

Developing Innovation and Creativity for Business Advantage

**Week – 4 (Part 2)
Innovation, Growth and
Competition**

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Agenda for this Presentation

- Innovation brings economic growth
 - Identifying the causal links assists policy-making
- Needs proactive public policies and free market forces working together.
- Inside and market-oriented innovation
 - Distinctions lend much clarity to analyses
- Special modes of finance.
- Competition for sustaining innovation and growth
- Conclusion

Today's consumers are demanding more than ever...

- a taxi in 5 minutes
- a pizza in 20 minutes
- groceries in 60 minutes
- search results in 0.3 seconds
- content on demand
- not to stand in line at a supermarket
- not to pay cash
- immediate answer to questions



Innovation, Growth and Competition

Knowledge Economy

Innovation brings economic growth

- The innovations and productivity brought by knowledge have caused (far) more than 50% of historical economic growth.

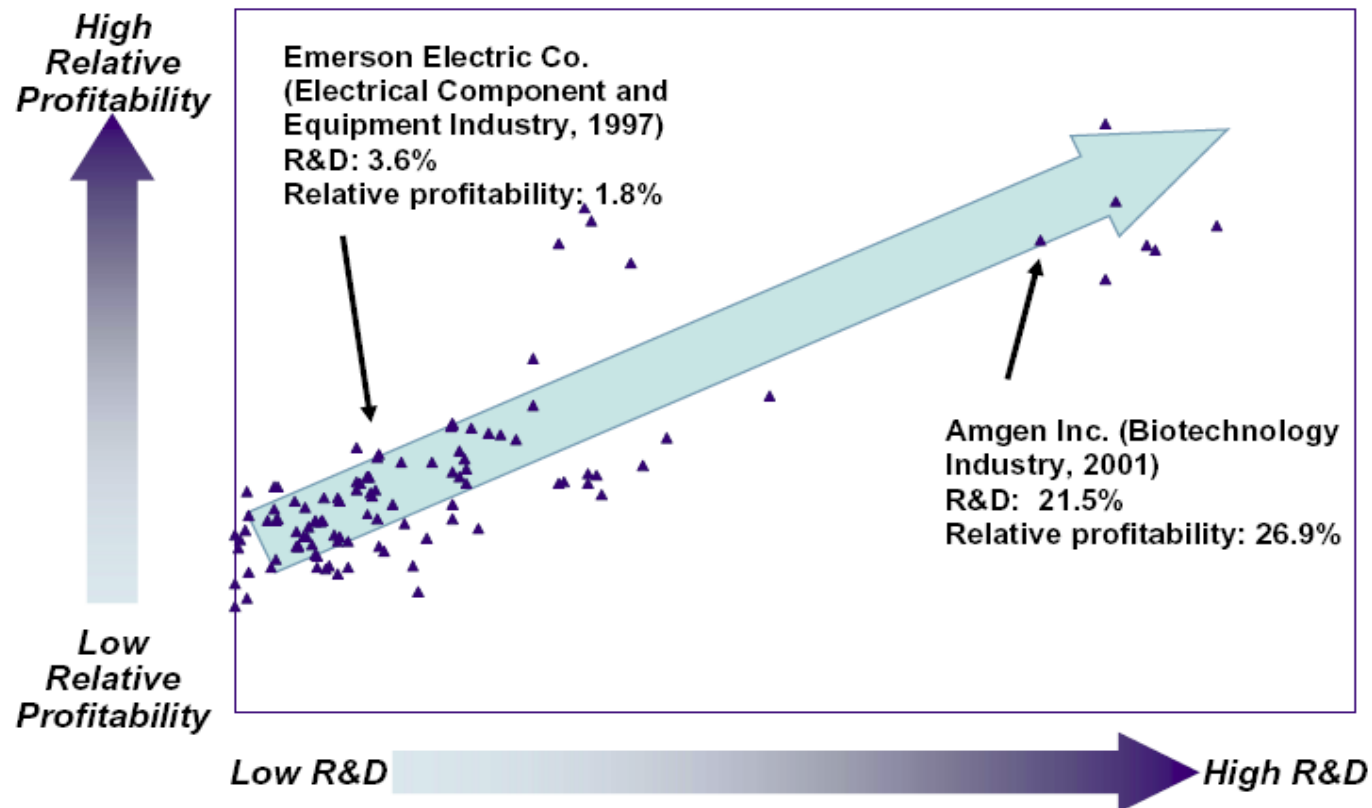
- **HOW?**

- Enhanced effectiveness of physical capital
- Complementarities with labor
- Magnified productivity of human capital
- Impetus for further investments in intellectual, physical and human capital – “endogenous growth”

- High rewards for successful efforts of labor with human capital – “good jobs for good pay.”
- Not just risk premium payments to cover the vicissitudes of the cutting edge, but Ricardian rents for entrepreneurial cost advantages and new products.
- Incentive pay and information rents for workers where efforts are both hard to monitor and pivotal to enterprise success.

Relationship between R&D Intensity and Profit Superiority

R&D and Relative Profitability



▲ R&D Industries Except Software 1995 - 2001

Study by M. Samuelson of the Analysis Group

- Innovation has the dynamics of an upspiral
- with social returns substantially greater than private returns.
 - The extra is due to consumer benefits from better and less expensive products,
 - spillover benefits to other firms from the availability of better and less expensive inputs,
 - generalized benefits from the dissemination of the knowledge and information content of the innovation,
 - all net of the losses of profits to the losers in the innovation competition that the successful firms won.

Such positive externalities make the case for public support to foster innovation

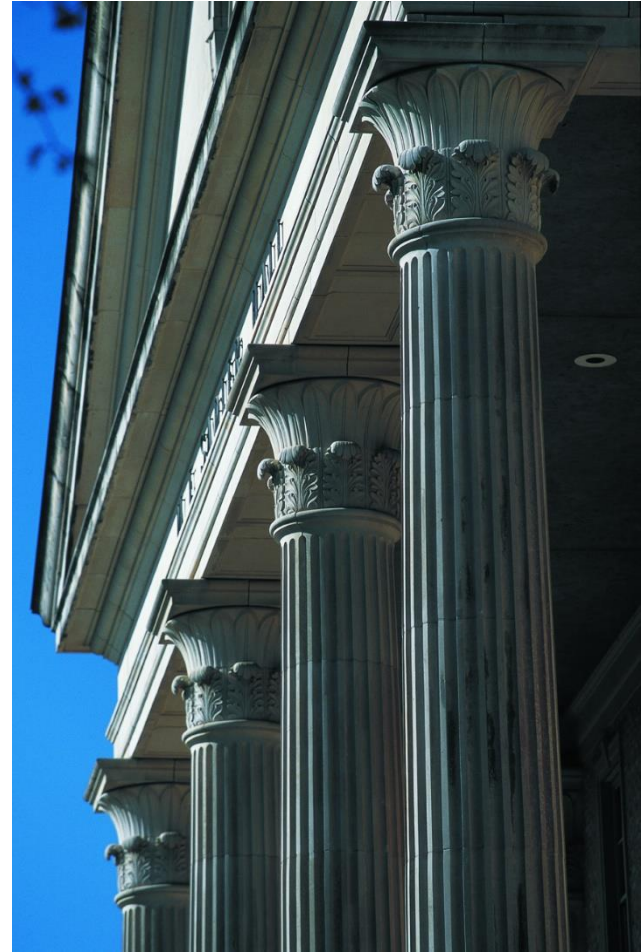
The “Four Pillars of the Knowledge Economy”

Education and training

Information
infrastructure

Innovation systems

Economic incentives
and the institutional
regime



**Need proactive policies and market forces working
together**

Inside and market-oriented innovation

- Market-oriented innovations apply to the products and services sold into the market.
 - New outputs may also require new internal modes of operation.
- Inside-oriented innovations apply to the inner workings of an enterprise,
 - are aimed at improving productivity and performance through establishment or change of best practices,
 - include process innovations that apply to manufacturing technology, but extend to services providing organizations as well.

Inside-oriented innovation faces fewer hurdles for its benefits

- Less needy of IP protection
 - less subject to escape and imitation.
- Less needy of special modes of finance
 - personnel opportunity costs
 - cash purchases of ICT and other equipment that can serve as collateral for their own financing.

But, inside-oriented innovation needs adaptive management skills

- Recent research on European experience:
 - inside-oriented innovation key for productivity, but highly vulnerable to inhospitable firm culture.
 - e.g. managerial flexibility and organizational devolution are critical for ICT to drive inside-oriented innovation and productivity gains. (*see Bloom, Sadun and Van Reenen papers*)
- Public-private partnerships can bring needed management models and training, along with financed equipment and systems.

Market-oriented innovation needs special modes of finance

- The necessary R&D generates little material collateral.
- The details and accomplishments of the necessary R&D cannot be fully and credibly conveyed and promised to an arms-length lender or investor.
- Venture capital supplies capital in exchange for active supervision, cooperative management and equity participation.
- However, strong retained earnings and commercial venture capital are scarce in developing and transition economies.
 - not readily portable across societies.

- Purely governmental funding of commercially-oriented R&D  dangers of capture, self-serving uses of funds or outright corruption.
 - moral hazard acute because both the inputs of effort and the outputs of uncertain accomplishment are problematic to observe and monitor.
- Purely governmental labs good at science – bad at market-oriented innovation, even as collaborators.
- Best solutions are apt to mix governmental and private roles – matching grants, mini-grants or shared equity venture capital.
 - see *“Public Financial Support for Commercial Innovation,” ECA Knowledge Economy Study, Part 1*

Key Roles for International Commercial Relations

- Access to needed IP and distribution may come with three-way participation by established international enterprises.
- Contract intermediate supply for established technologically-advanced international sellers productive for linkages to local leadership roles.

Competition for sustaining innovation and growth

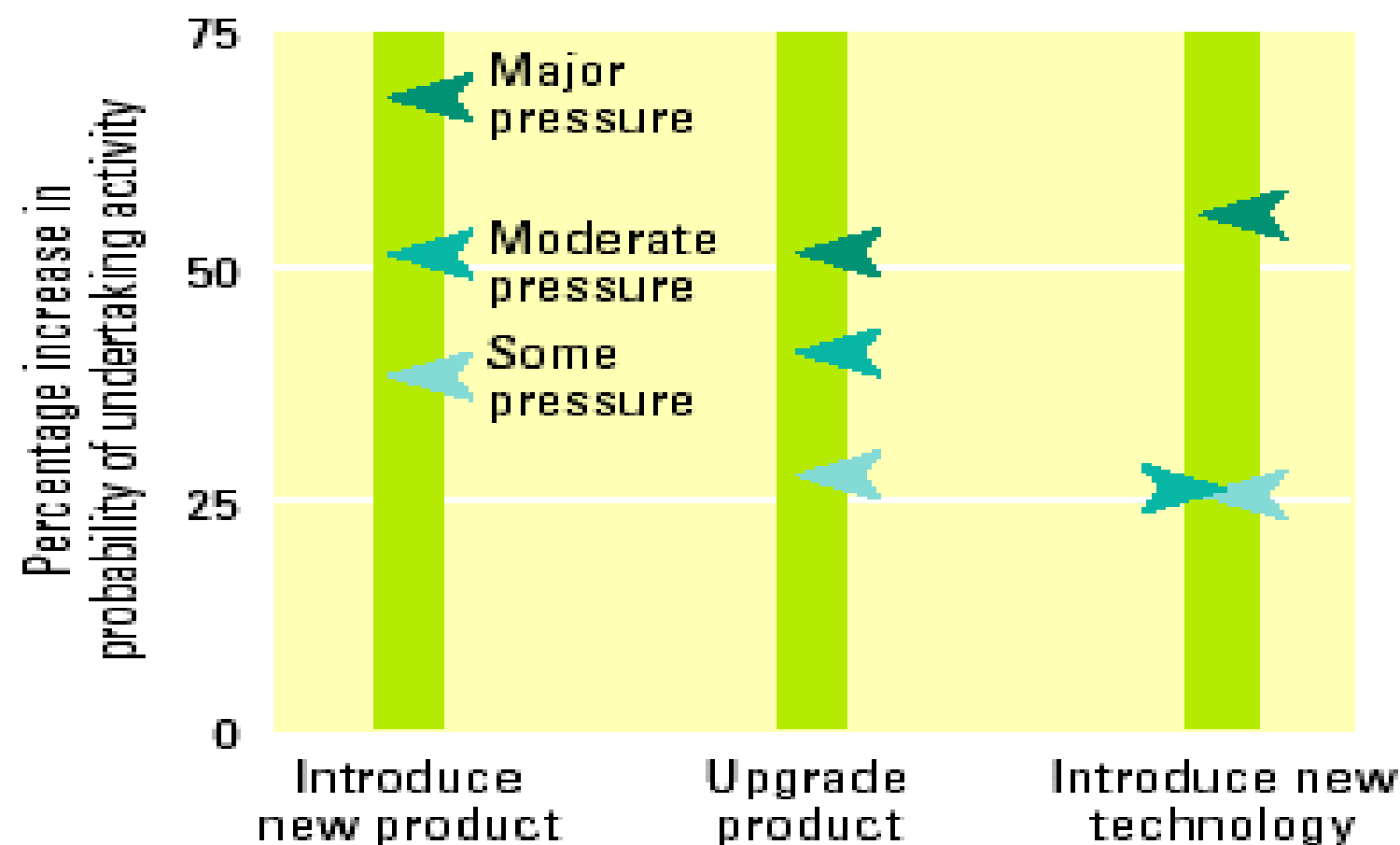
- “The Free-Market Innovation Machine” vision of Baumol has displaced the Schumpeterian monopolist.
- Product market competition drives innovation.
 - Needs market-friendly institutional environment in the economy.
 - But decentralized competitive forces far outperform governmental planning and micromanagement.

The joust of the incumbents and upstarts

- Incumbents spend on R&D to protect their successful market positions.
- Incumbents otherwise inclined to “rest on their laurels.”
- Upstarts discouraged by the “entry deterrence effect.”
 - They are undermotivated to spend on R&D that will at best allow them to compete with strong incumbents.

- Upstarts accomplish revolutionary innovations.
 - These rise above competing with incumbents' products and render them obsolete.
 - Upstarts have no laurels to rest on.
- Incumbents accomplish “routine innovation.”
 - driven in its pace by the threat from upstart and other incumbent rivals.
- Empirical support for such a dynamic equilibrium with leap-frogging
 - *See Baumol for powerful articulations and Tirole and the earlier work by R. Gilbert and J. Reinganum for theoretical treatments..*

Figure 1.12 More competitive pressure, more innovation



Note: Surveys cover 27 countries in Eastern Europe and Central Asia.
Source: World Bank Investment Climate Surveys/BEEPS II.

- In centrally planned economies with effective scientific research and invention, there was a systematic absence of follow-through to innovation with market impact.
 - *See paper by Iacopetta*
- In the US, most patenting activity is by large established firms.
- In the US and in developing countries most R&D spending is by relatively large firms.
 - *World Development Report on the Investment Climate, Box 3.3*
- But a large % of the most cited U.S. patents were issued to firms that were small in their markets.
- An impressive list of revolutionary innovations were discovered by newcomer firms.

POLICY LESSON:

Foster innovation-seeking start-ups.

Use collaborations that provide financing, IP access, and market-driven management.

Only a few successes will provide ample returns.



The policy needs of competition that can drive innovation and sustain growth

- an environment that is generally friendly to market activities and private investment
- access to and protection of IP
- access to international markets for acquisition of ICT and other production-process inputs
- access to sufficiently large (often international) markets for the sale of outputs
- avoidance of governmental barriers and hurdles to entry and exit by private enterprises.

- permitting the forces of competitive markets to provide the financial threats and inducements that make innovation a self-sustaining outcome.
 - avoiding policies that blunt the losses of falling behind
 - avoiding policies that sour the rewards of successful innovation

Conclusion

- To build and sustain growth, innovation needs competition and the open market economy that houses it.
- The needed proactive public policies should be focused and respectful of the surrounding markets. For example:
 - Management training for inside innovation for productivity and linkages
 - Three-way limited partnerships (public, local private and international) for market-oriented innovation.

- While the policy needs may seem daunting, most will be addressed with practical suggestions in the sessions of this Forum.
- The next session begins the process with the excellent report on “Public Financial Support for Commercial Innovation.”
- These challenges are well worth taking on for ECA because embracing innovation is the fastest road to productive and sustainable growth.

Innovation needs harmonized public support for its educational underpinnings

- Although heterogeneous, many ECA countries have relatively high levels of past investment in higher education and of members of their populations involved in scientific pursuits. This is propitious for participation in the knowledge economy, but not at all sufficient.
 - See *“Public Financial Support for Commercial Innovation,” ECA Knowledge Economy Study, Part 1*”
- To be productive, support for the educational underpinnings of innovation and for R&D must be coordinated.
- For economies close to the technology frontier, R&D support should be balanced with support for concomitant advanced education to supply the needed skills and to avoid merely spending the support on elevated pay for the scarce R&D workers.

- For economies well inside the technological frontier, in order to be effective, support for innovation-oriented tertiary education needs a design that defends against emigration of its graduates.
- Here, aggressive support of less ambitious (tertiary or secondary) education is apt to be more effective in raising productivity through promotion of skills for technology imitation and adoption of inside-oriented innovation.
 - *See papers by Krueger and Lindahl for empirical support, and by Aghion, Boustan, Hoxby, and Vandenbussche for a recent modeling exercise confirming these results.*
- This strategy may need management training to shape enterprise culture in order to be effective.
- Through such measures, over time the economy is apt to move relatively rapidly towards the technology frontier.

Small Firm Breakthroughs

Air Conditioning
Airplane
Assembly Line
Audio Tape Recorder
Biosynthetic Insulin
Catalytic Petroleum Cracking
Cotton Picker
Defibrillator
DNA Fingerprinting
Electronic Spreadsheet
FM Radio
Heart Valve
Helicopter
Hydraulic Brake
Integrated Circuit
Microprocessor

Nuclear Magnetic Resonance
Scanner
Optical Scanner
Oral Contraceptives
Pacemaker
Personal Computer
Polaroid Camera
Portable Computer
Prefabricated Housing
Quick-Frozen Food
Safety Razor
Soft Contact Lens
Vacuum Tube
Xerography
X-Ray Telescope
Zipper

Source: U.S. Small Business Administration, 1995, p. 114.

- There is no theoretical reason to believe that private incentives under-invest in R&D in this equilibrium, due to power of incumbents' fear factor.
- There is indicative empirical support for the applicability of this theoretical picture.
 - First, in the ECA region survey evidence shows that competitive forces align with innovative activities.
 - *World Development Report on the Investment Climate, Fig 1.12*

Discussion & action

- Identify the sources of innovation for your organisation