Technology and Innovation Management: Introduction

Introduction

Why Does Innovation Matter?

- main driver of growth
- OECD estimate is 60-70% of labour productivity growth
- under capitalism innovation becomes mandatory

Product or service innovation:

- to generate/increase Sales
- must be established on the market

Process innovation:

- to enable/improve production of goods or services
- must be established inside the organisation

Business model innovation

- Reshuffling of value proposition, processes, products, services, ...
- Example: Ikea selling unassembled furniture

The Vasa

- Failed Innovation
- Lack of communication, nobody dares to voice concerns

Patterns in Innovative Activity

Long-term patterns of technological change

- Technological change is cumulative and evolutionary
- Most innovations are new combinations of existing technologies or the introduction of new elements into existing systems
- some changes can be identified as revolutionary

Innovation shifts socio-economic paradigms

K-waves/Schumpeter's waves: Long cycles of economic growth and decline (50 years), where new inventions start new cycles of growth

Patterns in Technological Evolution

S-curve

- X-axis: Aggregate R&D spending (or time)
- Y-axis: Performance over time
1. Emergence: low performance
2. Rapid improvement: accelerating performance
3. Declining improvement: deccelerating performance
4. Maturity: saturated performance
- Often, a technology follows the S-Curve
- New technology at some point surpasses old technology's s-curve
- S-curve does not always represent reality (e.g. lithography)

Sailing ship phenomenon

- S-cuves of sailing ships and then steam ships
- Right before steam ships overtake sailing ships in performance, new better sailing ship technology (the Cutty Sark)
- Final sprint of old technology motivated by accelerating performance of new technology

Product Life Cycle (PLC)

Fluid Phase:
- In the early phase of a new product, frequent product changes occur
- diverse design
- Unspecified focus of R&D
- entrepreneurial organisation
- Much competition, more players enter market than exit

Transitional Phase:
- Major process changes
- One product design
- One R&D focus
- Organisation through project and task groups

Specific Phase:
- Incremental changes and innovations
- Only standard products
- R&D on incremental product technologies

- Well structured organisation
- More players leave market than enter

Adopter Categories

- Innovators
- Early adopters
- Early majority
- Late majority
- Laggards

Jeffrey Moore: Crossing the Chasm:
- Chasm is hurdle between early adopters and early majority
- Central question in marketing of new technology

Who Innovates, and Why?

Costs and benefits of innovation are the dominant drives of innovative activity
- Whoever gains the most is most likely to perform it
- Whoever has the lowest cost is most likely to do it

Schumpeters classical question: What market structure is most conducive to innovation?
- Schumpeter I: Entrepreneurs and new firms drive innovation =¿ fragmented markets
- Schumpeter II: Large firms drive innovation =¿ markets with some monopoly power

Arrow's Model

Linear demand curve. Constant cost c_0. New innovation reduces cost to c_1.
Question: What price would the innovator pay for the innovation?
Ex-ante perfect competition =¿ ex-post monopoly because