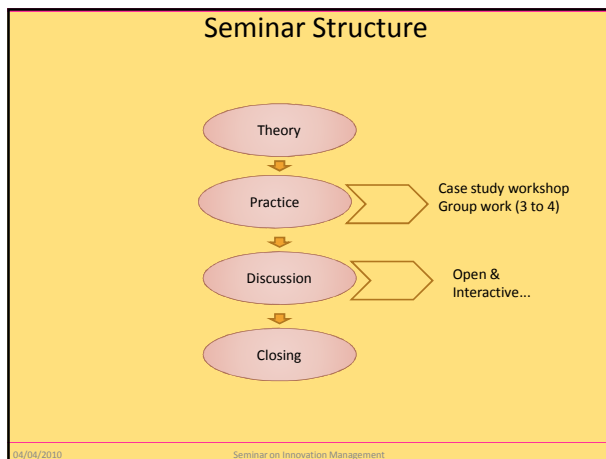


Innovation Management

Assoc Prof. Dr.ir. Srinivas Kumar Pinjala
Group T International University College Leuven
kumar.pinjala@groept.be



- ## Overview
- Innovation... What is it?
 - Introduction to Innovation management
 - Innovation management: process, models and organization
 - Managing innovation within firms
 - Case study and Discussion
 - Conclusions
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Innovation?

Innovation involves the conversion of new knowledge (obtained through research in a lab or own expertise and skills) into a new product, process, or service and the putting of this new product, process, or service **into use**, either via the marketplace or by other processes of delivery.

Example: Edison's conversion of his knowledge into products such as electric bulbs, phonograph, telecommunication devices etc into use, with the company

Innovation = theoretical conception + invention + commercialization

Genius is one percent inspiration, ninety-nine percent perspiration." - Thomas Alva Edison, Harper's Monthly (September 1932)

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Innovation and Entrepreneurs

Steve Jobs

James Harrison

Sir Stelios Haji-Ioannou

James Watt

Jack <Ma>Yun

Mumbai Dabbawallas

Ratan Tata

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Introduction to Innovation management

- Importance of Innovation
 - Ability to change and adapt is essential to survival
 - Innovation drives economic growth
 - Provides substantial economic benefits for the company and country

Innovation	Innovator	Time
Steam Engine	James Watt	1770-80
Locomotive	George Stephenson	1829
Electromagnetic induction dynamo	Michael Faraday	1830-40
Electric light bulb	Thomas Edison and Joseph Swan	1879-90
19th Century important innovations Source: Innovation management and New Product development by Paul Frost, Prentice publications		

- Helps society in achieving a better quality of life
- ...

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Introduction to Innovation management

Impact of Innovation

- At macro level (society, economic system and industry)
 - Modifies structure of industries
 - Changes the composition of demand in the labour market
 - Increases the well being of society as a whole
- At micro level
 - Affects the competitiveness of businesses
 - Orients towards the design of strategies

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Introduction to Innovation management

Why innovation?

- Major drivers of competition
 - Productivity (60 – 70s)
 - Quality (70 – 80s)
 - Flexibility (80 – 90s)
 - Innovation (90s - ...)
- Evidence at firm level (e.g. Apple, 3M, Intel, ...)
- Evidence at geographic level
 - Clusters and networks (Japan, Germany, N.Italy, Silicon valley,...)
- Innovation research disciplines
 - Economics, Sociology, Management, History and Psychology

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Innovation management: process

Overview of Innovation Process

Scientific and technological developments inevitably lead to knowledge inputs

Creative individuals

Firms operating functions & activities

Firms develop knowledge, processes and products

Firms architecture & external linkages

Societal changes and market needs lead to demands and opportunities

Source: innovation management and New Product development by Paul Trott, Prentice publications

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Innovation management: process

Cross disciplinary point of view...

- Economics**
 - economic impact of innovation
 - antecedents of innovation
 - Influence of innovation policies
- Sociology**
 - science & tech creation processes
 - group/community dynamics
 - institutional context of innovation
- Psychology**
 - career dynamics of innovative professionals
 - climates of productive innovation
- Management**
 - innov metrics & performance
 - strategic & operational processes
 - organizational models
- History**
 - case study analysis on innovations
 - ...

Innovation is complex and hence requires a cross disciplinary approach!!!

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Innovation management: process

Innovation Process

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Innovation management: process

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Innovation management: process

- Characteristics of Innovation process
 - Non-linearity (interactive), Feedback loops (iterative)
 - Coping with uncertainty and ambiguity
 - Filtering+ Tunneling = "FUNNEL"
 - Dealing with paradoxes and tensions
 - Long-term versus short-term
 - Competence disrupting versus competence enhancing
 - Individual/collective creativity versus strategic management
 - Effectiveness versus efficiency
 - Slack versus speed

The Funnel Concept

Ideas Fuzzy front → Projects → Platforms & generations

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Innovation management: process

A model for managing projects and competences in innovation

- Boundary spanning inter(action), communication, information exchange, gatekeeping
- Team constitution and limited team size
- Importance of organizational/physical location
- NIH syndrome --- active management of openness and closure is required
- Interface is required between Business unit and innovation function (R&D)
- Informal communication as complement to formal communication and information exchange

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Innovation management: models

- Three types of models
 - Prediction theory
 - Static
 - Dynamic
- Some of the static models try to test the prediction theory
- Prediction theory >>> mainly coming from Schumpeter
 - It is mostly Entrepreneurs who innovate >>> IDENTIFICATION OF INDIVIDUALS/GROUPS
 - Large firms with monopolistic characteristics are more likely to innovate >>> SIZE MATTERS!

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Innovation management: models

- **Static Models**

Basic assumptions: Innovation process is an exogenous factor, principal product, technology is information

- Neoclassical economics
 - Innovation is exogenous, economic consequences, technologies are information-intensive goods
- Industrial economics
 - Structure of the industry determines the innovatory behaviour of firms. Again can be considered as exogenous
- Sociology of technological determinism
 - Technology evolves autonomously and technical forces determine the social and cultural change. The action of social agents is not considered. Technical changes can be used to predict future social and cultural behaviours
- Traditional historians of technology
 - Technology determines human activities and beliefs. Innovation is a succession of events

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Innovation management: models

- **Dynamic models**

Basic assumption: Innovation process is endogenous and controllable by social actants, technology is not information but has the attributes of knowledge.

- Evolutionary economics
 - Creative destruction mechanism... Internal mutation that destroys old and creates new. Based on biological evolution mechanism.

Diversity

- Processes of genetic mutation (processes of new technological knowledge)

Inherited Characteristics

- Genetic varieties spread through inherited features (diffusion and accumulation of new technological knowledge)

Selection

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Innovation management: models

- **Dynamic models (contd...)**

- Evolutionary historians
 - Drawing of analogies between organic species and technological knowledge
- Sociology of social constructivism
 - Actants like social and cultural forces determine the nature and pace of innovations. Cultural and political values act as a selection mechanisms for the technologies that will develop
- New industrial economics
 - Strategic behaviour of the firms and hence businesses in respect of technology can modify the structure of the industry

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Innovation management: models

Levels of analysis in Innovation models

Unit of Analysis	Principal Discipline
Macro Level	
Society	Sociology/History
Economic system	Economics
Industry	Industrial Economics
Micro Level	
Firm	Management
R&D department	
R&D project	
Product	

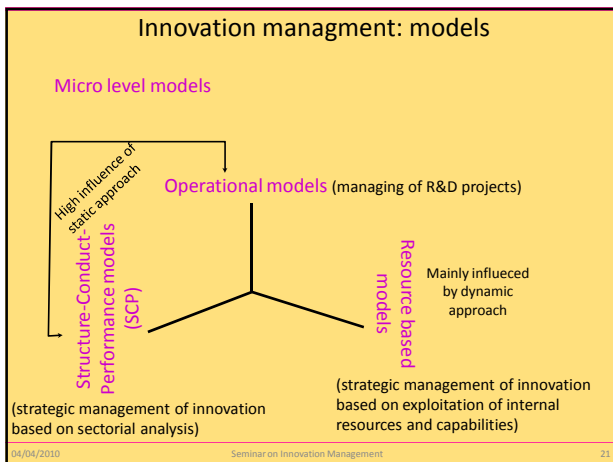
Source Nieto,M. From R&D management to knowledge management: an overview of studies of innovation management, Technological Forecasting & Social Change 70(2003)pp 135-161

Innovation management: models

Macro level models

Unit of Analysis	Discipline	Principal features studied
Human Society	Sociology	Technological progress and social change Technology assessment Social control of technology Ethical implications of technological change
	History	Nature of technological change Evolution of technology in different societies
Economic system	Economics	Innovation and economic growth National innovation systems Technology policies The economics of patents Innovation and employment Economic analysis of the process of innovation Diffusion of innovations Technological change and international trade
Industry	Industrial Economics	Concentration Conditions of appropriation Differentiation Technological opportunities Market opportunities Firm size Patterns of innovation

Source Nieto,M. From R&D management to knowledge management: an overview of studies of innovation management, Technological Forecasting & Social Change 70(2003)pp 135-161

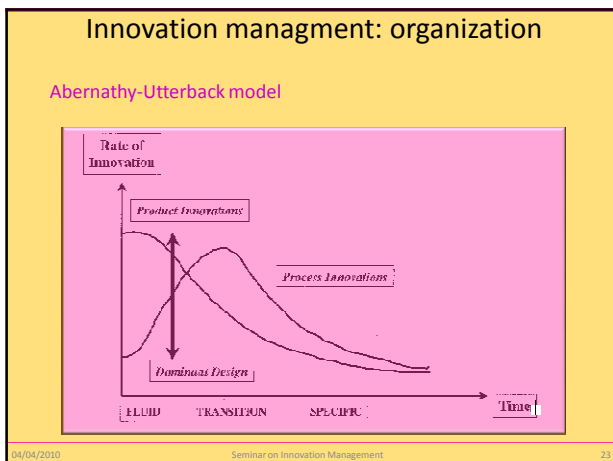


Innovation management: models

Micro level models

Type of model	Unit of analysis	Principal features studied/decision models developed
Operational	R&D department, projects	Techniques for evaluation of projects Technological forecasting Planning and control of R&D projects Management of R&D projects Managing professionals in R&D Management of R&D/production/marketing interfaces
SCP	Firm	Portfolio models Strategic analysis of technology Technological forecasting Integration aspects of technological strategy into corporate strategy Comparative analysis of productivity of various technologies using S-curves Typologies of technologies in accordance with maturity and competitive impact
Resource based models	Firm and Products	Internal technological diagnostic tools to identify technological competition Technological maps Design of organizational structures promoting creativity Learning organization Continuous improvement Product platforms Models to overcome organizational inertia

Source Nieto,M. From R&D management to knowledge management: an overview of studies of innovation management, Technological Forecasting & Social Change 70(2003)pp 135-161



- ### Managing innovation in firms
- #### Innovation dilemmas
- How far to follow technological opportunity as against market demand?
 - How much to invest in product innovation rather than process innovation?

Managing innovation in firms

Technological push vs Market pull

- Technological push>> managers should listen primarily to their scientists and technologists and support them resources
- Market pull (Eric von Hippel)>> users (lead) are common sources of innovation (authenticity)
 - e.g. surgical instruments by surgeons, sports people in extreme sports such as snowboarding or windsurfing
 - Managers build close relationships with lead users

Most organizations find a compromise between the two views with the balance varying between industries and often over time!!

Do not rely on habit or prejudice!

Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Case study: Sole Technology

- Pierre André Senizergues >> professional skateboarder in France.
- Created an action shoe and apparel business (Sole Technology) with 7 brands
- First skateboard shoe research lab
- 1988>> signed to ride skateboard brand of a French venture
- Poor English and less business experience
- Selling of Etnies shoes and obtained license for USA
- Introduced own designs and mid 1990s>> success!!!
- Bought French venture and opened new venture>> Sole Technology



Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Case study: Sole Technology (contd...)

- Own professional skateboarding expertise
- Bio-mechanical research in skateboarding
 - Gel and air bag technology
- Designed low-top shoes with durability
- Company close to sports>> sponsored >100 athletes
- Design-your-own shoe facility
- Releases potential specifications for new products thru blogs>> for feedbacks and ideas
- Employees in sports
- World's first skateboarding research facility



Does Sole Technologies has technology push or market driven perspective?

If a big company like Nike or Adidas was looking to grow in this market, as a strategist what would you advise it to do?

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Product vs Process innovation

- Product innovation>> final product or service to be sold
- Process innovation>> the way the product is produced or distributed

- New developing industries favor product innovation
- Maturing industries favor process innovation
- Small new entrants have greatest opportunities in early stages of an industry
- Large incumbent firms have advantage in later stages

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Technological or Business model

- A **business model** describes the structure of product, service, and information flows and the role of participating parties.
 - The product: what the product/service is and how it is produced? >>Technology development, procurement, inbound logistics, and operations
 - The selling: particular way of selling or diffusing a product or service >> Outbound logistics, marketing, sales and service

What is then the difference between business model and business level strategy?

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

- **Diffusion** is the process by which innovations spread amongst users, varying in pace and extent. >> managers can influence from both the supply and demand side using the S-curve model.

Diffusion of innovation

Supply side determinants	Demand side determinants
Degree of improvement	Market awareness
Compatability	Observability
Complexity	Customer innovativeness
Experimentation	
Relationship management	

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Diffusion S-curve

- Timing of the tipping point
- Timing of the plateau
- Extent of diffusion
- Timing of the tripping point

Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

To be First mover or Follower **Late mover advantages**

Experience curve benefits	Scale benefits	Free riding
Pre-emption of scarce resources	Buyer switching costs	Learning
Reputation		

First or Second? Cotextual factors to consider

- Capacity for profit capture
- Complementary assets
- Fast moving arenas

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

A **disruptive innovation** creates substantial growth by offering a new performance trajectory that, even if initially inferior to the performance of existing technologies, has the potential to become markedly superior

Based on Johnson, G., Scholes, K., Whittington, R. 2008, Exploring Corporate strategy, Text and Cases, Prentice Hall publications.

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Managing innovation in firms

Organizational characteristics that facilitate innovation

	Organic	Mechanistic
Channels of communication	Open with free information flow	Highly structured, restricted information flow
Operating styles	Operating style allowed to vary freely	Operating style
Authority for decisions	Based on expertise of the individual	Based on formal line management position
Free adaptation	By the organization to changing circumstances	With insistence on holding fast to tried and true management principles despite changes in business conditions
Emphasis on getting things done	Unconstrained by formally laid out procedures	Reliance on tried and true management principles
Control	Loose, informal with emphasis on norm of cooperation	Tight, through sophisticated control systems
Job behaviour	Flexible, to the individual's requirements	Constrained and required to conform to job descriptions
Decision making	Participation and group consensus used frequently	Superiors make decisions with minimum consultation and involvement of subordinates

Based on Innovation management and New Product development by Paul Trott, Prentice publications

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Case study and Discussion

Case study : KH VATEC

- Investigate the strategy of KH Vatec with respect to innovation dilemmas. Explain whether the innovation was more technology push or market pull; or product or process driven; or technological; or more broadly business model based.

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Conclusions

- Innovation is complex and is cross disciplinary
- Understanding innovation management requires a cross-disciplinary perspective
- Innovation management involves handling paradoxes and tensions
- The true nature of innovation management cannot be understood by static models alone, dynamic models also play an important role.
- Innovation management involves finding a balance between technology push and market pull dilemmas
- To be first or second in the market requires the consideration of contextual factors
- Disruptive innovation requires careful consideration of the product and market structures
- The choice of a given organizational structure, communication and control mechanisms depends upon the industry type, size and many other factors.

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