focused on the technical logistics of moving materials and labour in a scheduled manner, to achieve the time, cost and quality expectations of the

investor, a formula that worked when the owner the architect and the builder were the only stakeholders. However, the sophistication of today's projects with the diverse stakeholder networks and technical complexity makes the iron triangle of time cost and quality an inadequate metric for the evaluation of success. Indeed, projects need a level of Leadership commensurate with the sophistication of the project network organization, rather than management.

This study looks at the nature and type of leadership required to manage complex international projects. Authentic leadership became a focus of attention in the early 2000's. Luthans and Avolio (2003) describe a period at the beginning of the 21st century, of turbulent social and political complexity. New technologies were transforming and globalizing communication and business. There was a rash of devastating corporate collapses: Enron, WorldCom, Tyco for example, in which corrupt and illegal practices were major contributors. It was apparent that leadership had lost its ethical compass and was motivated by the desire for power and wealth over sustainable growth and the development of stable organizations. Luthans and Avolio (2003) identified the need for type of leadership that was based in values, integrity, self-reflection and balanced decision making, authentic leadership.

As will be outlined in this paper, it is recognized that complex projects are business systems of highly sophisticated differentiated actors (Windeler and Sydow 2001; Ahola 2009), interacting in a complex and structured manner to complete multiple tasks. The project system in construction is as prone to corrupt or incompetent behaviour as any business. The consequences can be disastrous. The origins of 'authenticity' can be found in Greek philosophy, "To thine own-self be true". Luthans and Avolio (2003) describe authentic leadership as a process that has its foundations in "positive psychological capacities and highly developed organizational context, which results in both greater self-awareness and self-regulated positive behaviours on

the part of leaders and associates.” In essence it is leadership which provides a positive model to develop authentic followers.

Defining a Project

A project is a temporary arrangement of or organization of players with a common purpose in the delivery of the Projects confront risks, physical risks to the builders, financial risks to the investors, reputational risks to the project sponsors, environmental risks to the stakeholders who will be affected by the project, and operational risks to the end users for whom the project may have been envisioned.

Studies of project management have traditionally fallen into two categories: prescriptive procedural advice on how to manage a project in a sequential manner, or studies in how to avoid common risks in project performance. Normative studies based on various accepted constructs of the stages of a project defined by industry organizations RIBA, PMI, ISO

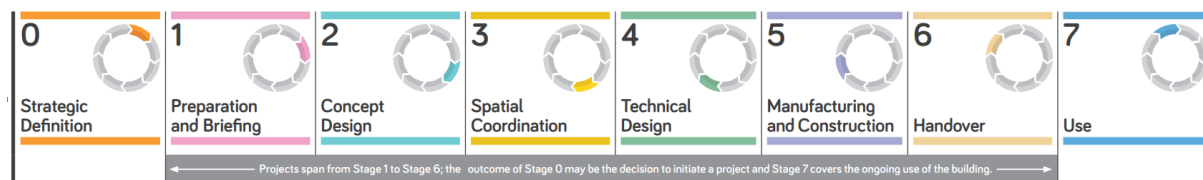


Figure 1 RIBA Project Stages

Project Management studies look at the areas under the control of the project manager: schedule management, scope management, resource management, communication management, risk management, and the so-called iron triangle of time cost and quality which have been the defining metrics of projects for since the industrial area. These are the traditional standards of project management control on single projects with clearly defined objectives, undertaken within a familiar context.

The study of complexity in projects is a recent area of interest made more important by the growth in the number international projects bringing together large numbers of players from

diverse national and cultural backgrounds undertaking complex infrastructural and technical projects funded publicly and privately. These projects frequently magnify the attention of stakeholder impact when projects take place on rural land, depend on local unskilled labour and may produce.

The days of a single company being able to meet the technical requirements of complex developments have passed. Complex international structures are now being designed by networked project organizations which come together temporarily and disband. In the case of international projects.

Integrating the participation and timing of international teams requires its own level of management. Projects which are performed internationally, in unfamiliar locations with unfamiliar participants and unfamiliar social and political norms become complex projects.

Complex projects require specific skills and experience. A project may be initiated because of a local infrastructural or cultural need and locally lack the experience, technology or know how to undertake the work. Power generation plants, high speed rail, super tall buildings and university campuses, for example, all require specialist skills in design and construction and frequently in finance. Furthermore, the intended operator may be an international institution or entity with specific requirements for the operations of the facility the need for timeliness and clarity of communication can mean significant differences to the outcome of the project.

Business, industry, healthcare, education, the arts, all make reference to the concept of projects (Artto and Kujala 2008) to define a specific event in time requiring special focus and attention from an individual or team in the pursuit of a defined outcome, often within a defined timeframe. Studies by Artto and Kujala (2008) for example, have highlighted the project-based nature of activities in the development of modern societies.

Significant in the consideration of major international projects is the collaborative roles of an organization of contributors to the successful completion of the project. Major construction projects now require levels of expertise in specific fields which are beyond the capability of any single consultant or contractor to provide. The pervasive penetration of technology not only contributes to the final use of most buildings, but also to the manner in which they are designed and the techniques required to construct them. Complex international projects, which are the focus of this study, generally involve a network organization of multiple specialist players from different countries, contributing specific know as parts of the whole project.

Defining Complexity

The construction industry is arguably the most complex industry (Baccarini 1996) Since the WWII the construction industry has become more progressively complicated. We are now in the midst of a new era of complexity induced by the pervasive implementation of technology at every stage of the design, construction and operations of a new building.

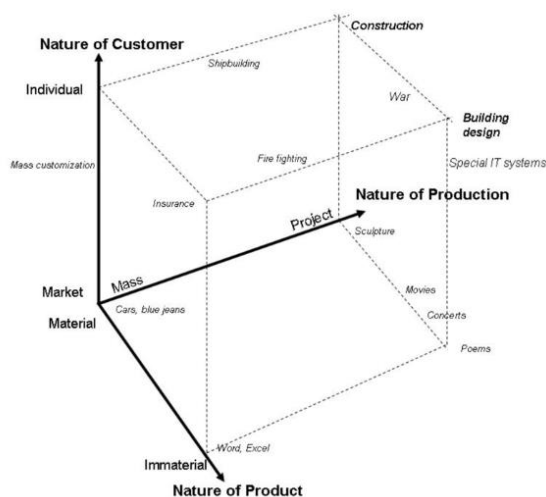


Figure 2 Dimensions of Complexity Baccarini (1996)

The impact of complexity in project management can be observed in the planning and set up of a project. The structure of the organization required to undertake the project and the setting of metrics for success(Baccarini 1996). Complex international projects require big teams of participants with diverse specialisms. Project organizations are working

systems. Complexity Theory is concerned with the “behaviour over time, of certain types of systems” (Rosenhead et al. 2019)

Project complexity can be viewed from two perspectives: the technical aspects of design, construction method and building function. Secondly, from the organizational perspective. How many specialists required to design the building, the replication of design teams across geographic borders for international projects. The involvement of Government authorities in state sponsored projects, the sequencing of specialist trades during the construction process and the commissioning of complex technical systems prior to handover to the end user. Plus the engagement of multiple stakeholders with or without a commercial interest in the project for example, local communities and environmental advocates. These large networks of participants are described as temporary project organizations (Baccarini, 1996) They operate in both vertically and horizontally differentiated dimensions, in which the greater the differentiation, the higher degree of complexity. Vertical differentiation defines the depth of hierarchical layers and is often determined by the size of the project. Horizontal complexity is the diversity and number of organizational units and task structure, which is defined by the number of specialists required to undertake the project. The role of the project manager is management and integration of communication between, and coordination of, the temporary project organization.

Project networks have featured as a focus of studies in management of collaboration and inter-organizational relations in complex project structures.(Windeler and Sydow 2001; Artto et al. 2008). These are temporary organizations which are formed to undertake a specific task and disband upon completion of the project. Project network players can be considered in two categories: business and non-business. The business players are the architects, engineers, investors, contractors and sub-contractors, the end users, the parties who have a direct and vested interest in the project. Included in the ‘non-business’ project network players category are the: Government, authorities, municipalities, community interests, unions and environmentalists, for example.

With acknowledgement that projects are large networked temporary organizations with heavily differentiated layers of stakeholders and specialist in a hierarchically differentiated structure. Diversity in purpose brings with it diversity in expectations and definitions of success. It is necessary therefore that success is defined by and for the project actors.

Defining Project Success

The so-called iron-triangle of time, cost and quality has, and in many projects remains the only yard stick of success for projects. Depending on the nature of the project, whether it is industrial, infrastructural or mission critical would determine the weighting in importance of the respective components, however, cost consistently out-weighs the other measurables and defines many aspects of project set-up and delivery, sometimes with disastrous consequences.

The project may have been initiated because of a local need for experience, technology or know how on a specific subject. Nuclear power plants, high speed rail, super tall buildings for example all require specialist skills in design and construction and frequently in finance.

Although success of a project is often attributed to leadership the nature and type of leadership is frequently overlooked in deference to technical competency factors. Muller, Geraldi and Turner (2011) challenged the lack of leader character attributes in the definitions of project success. Their framework focuses on the intellectual (IQ), emotion (EQ) and managerial (MQ) qualities of leadership. The results of their studies indicated that an increase in EQ and MQ “impacts projects positively and directly” (Muller Geraldi Turner 2012), furthermore, they suggest that projects with high levels of integration complexity should be resourced by leaders with high levels of EQ and MQ.

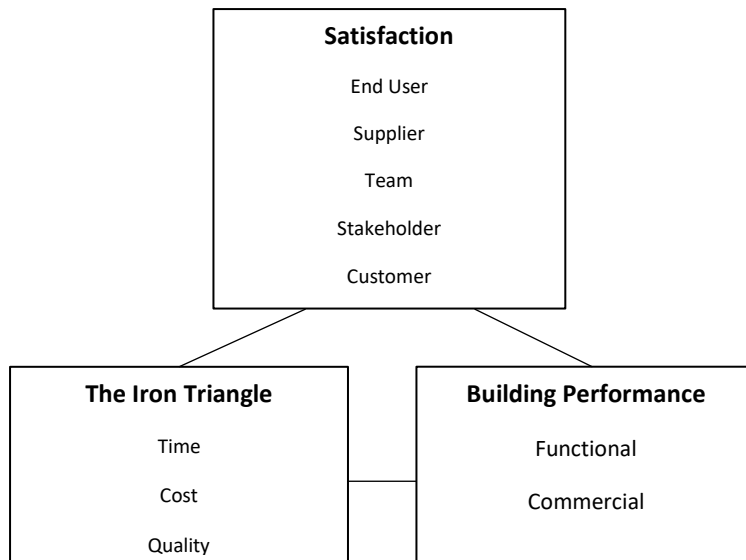


Figure 3 Alternative Holistic Definition of Success

In the context of complexity theory and the uncertainty of outcomes in a non-linear dynamical system,(Rosenhead et al. 2019), such as a complex project system, seemingly small cost savings, for example in the implementation of 3D design rendering technology for a complex building form, can result in increased drawing coordination errors, onsite construction clashes, and major project schedule disruptions which, ironically, are the most expensive disruptions to a project. So, not only has the iron triangle failed to keep up with the increased sophistication of the construction industry, (Murphy, Baker, Fisher, 1974), it also fails to meet the diversity of objectives created by the recognition that projects are very large temporary organizations.

In the case of international projects, the temporary organization encompasses multi-cultural, multi-lingual, public and private institutional interests and usually vast differences in technical capability based on the level of economic development of the countries involved.

H1: Project Success is mediated by the relationship between project complexity and authentic leadership.

Research Questions

1. Does complexity increase the probability of unsuccessful project outcomes?
2. Does authentic leadership mediate the impact of complexity on project success?

Research objectives

This study focuses on the determinants of success in the growing sector of international project management. International projects are characterized by their complexity, they require large networks of directly engaged 'business' and 'non-business' actors.

Firstly, defining success in international projects is necessary. Traditional metrics of time, cost and quality are inadequate representations of the expectations of large and diverse stakeholder groups in the international projects.

Secondly, defining complexity in international projects. Technical complexity and Organizational complexity are the broad classifications which have been applied to project complexity for decades. International projects stretch the capacity of Organizational theory to explain the diversity of interests represented by stakeholders. There is a need to re-evaluate the limitations of these influences of complexity.

Thirdly, exploring the role that leadership plays in mediating the impact of complexity on the success of complex international projects. In a complex project network environment, do the attributes of authentic leadership, as described by Avolio, Walumbwa et al 2007, elicit positive behavioural attributes in followers which contribute to mediation of complexity and better project outcomes.

1. To provide a model of leadership in construction which is appropriate to the increased levels of complexity in the industry.

2. To ensure that full representation of all stakeholders' interests are represented in the definition of success of the project.
3. To provide the basis for a training model which will develop the necessary skills for the construction industry of the future.
4. To encourage young graduates to enter the industry by mitigating some of the negative perceptions which exist.

Research Contribution to Theory and Practice

It has been argued by Hunt 1999 Uhl Bien et al 2007, Mackenzie 2006, that leadership theories that have not addressed the impact of complexity as a defined measurable in leadership are failing to address the inherent 'nature' of leadership and instead are concerning themselves only with style and method of leaders. This study aims to contribute to the growing body of work which differentiates between leaders and leadership, in-order to establish a definition of leadership in complexity which characterizes the dynamic interactions which leaders are able to affect.

The industry acknowledgement of global environmental issues has brought a focus to the construction process for its disproportionate contribution to CO₂ emissions and global warming. Historical dimension of success, time cost and quality, failed to address the broader concerns of the 'non-business' stakeholders who are affected by the process of construction. Broadening the metrics of success in construction, from the Iron-Triangle, to standards which are representative of the all stakeholder interests improves the 'efficiency' of projects. Furthermore, publicly listed companies in most countries, including Hong Kong, are now committed to ESG reporting protocols which include quantified and certified reporting on environmental and social impact. To that end, this study contributes to the important development of industry tools which improve project performance across a range of stakeholder defined issues.

Literature Review and Research Gaps

The history of academic study on the nature of project execution is predominantly a product of post mid-20th century attention. Foundational work in trying to systematize and standardize the process of project management focused on creating tools and processes such as Work Breakdown Structure, Program Review and Evaluation Techniques and Critical Path Method. (Ahola, 2009) These are summarized as the planning and scheduling aspects of construction which have dominated the profession since its inception. Research has focused on providing planning and scheduling tools and processes which could be repeated under any conditions by different actors to achieve consistent accuracy (Sears, Sears and Clough 2008). Focusing on tools and systems reduces the reliance on the individual, the team, and the leader, making the project management process mechanized and repeatable. There has been a predominance of studies on the efficiency of projects as defined within the constraints of time, cost and quality. (Jackson 2002; Yaghootkar and Gil 2012)

As the impact of projects has been recognized as extending into a larger social stakeholder group there has been a greater focus on the concept of the project as a temporary organization. (Stretton 2018) This focuses the study onto critical mechanisms of communication, roles and responsibilities, many studies focused on the internal mechanisms of the organization in isolation from the context in which they operated.

Studies which extended consideration of risk management tended to also consider the internal workings of the organization, with the aim of seeking a repeatable template which was not contingent upon context. Today project management is still conducted in this manner, by clearly defined and, by definition, closed, hierarchical management systems which fails to account for the networked complexity of the dynamic interactive forces which characterize

projects today and specifically international projects. A complex, dynamic environment requires an open system response (Artto and Kujala, 2008).

Studies of isolated projects, undertaken by a single company are not representative of the current industry conditions (Engwall 2003) which involve multiple specialist actors directly interacting on the output of the project and a diverse non-business group of stakeholders whose interests may be contradictory, but who none the less wield power to alter the course of a project. The study of how complex international projects is undertaken by the project networks required to undertake them has not been well studied. Engwall (2003) speaks to the need to consider the historical and organizational context of a project, stating that no project is an island.

Complexity Theory posits that systems are in a continual state of evolution which is not predictable and prone to patterns of fluctuation (Psychogios and Garev, 2012). Complexity Theory regards organizations as complex adaptive systems, of which construction projects are a class of temporary organization in which numerous actors are engaged in 'non-linear, unpredictable and constantly emergent behaviour' (Baruti, 2015)

The study of complexity brings a vital perspective to the dynamic interactions which are fundamental to leadership in a complex context. (Uhl Bien et al 2007) Complexity Leadership Theory as presented by Uhl Bien et al (2007) differentiates between leadership and leaders. Leadership being an emergent interactive dynamic which facilitates necessarily adaptive outcomes, and leaders as the individuals who act in ways that influence this the interactions and the outcomes.

Complexity demands higher levels of leadership. Complexity Leadership Theory (Uhl Bien et al 2007) acknowledges that leadership is more than the interaction of one or more individuals, it is the interplay of multiple dynamic forces. The ability to identify and interpret complex data and respond in a contextually appropriate manner. A contextually appropriate manner may

mean not responding with instinctive impulse, but through the balanced consideration of the data and resources available, and learning quickly and responding at the pace required of the time.

An adaptive leader's flexible response and ability to utilize the resources available is referred to as 'sensemaking' (Pye, 2005). Leaders who are flexible in their ability to evaluate and assess a situation know when to rely on the input of others and when they can trust their own judgement.

The ability to: make balanced judgements, rely on others and trust one's own judgement (Avolio and Mhatre 2012), which are central to sensemaking also contribute to the makeup of the authentic leader as described by Walumbwa et al. (2011)

Authentic Leadership

(Jensen and Luthans 2006) found that perceptions of leadership authenticity were the strongest single predictor of: employee job satisfaction, happiness and organizational commitment.

The Authentic Leadership Questionnaire developed by (Walumbwa et al. 2008) has been applied to sample groups in China the US and Kenya. The results supported the multi-dimensional authentic leadership construct which was composed of: "leader self-awareness, internalized moral perspective and balanced processing." (Walumbwa et al, 2008(Avolio et al. 2018)). Importantly for the model's relevance to the leadership of complex projects, the authentic leadership construct also predicted organizational citizenship behaviours (OCB) and organizational commitment above ratings produced for ethical and transformational leadership (Walumbwa et al. 2008). Organizational citizenship behaviour (OCB), is behaviour which goes over and above that defined in a job description or contract. (Bies and Organ 1989) described the three attributes of OCB as being: discretionary in nature, beyond enforceable job description and positively contributing to organizational effectiveness.

The strong emphasis on organizational commitment and contribution of Authentic Leadership make the construct an attractive proposition for the study of Leadership of complex projects.

Previous studies have been performed in banking, military, police, manufacturing and IT environments (Gardner et al. 2005; Luthans et al. 2005; Walumbwa et al. 2008) but not in the context of international project management. This study will provide additional support to broaden the studies in other sectors and also specifically to the studies performed in China.

H2 Authentic Leadership is a mediating factor in the reporting of project success defined by all stakeholders.

Research Model

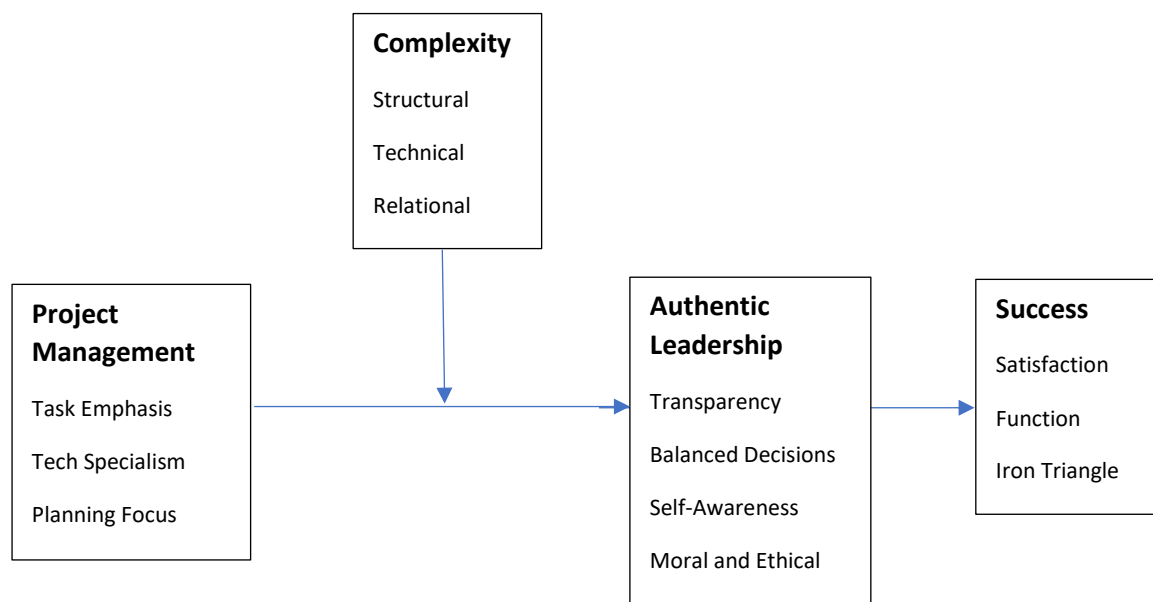


Figure 4 Research Model

This is a deductive study which will be drawing on research into authentic leadership which was initiated by (Luthans et al. 2005) and undertaken across various industries and global geographies. The Authentic Leadership Survey developed by Avolio, Walumbwa et al (2005) serves as a bench-mark for this study. Although the ALS has been used in a diverse range of industries, there are no published papers on the implementation of ALQ in the construction industry and no records of its application in Hong Kong. The ALQ provides a triangulated

study of the Leader, from the perspective of the Leader, The Followers and the Line Manager, providing a complete montage of data on the performance of the Leader.

To operationalize the complexity variable this study relies on the work of Click or tap here to enter text. Geraldi and Adlbrecht (2007) whose work takes a holistic stance in looking at the influences of uncertainty, multi-culturality, relational dynamics and so on. Geraldi and Adlbrecht's studies revealed that the most significant triggers of project complexity were: people, multi-disciplinarity, internationality and clients. The work of Geraldi and Adlbrecht (2007) provides strong support for the hypothesis that:

H3: International projects present high levels of complexity

H4: Projects requiring large multidisciplinary teams are rated as more complex.

Research Design

There are three sections to the study which will look at:

1. Authentic Leadership
2. Complexity
3. Project Success Factors

1. The Authentic Leadership section is in the form of a 16point multi-factor questionnaire, which covers four factors, on a 5 point Likert rating system from 0-4.

The four factors are:

- a. Transparency
- b. Moral/Ethical Behavior
- c. Balanced Processing
- d. Self Awareness

An example of the Balanced Processing questions: “The Team Leader Encouraged Everyone to Speak their Mind”

The ALQ questionnaire developed by Walumbwa (2008) and has previously been used in China.

多因素真实领导力问卷 (MALQ 3.0 版团队成员)									
Multi-factor Authentic Leadership Questionnaire (MALQ Version 3.0 Team Members)									
名字 Name									
	偶尔 Occasionally	有时 Sometimes	相当频繁 Fairly often	经常或总是 Frequently or always					
	1	2	3	4					
1 班组长总是说他的意思					0	1	2	3	4
1 The team leader always said exactly what he meant					0	1	2	3	4
2 班组长承认了自己的错误					0	1	2	3	4
2 The team leader admitted his own mistakes					0	1	2	3	4
3 班组长鼓励大家说出自己的想法					0	1	2	3	4
3 The team leader encouraged everyone to speak their mind					0	1	2	3	4
4 团队领导总是说出艰难的真相					0	1	2	3	4
4 The team leader always told the hard truth					0	1	2	3	4
5 班组长表现出的情绪完全符合他的感情					0	1	2	3	4
5 The team leader displayed emotions exactly in line with his feelings					0	1	2	3	4
6 团队负责人表现出与他的行为一致的信念					0	1	2	3	4
6 The team leader demonstrated beliefs that were consistent with his actions					0	1	2	3	4
7 团队领导根据他的核心价值观做出了决定					0	1	2	3	4
7 The team leader made decisions that were based on his core values					0	1	2	3	4
8 团队领导要求我们持有支持我们核心价值观的立场					0	1	2	3	4
8 The team leader asked us to take positions that supported our core values					0	1	2	3	4
9 团队负责人基于高标准的道德行为做出了艰难的决定					0	1	2	3	4
9 The team leader made difficult decisions based on high standards of ethical conduct					0	1	2	3	4
10 团队负责人征求了挑战他根深蒂固的观点的观点					0	1	2	3	4
10 The team leader solicited views that challenged his deeply held opinions					0	1	2	3	4
11 团队负责人在做出决定之前分析了相关数据					0	1	2	3	4
11 The team leader analyzed relevant data before coming to a decision					0	1	2	3	4
12 团队负责人在得出结论之前仔细听取了不同的观点					0	1	2	3	4
12 The team leader listened carefully to different points of view before coming to a conclusion					0	1	2	3	4
13 团队负责人寻求反馈, 以改善与他人的互动					0	1	2	3	4
13 The team leader sought feedback to improve interactions with others					0	1	2	3	4
14 团队领导准确地理解了别人如何看待他的能力					0	1	2	3	4
14 The team leader accurately understood how others viewed his capabilities					0	1	2	3	4
15 团队领导知道什么时候该重新评估他在重要问题上的立场					0	1	2	3	4
15 The team leader knew when it was time to re-evaluate his position on important issues					0	1	2	3	4
16 团队负责人表明他了解具体行动将如何影响他人					0	1	2	3	4
16 The team leader showed he understood how specific actions would impact others					0	1	2	3	4

Figure 5 ALQ Questionnaire Walumbwa (2008)

2. The Complexity factors are operationalized through the use of the 12 point, Geraldini and Adlbrecht, 7 point Likert questionnaire, which is divided into the three complexity factors of:
 - a. Technical
 - b. Structural
 - c. Relational

The questionnaire is divided into the 5 stages of the project to capture any temporal changes which take place from beginning to completion of the project.

PROJECT COMPLEXITY QUESTIONNAIRE																																								
						Feasibility							Design							Construction							Closeout							Commissioning						
						1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
A.	Project Structural Complexity																																							
	1 Maturity of the Project																																							
	2 Technical Specification Change Frequency																																							
	3 Impact of Technical Changes																																							
	4 Project Eccentricity (architectural design, function)																																							
B.	Technical Complexity																																							
	5 Volume of Data																																							
	6 Number of Stakeholders and Team Members																																							
	7 Interaction of individuals, organizations																																							
	8 Project Scale																																							
C.	Relational Complexity																																							
	9 Degree Internationalism																																							
	10 Number of disciplinary skills																																							
	11 Transparency of Information Flow																																							
	12 Empathetic Connection of Stakeholders																																							

Figure 6 Complexity Gerald Adlbrecht (2007)

3. Project Success Factors uses the Turner and Muller 9 factor, 5 point Likert scale questionnaire. The multi factor list is divided into:
 - a. Satisfaction, various stakeholders
 - b. Iron Triangle time cost and quality
 - c. Factors Unique to the Project

PROJECT SUCCESS MEASURES					
					1 2 3 4 5
1 Enduser Satisfaction					
2 Supplier Satisfaction					
3 Team Satisfaction					
4 Stakeholder Satisfaction					
5 Time, Cost Quality					
6 User Requirements					
7 Achieves Stated Purpose					
8 Customer Satisfaction					
9 Project Defined Success Criteria					

Figure 7 Project Success Turner Muller ()

Sampling Method

The study will employ a snowball sampling or chain referential sampling method. This sampling method was effectively employed on a similar study in Singapore by Toor and Ofori (2009), which studied the influence of authenticity on wellbeing. Senior Board

Members of the professional societies and associations noted below, will be interviewed a presentation of the study objectives, method and benefits to the profession, will be provided. Board members will be asked to nominate appropriate candidates for the study. Using the snowball sampling methodology, those nominees will also be asked to refer candidates and so on. It is anticipated that up to 100 nominees will be provided using this method.

Selection of Respondents

As this study is focused on only on international projects, Project Directors (line managers) and Project Leaders will be approached through references from their professional associations and societies and invited to participate in the study. The Leaders will also be invited to recommend other participants to the study.

Invitees will be presented with a package of information on the objectives of the study and expectations for their participation. A face-to-face presentation will be given to the boards and membership, to encourage participation and elicit interest in the study.

Permission will be obtained from the Associations and Societies.

- The Societies and Associations will include:
- The Architects Society of China
- The Hong Kong Institute of Architects
- The Hong Kong Institute of Engineers
- The Engineering Society of China
- China International Contractors Association
- Hong Kong General Builders Association.

Data Collection Method

Participants in the study will receive an online survey through a proprietary online service such as: SurveyMonkey, Qualtrics, Wenjuan. The platform will need to be available in both Chinese and English and accessible in Hong Kong and China.

Questionnaires will be bi-lingual in Chinese and English. A preliminary test has already been undertaken which used a 3-way translation process: English to Chinese to English

Data Analysis

Approximately 100 candidates are expected to receive the survey. Based on (Cooper, D. R., Schindler, P. S., & Sun 2006) definition of distribution of means thresholds it is anticipated that a response rate of over 30% would be desirable. This will provide confidence in undertaking t-tests, ANOVA tests, to test for bias between participant groups and linear regression tests to analyze the relationship between independent and dependent variables. The ANOVA tests will evaluate for potential response differences based on demographic of age, gender, organization, work experience and location.

Collecting Demographic Detail

Demographic		Range	Frequency
a.	Age	<30	
		31-40	
		41-50	
		51-60	
		Mean age	
b.	Gender	Males	
		Females	
c.	Organization Type	Developer/Investor	
		Consultant/Designer	
		Contractor	
d.	Work Experience	<5 years	
		5-10	
		11-15	
		16-20	
		21-25	
		26-30	
		Mean Experience	
e.	Location	China	
		Hong Kong	

Figure 8 Collecting Demographic Data

This study will also use Confirmatory Factor Analysis (CFA). It will allow us to establish the factors of authentic leadership and their impact on indicators presented by followers.

Confirmatory Factor Analysis is an appropriate analytical tool in this case as it allows for the study of the unobservable factor or variable, and its impact over one or more observable measures. CFA is also relevant as an analytical tool when tests are being performed across distinct groups, such as demographically separated, gender based, geographically or culturally distinct sample groups. This study is only focusing on sample groups from within the construction industries in both China and Hong Kong, who are working on international projects. Previous studies in authentic leadership have looked at sample groups in the US and China (Luthans et al. 2005)

	Structural Complexity	Technical Complexity	Relational Complexity
Project Maturity			
Specification Changes			
Impact of Change			
Uniqueness			
Data Volume			
# of Stakeholders			
Connectedness			
Project Scale			
Internationalism			
Disciplines			
Transparency			
Empathy			
Cronbach Alpha Reliability Test			

Figure 9 Cronbach alpha Reliability Test

To evaluate the internal reliability of responses to the Cronbach alpha test which is appropriate for psychometric tests such as this, and especially useful in the assessment of reliability in composite scales looking at authenticity, complexity and measures of success.

Research Schedule

ACTIVITY	MONTH	1	2	3	4	5	6	7
Prepare Presentation to Prof Societies & Assoc.								
Interviews with Prof Societies and Associations								
Prepare Online Survey								
Publish Online Surveys								
Response Period								
Reminders								
Collation and Analysis								
Write up Results and Report								
Present								

Figure 10 Research Schedule

Expected Results

This study expects to find support for the argument that authentic leadership has a moderating effect on project complexity. Also, that project complexity is strongly relational in nature, that is, it is influenced by the relative impact of a large number of stakeholders some of whom will have no direct business connection to the project but who, through position and status can wield disproportionate influence, but who are most difficult to manage due to their distance from the project.

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