INTRODUCTION TO INNOVATION MANAGEMENT
(INN001, 5 p.)

INTRODUCTORY LECTURE
Today’s contents

- Course outline
- The role of innovation in the modern economy
- What is innovation (definitions, typologies of innovation)
- What is innovation management?
- Models of the innovative process
PEOPLE

• Teachers:
  – Per Högselius (responsible for the course; 046-2227848; per.hogselius@circle.lu.se)
  – Fabrice Coulon (046-2220298; fabrice.coulon@innovation.lth.se)

• Course secretary:
  – Kristina Miolin (046-2228510; kristina.miolin@mkon.lth.se)
The Division of Innovation is located in the Design House (IKDC, Sölvegatan 26), where also most teaching will take place. Some teaching takes place in the M-house:

- Mondays 13-15: IKDC room 310
- Tuesdays 13-17: M-house room B
- Thursdays 13-15: IKDC room 567
- Fridays 10-12: IKDC room 243
COURSE AIMS...

(1) to provide students with fundamental knowledge of the phenomenon of innovation and innovation processes in capitalist economies from the perspective of firms and industries;

(2) to enable students to use basic theoretical tools that help analyse and manage real-world processes of innovation;

(3) to enhance students’ appreciation of the importance of understanding innovation-related issues for the development of businesses, industries, countries and citizens.
WEEKLY THEMES

• Overview of the study field, with basic definitions, concepts and typologies
• Strategy analysis for innovation in firms
• Resource mobilisation and strategy implementation
• Industrial evolution and the dynamics of technology-intensive sectors
• The external dimension: markets, networks, institutions, systems
FIRST FIVE WEEKS

• Mondays: Introductory lecture
• Tuesdays: Follow-up tutorial
• Thursdays/Fridays: intensive seminar
  – The seminar is strongly compulsory
  – Active participation expected
  – Assignments to be handed in before the seminar
  – Seminar may include presentations etc.
LAST TWO WEEKS

• Sixth week:
  – Reserved for writing the home exam, which is the main form of examination.
  – In principle no teaching, but there will be an extra voluntary tutorial Tuesday 13-17

• Seventh and last week:
  – Takes up the final essay (which is a part of the home exam) for discussion among the students in smaller groups (5-6 people)
EXAMINATION

• Students’ progress and learning is assessed not only at the end of the course but throughout the entire course. Different forms of examination are used to gauge students’ progress:
  • Weekly written assignments in preparation for seminars
  • Formal presentations at seminars
  • Home exam, including final discussion seminar
• Of the three examination forms above, the main examination form is the home exam.
The first part of the home exam takes the form of a number of short questions relating to the course literature. These questions will be handed out on Thursday/Friday in fifth course week (29-30 September).

The second part of the home exam takes the form of a more open essay: students are asked to select a specific firm (or other organization) of their own choice and gather information about this particular firm with respect to its innovation activities. The essay should then relate the firm and its innovation activities to a number of more specific issues that have been taken up in the course literature and in teaching.
Questions for the second part of the home exam

- What types of innovation does the firm (not) concentrate on?
- Does it seem to be successful in its innovative activities? Why (not)?
- To which technological trajectory does the firm belong?
- How would you characterise the firm’s innovation strategy?
- What parts of the firm seem most important for innovation to be successful in the firm?
- Does the firm use external collaboration to enhance its innovations? If so, what types of collaboration, and why exactly those forms? And what types of partners?
- What type of competition is threatening the survival of the firm on the short and the long term?
- Does the firm use corporate ventures, and if so, of what type are they?
- In what stage of development is the industry in which the firm is active?
- What type of market (international?, local?, mass market?, niche market?) is at focus?
- Are there any institutional regulations or other political developments that are particularly important influencing the innovation activities of the firm? And how does the firm itself try to influence political developments?
What is expected from you?

Given the short time available for the essay, it is not expected that all the above questions can actually be answered in detail. However, it is important that the essay relates itself to at least some of the above issues. Please specify which issues you are trying to address. It may be that the student finds one or a few of the above issues particularly interesting, and the essay may then focus more in depth upon these selected aspects. Students may thus choose between width and depth.
Course literature

• The course literature may be borrowed (or purchased) from the Division of Innovation. It consists primarily of the following two books:
Reading suggestions:

• Week 1: Tidd et al., chapters. 1-2
• Week 2: Tidd et al., chapters. 3-6
• Week 3: Tidd et al., chapters. 9-12
• Week 4: Utterback (entire book)
• Week 5: Tidd chapters 7-8
<table>
<thead>
<tr>
<th>Dates</th>
<th>Teacher</th>
<th>Monday IKDC 310</th>
<th>Tuesday Room M:B</th>
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<th>Thursday IKDC 567</th>
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- Models of the innovative process
WE LIVE IN AN ERA OF INCREDIBLE CHANGES...!!

“Constant revolutionizing of production, uninterrupted disturbance of all social conditions, everlasting uncertainty... All old-established national industries have been destroyed or are daily being destroyed. They are dislodged by new industries, whose products are consumed not only at home, but in every quarter of the globe. In place of old wants satisfied by the production of the country, we find new wants... The intellectual creativity of individual nations become common property...”
Manifest

der Kommunistischen Partei.

Veröfentlicht im Februar 1848.

Proletarier aller Länder vereinigt euch.

London.

Geburtstag der Bildungs-Gesellschaft für Arbeiter
von J. E. Berghofer
46, Liverpool Street, Innerwarpalas.
VI RÅKAR LEVA i en tid av fantastiska vetenskapliga och teknologiska genombrott. De är spännande och de kommer att förändra våra liv, liksom våra föreställningar om vad det är att vara människa. Jag tänker särskilt på vad som pågår inom det biomedicinska fältet.
So – is there really anything which fundamentally distinguishes the 21st century from the 19th century with respect to scientific and technological developments??
Yes, of course...

- Technologies have grown much more complex
- Great hopes that the natural sciences will contribute to innovation
- Competition at an increasingly international and global scale
- Shorter product life cycles
- Increasing awareness among firms and analysts of innovation as a potential source of competitive advantage
- Etc.
Recognizing the importance of science and technology for economic development...

- **Francis Bacon (1620):** Printing, gunpowder and the compass ‘have changed the whole face and state of things throughout the world…’

- **Adam Smith (1776):** ‘Improvements in machinery’ go hand in hand with the division of labour, and ‘very pretty machines . . . facilitate and quicken’ production...

- **Karl Marx (1848):** ‘The bourgeoisie cannot exist without constantly revolutionizing the means of production’!
• Alfred Marshall (1897): ‘Knowledge’ is the chief engine of progress in the economy
• Bush (1945): Science and basic research as incredibly powerful sources of future economic and societal development...
• Joseph Schumpeter (1911): The entrepreneur and his search for ‘new combinations’ is the driving force in all economic development...
• Freeman & Soete (1997): ‘In the most fundamental sense the winning of new knowledge is the basis of human civilization’...
• Etc.
• So, no one doubts that innovation is crucial for our modern economies...
• ... but how can innovation be ’analysed’...
• ... and how can it be ’managed’?
NORMAL ECONOMICS IS BORING!!

’... The problem that is usually being visualized is how capitalism administers existing structures, whereas the relevant problem is how it creates and destroys them. As long as this is not recognized, the investigator does a meaningless job...’

(Schumpeter, 1942, p. 84)
Economics of change...

- ’Production capacity’ = capital goods, knowledge and labour skills to PRODUCE
- ’Technological (innovative) capabilities’ = skills, knowledge and institutions that make it possible to generate and manage CHANGE in technology

(Bell & Pavitt 1997)
“INNOVATION MANAGEMENT”

How can firms (and other organizations) exploit innovation in pursuit of their differing goals – in particular their own survival, profit and growth? How does innovation threaten their existence? How can entrepreneurs use S&T as a basis for the creation of new firms? Etc.
Schumpeter’s distinction between “Invention” and “innovation”

• An *invention*’ is an idea, a sketch or model for a new or improved device, product, process or system. It has not yet entered to economic system, and most inventions never do so.

• An *innovation*’ is accomplished only with the first commercial transaction involving the new product, process, system or device. *It is part of the economic system.*
”INNOVATION SPACE”

• Innovations can be of very, very different kinds!
• Firms are often good at one or two types of innovation...
• ... but there are enormous opportunities if a firm is able to explore and exploit the entire innovation space!
What type of innovation?

- "product innovation" vs. "process innovation"
- "goods" vs. "services"
- "technological" vs. "organizational" innovation
- "incremental" vs. "radical" innovation
- ("continuous" vs. "discontinuous" innovation)
- "architectural" vs. "modular" innovation
- "richness" vs. "reach"
- "position" innovation
- "techno-economic paradigm change"
- etc.
Innovations

Product innovations

In goods

In services

Process innovations

Technological

Organizational
FIGURE 1.1 Dimensions of innovation

SYSTEM LEVEL

COMPONENT LEVEL

INCREMENTAL

('doing what we do better')

RADICAL

('new to the world')
ZONE 2
- modular innovation

ZONE 3
- discontinuous innovation

ZONE 1
- incremental innovation

ZONE 4
- architectural innovation

Unchanged

Changed

LINKS BETWEEN KNOWLEDGE ELEMENTS

FIGURE 1.4 Component and architectural innovation
Changes in techno-economic paradigm

• Industrial revolutions, long waves, techno-economic paradigms...

• Freeman & Perez (1988):
  – 1780-1840 (early mechanization)
  – 1840-1890 (steam power and railways)
  – 1890-1940 (electrical and heavy engineering)
  – 1940-1990 (fordist mass production)
  – 1990-? (information and communication)
Which type of innovation is most important???

"...it is the *perceived* degree of novelty which matters; novelty is very much in the eye of the beholder. For example, in a giant, technologically advanced organization like Shell or IBM, advanced networked information systems are commonplace, but for a small car dealership or food processor even the use of a simple PC to connect to the Internet may still represent a major challenge"!
The aim of innovation...

• ... is rarely innovation "per se"!
• Goal is mostly to survive, to grow, to make profit!
• Engineers always want to do their best in a technical way...
• ... but what matters for innovation is how it influences survival chances, profit and growth opportunities!
• => Risk for "over-invention"
We live in a world of crap...

• There are a lot of useless things going on in the world...
• ... only very few inventions have any economic chances...
• ... but this "waste" is totally necessary for the innovative economy to function!!
• (compare with biological evolution...)
So, never forget Schumpeter…

• An ‘invention’ is an idea, a sketch or model for a new or improved device, product, process or system. It has not yet entered to economic system, and most inventions never do so.

• An ‘innovation’ is accomplished only with the first commercial transaction involving the new product, process, system or device. It is part of the economic system.
"CREATIVE DESTRUCTION"

"Before": "A long period of relative stability during which a continuous stream of variations around a basic innovation theme take place. Essentially this is product/process improvement along the lines of ’doing what we do, but better’..."
"CREATIVE DESTRUCTION"

"After": Harmonic, stable innovation conditions are "punctuated by occasional discontinuities – and when these occur, one or more of the basic conditions (technology, markets, social, regulatory, etc.) shifts dramatically. In the process the underlying 'rules of the game' change and a new opportunity space for innovation opens up. 'Do different' conditions of this kind occur..."
FIGURE 2.2  ‘Do better’ and ‘do different’ innovation processes
Triggers of discontinuity

- New market emerges
- New technology emerges
- New political rules emerge
- Running out of road
- Change in market sentiment or behaviour
- Deregulation or reregulation
- Fractures along ‘fault lines’
- Unthinkable events
- Business model innovation
- Shifts in techno-economic paradigm
- Architectural innovation
Important contextual factors that have an impact on innovative opportunities

- Type of sector
- Size of your firm
- The country and region where you are active
- The stage in the industry life cycle
- Political regulations
- Etc.
<table>
<thead>
<tr>
<th>Context variable</th>
<th>Modifiers to the basic process</th>
<th>Example references discussing these</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector</td>
<td>Different sectors have different priorities and characteristics – for example, scale-intensive, science-intensive</td>
<td>2, 12</td>
</tr>
<tr>
<td>Size</td>
<td>Small firms differ in terms of access to resources, etc. and so need to develop more linkages</td>
<td>13–17</td>
</tr>
<tr>
<td>National systems of innovation</td>
<td>Different countries have more or less supportive contexts in terms of institutions, policies, etc.</td>
<td>5, 18, 19</td>
</tr>
<tr>
<td>Life cycle (of technology, industry, etc.)</td>
<td>Different stages in life-cycle emphasize different aspects of innovation – for example, new technology industries versus mature established firms</td>
<td>20–23</td>
</tr>
<tr>
<td>Degree of novelty—continuous vs. discontinuous innovation</td>
<td>'More of the same' improvement innovation requires different approaches to organization and management to more radical forms. At the limit, firms may deploy 'dual structures' or even split or spin off in order to exploit opportunities</td>
<td>8, 24–26</td>
</tr>
<tr>
<td>Role played by external agencies such as regulators</td>
<td>Some sectors – e.g. utilities, telecommunications and some public services – are heavily influenced by external regimes which shape the rate and direction of innovative activity. Others – like food or healthcare – may be highly regulated in certain directions</td>
<td>26, 27</td>
</tr>
<tr>
<td>Innovation characteristic</td>
<td>Fluid pattern</td>
<td>Transitional phase</td>
</tr>
<tr>
<td>-------------------------------------------</td>
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<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Competitive emphasis placed on . . .</strong></td>
<td>Functional product performance</td>
<td>Product variation</td>
</tr>
<tr>
<td><strong>Innovation stimulated by . . .</strong></td>
<td>Information on user needs, technical inputs</td>
<td>Opportunities created by expanding internal technical capability</td>
</tr>
<tr>
<td><strong>Predominant type of innovation</strong></td>
<td>Frequent major changes in products</td>
<td>Major process innovations required by rising volume</td>
</tr>
<tr>
<td><strong>Product line</strong></td>
<td>Diverse, often including custom designs</td>
<td>Includes at least one stable or dominant design</td>
</tr>
<tr>
<td><strong>Production processes</strong></td>
<td>Flexible and inefficient – aim is to experiment and make frequent changes</td>
<td>Becoming more rigid and defined</td>
</tr>
</tbody>
</table>
Industry life cycles

• To be dealt with further during week 4
• See Utterback book!
The innovation management process

• Searching – scanning the environment (internal and external) for, and processing relevant signals about, threats and opportunities for change.
• Selecting – deciding (on the basis of a strategic view of how the enterprise can best develop) which of these signals to respond to.
• Implementing – translating the potential in the trigger idea into something new and launching it in an internal or external market.
• Learning – enterprises have (but may not always take) the opportunity to learn from progressing through this cycle so that they can build their knowledge base and can improve the ways in which the process is managed.
Implementation

– Acquiring the knowledge resources to enable the innovation (for example, by creating something new through R&D, market research, etc., acquiring knowledge from elsewhere via technology transfer, strategic alliance, etc.).

– Executing the project under conditions of uncertainty which require extensive problem-solving

– Launching the innovation and managing the process of initial adoption

– Sustaining adoption and use in the long term – or revisiting the original idea and modifying it – reinnovation.
Search
Select
Implement
(Acquire/Execute/Launch/Sustain)

Learn

TIME

FIGURE 2.1 Simple representation of the innovation process
<table>
<thead>
<tr>
<th>If innovation is only seen as...</th>
<th>...the result can be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong R&amp;D capability</td>
<td>Technology which fails to meet user needs and may not be accepted</td>
</tr>
<tr>
<td>The province of specialists</td>
<td>Lack of involvement of others, and a lack of in the R&amp;D laboratory key knowledge and experience input from other perspectives</td>
</tr>
<tr>
<td>Understanding and meeting customer needs</td>
<td>Lack of technical progression, leading to inability to gain competitive edge</td>
</tr>
<tr>
<td>Advances along the technology frontier</td>
<td>Producing products or services which the market does not want or designing processes which do not meet the needs of the user and whose implementation is resisted</td>
</tr>
<tr>
<td>The province only of large firms</td>
<td>Weak small firms with too high a dependence on large customers Disruptive innovation as apparently insignificant small players seize new technical or market opportunities</td>
</tr>
<tr>
<td>Only about 'breakthrough' changes</td>
<td>Neglect of the potential of incremental innovation. Also an inability to secure and reinforce the gains from radical change because the incremental performance ratchet is not working well</td>
</tr>
<tr>
<td>Only about strategically targeted projects</td>
<td>May miss out on lucky 'accidents' which open up new possibilities</td>
</tr>
<tr>
<td>Only associated with key individuals</td>
<td>Failure to utilize the creativity of the remainder of employees, and to secure their inputs and perspectives to improve innovation</td>
</tr>
<tr>
<td>Only internally generated</td>
<td>The 'not invented here' effect, where good ideas from outside are resisted or rejected</td>
</tr>
<tr>
<td>Only externally generated</td>
<td>Innovation becomes simply a matter of filling a shopping list of needs from outside and there is little internal learning or development of technological competence</td>
</tr>
<tr>
<td>Only concerning single firms</td>
<td>Excludes the possibility of various forms of inter-organizational networking to create new products, streamline shared processes, etc.</td>
</tr>
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INNOVATION SPACE

• Innovations can be of very, very different kinds!
• Firms are often good at one or two types of innovation...
• ... but there are enormous opportunities if a firm is able to explore and exploit the entire innovation space!
<table>
<thead>
<tr>
<th>Basic ability</th>
<th>Contributing routines</th>
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<tbody>
<tr>
<td>Recognizing</td>
<td>Searching the environment for technical and economic clues to trigger the process of change</td>
</tr>
<tr>
<td>Aligning</td>
<td>Ensuring a good fit between the overall business strategy and the proposed change – not innovating because it is fashionable or as a knee-jerk response to a competitor</td>
</tr>
<tr>
<td>Acquiring</td>
<td>Recognizing the limitations of the company's own technology base and being able to connect to external sources of knowledge, information, equipment, etc. Transfer technology from various outside sources and connecting it to the relevant internal points in the organization</td>
</tr>
<tr>
<td>Generating</td>
<td>Having the ability to create some aspects of technology in-house – through R&amp;D, internal engineering groups, etc.</td>
</tr>
<tr>
<td>Choosing</td>
<td>Exploring and selecting the most suitable response to the environmental triggers which fit the strategy and the internal resource base/external technology network</td>
</tr>
<tr>
<td>Executing</td>
<td>Managing development projects for new products or processes from initial idea through to final launch</td>
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<td></td>
<td>Monitoring and controlling such projects</td>
</tr>
<tr>
<td>Implementing</td>
<td>Managing the introduction of change – technical and otherwise – in the organization to ensure acceptance and effective use of innovation</td>
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<tr>
<td>Learning</td>
<td>Having the ability to evaluate and reflect upon the innovation process and identify lessons for improvement in the management routines</td>
</tr>
<tr>
<td>Developing the organization</td>
<td>Embedding effective routines in place – in structures, processes, underlying behaviours, etc.</td>
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</table>
Real-world aspects of the innovation process

- Shocks trigger innovations – change happens when people or organisations reach a threshold of opportunity or dissatisfaction
- Ideas proliferate – after starting out in a single direction, the process proliferates into multiple, divergent progressions
- Setbacks frequently arise, plans are overoptimistic, commitments escalate, mistakes accumulate and vicious cycles can develop;
- Restructuring of the innovating unit often occurs through external intervention, personnel changes or other unexpected events;
- Top management plays a key role in sponsoring – but also in critisizing and shaping – innovation;
- Success criteria shift over time, differ between groups and make innovation a political process;
- Innovation involves learning, but much of their outcomes are due to other events which occur as the innovation develops – making learning often ’superstitious’ in nature
<table>
<thead>
<tr>
<th>Generation</th>
<th>Key features</th>
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<tbody>
<tr>
<td>First and second</td>
<td>Simple linear models – need pull, technology push</td>
</tr>
<tr>
<td>Third</td>
<td>Coupling model, recognizing interaction between different elements and feedback loops between them</td>
</tr>
<tr>
<td>Fourth</td>
<td>Parallel model, integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkages and alliances</td>
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<tr>
<td>Fifth</td>
<td>Systems integration and extensive networking, flexible and customized response, continuous innovation</td>
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</table>
SEMINAR ASSIGNMENT WEEK 1

• Give examples from the real world of
  – a firm that has been successful at innovation
  – a firm that has failed to innovate successfully

• What, would you say, might be the most important difference between the successful and the unsuccessful firm?

• Please hand in half a page or one page or so, and bring a print-out of your answer with you to the seminar!

• (The assignment will not be graded, but you have to bring it with you to the seminar in order to participate!)
## Schedule

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