

STRATEGIC MANAGEMENT OF INNOVATION AND TECHNOLOGY

Thursdays, 9:00-12:15

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Office Hours

My office hours at ESSEC will be on Wednesdays, from 12:30 AM to 6:00 PM. I will also be available after each class. However, I encourage you to address questions to me via email. Concerns and more extensive consultations can also be handled via the telephone or by appointment.

Course Description

This course explores the strategic management of innovation and technology. This is not a course dedicated to engineers. It targets management scholars and general practitioners who need to define the strategy, the organisation and the control at the business unit or corporate level. It may also be useful to policy makers and to managers of professional associations who aim at stimulating innovation and new technology adoption. This course presents the strategic games around technologies and innovation. It explores how technology and innovation can be managed.

Course Design

The course is divided into two parts. The first half examines patterns of technological changes and their impacts, planning for technological transitions, means for capturing benefits from innovations, and planning innovation projects. The second half of the course examines the organisational issues involved in innovating and in implementing technological innovations. These issues include organisational design, exploration and exploitation coupling, alliances and partnerships, technological entrepreneurship, and adoption/resistance to innovation.

Course Objectives

Upon the successful completion of this course, you should be able to:

Apply knowledge gained from other courses in the program

Integrate technology and strategy in a general management framework

Promote innovation and creativity in yourself and your organization

Maintain your currency in the field of technology management

Contribute meaningfully in the analysis of global business issues.

To be successful in this class, you are expected to:

Read the assigned materials in preparation for each class.

Participate in group exercises and class discussions.

Leverage supplemental resources such as the library and the Internet.

Allow adequate time to prepare written materials (2-3 hours).

Collaboration

Group work is not only acceptable but encouraged. Indeed I would strongly recommend that you form a study group with a few friends or colleagues who can meet to discuss the readings before each class.

Course assignments include the following

A: Class participation (discussion in class) – 35%

B: Class preparation – 35%

C: Research note to be presented in class 10 and/or given – 30%

List of class preparation

Class 2: Preparation of the case CMR paper on VCRs

Class 3: Preparation of the case on music industry

Class 4: Each group prepares a presentation on modularity, value proposition, or commodization

Class 5: Three groups of students prepares from the web and additional materials a short presentation of innovation Communities of users – BMX and mountain bikes, Kite surf, computer or on-line games, car tuning, telephone or mobiles, kayak, etc.

Class 6: Preparation with a firm.

CLASS 1: INTEGRATING TECHNOLOGY AND STRATEGY

Aims: This class aims at presenting the global relationship between innovation, technology and strategy. It presents key issues in innovation management, keys definitions and levels of analysis.

Key concepts: Strategic management, innovation, national system of innovation, innovation process, innovation strategy

Course outlines:

- Presentation and roundtable
- Presentation of the rules of the game
- Presentation of the general framework of the course
- The course will be as interactive as possible: short texts will be distributed to introduce the discussion on definitions, stakes and implication of innovation.

To be distributed

- Reading for section 1
- Reading for section 2
- Reading for section 3

Additional reading

Tidd J, Bessant J, Pavitt K. 1997. Integrating technological, market and organizational change. John Wiley & sons Ltd

Teece D. 1986. Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy. *Research Policy* **15**: 285-305.

Maidique M, Hayes E. 1984. The art of High-technology Management. *Sloan Management Review* **25**: 18-31

CLASS 2: TECHNOLOGICAL TRAJECTORIES AND DISRUPTIVE INNOVATIONS

Aims: This class aims at presenting the internal logic of technology evolution and trajectories. It examines the managerial consequences of competing technologies, lock in on technology trajectory and paradigm.

Key concepts: S curve, disruptive technology, trajectory, competing technologies, paradigm.

Readings:

Course outlines:

The course starts with the discussion of CMR paper on competing technologies. Students have to read the text. Questions must be prepared.

Key concepts will be presented.

Discussion of the case:

Rosenbloom R, Cusumano M. 1988. Technological pioneering and competitive advantage: the birth of the VCR industry, *Reading in the management of innovation*: 3-23. Ballinger Publishing Company

This case highlights several challenges which are special to the management of technology. It introduces different notions:

- incremental innovation and radical innovation
- Competing technologies
- Technological trajectories
- Dominant design

Questions about the text:

- What is the story and the strategy of each firm, Sony, VCR, JVC
- What are the targeted markets?
- Why VCR is a breakthrough innovation?
- Can you draw out the different stage? Is innovation linear or not?
- Can you cite other radical innovations? What happens amongst competitors?

Additional readings

Arthur B. 1988. Competing technologies: an overview. In G Dosi (Ed.), *Technological Change and Economic Theory*. Pinter publishers: London

Questions:

- What are the technologies under review?
- What are the strategic implications for one firm (first mover, first to market, technological achievements versus market domination,)

- What are the consequences for technological competition?

Dosi G. 1982. Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change. *Research Policy* **11**: 147-162.

- Draw the managerial consequences of technological trajectories
- Implications for identifying consumers?
- For investments?

David P. 1985. Clio and the Economics of QWERTY. *Economic History* **75/2**: 332-337 and David PA. 1990. The dynamo and the computer: an historical perspective on the modern productivity paradox. *The American Economic Review* **80**(2): 355-361

- What are the economic mechanisms which lead to sub-optimal choices?
- What are the effects of the lock-in for a firm? Incumbent? New entrant?
- What are the economic consequences?
- How to exit a lock in situation? Is it possible in all cases?

CLASS 3: INDUSTRY CONTEXT

Aims: This class aims at presenting one of the important aspects of the industry context is the industry structure. Porter (1990) gave us a comprehensive framework to analyse how competitive advantage can interplay with technology and innovation.

Key concepts: Dominant design, life cycle, industry life cycle

Course outlines:

The course starts with the discussion of the music industry case. Students have to read the text. Questions must be prepared.

Key concepts will be presented.

Discussion of the case:

Cha, B. and Rajgopal, K., 2004, Digital distribution and the Music Industry in 2001, in Burgelman R, Christensen C, Wheelwright S. 2004. *Strategic Management of Technology and Innovation*. Mc Graw-Hill: Boston

This case tells the story of Napster from its very beginning to its buy-out by Bertelsmann AG (BeCG). It presents the battle of Napster to promote a new business model in the music industry. Technological innovations, standard battle, business models, ways to make money and legal issues are combined in that case.

Questions:

- Can you tell Napster's story?

- What are the different ways to make money in the music industry?
- What are the different solutions for the majors?
- Who are the new entrants? On what they can make money?
- Is it the same industry or different industries?
- What are the key competencies for both Napster and the incumbents (big players)

Life cycles

Moore GA. 2004. Crossing the Chasm - and Beyond. In RA Burgelman, CM Christensen, SC Wheelwright (Eds.), *Strategic Management of Technology and Innovation*: 362-368. MacGraw-Hill: Boston

- What are the relationships between the chasm and the product life cycle?
- What are the recommendations which can be formulated to cross the chasm
- Does the chasm exist for incremental innovation? Architectural? Modular?

Industry life cycles

Klepper S. 1997. Industry life cycles. *Industrial and Corporate Change* 6(1): 145-181

Afuah A, Utterback JM. 1997. Responding to Structural Industry Changes: A Technological Evolution Perspective. *Industrial and Corporate Change* 6(1): 183-202

- which industries are under review
- Can you find industries at different phases of their life cycle?
- What are the linkages between industry life cycle and technological paradigms and trajectories?
- What are the consequences of industry life cycle on the competition? On the competencies?

Characteristics of innovation - Dominant design

Henderson R, Clark K. 1990. Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly* 35: 9-30

Anderson P, Tushman ML. 1990. Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change. *Administrative Science Quarterly* 35(4): 604-633.

CLASS 4: VALUE PROPOSITION, COMMODIZATION, MODULARITY

Aims: This class aims at exploring three key concepts in the innovation process in the 21st century. The class defines the concept of modularity, explores its dimension and discusses the relative advantages. It also defines commodization of product and process as well as value proposition

Key concepts: Value proposition, commodization, modularity

Course outlines:

The course explores three interrelated questions: modularity of products and processes, commodization of products and processes, and value proposition. The organisation of the course can be the following

A group of 2 or 3 students prepares and presents the basic paper on modularity and on commodization, respectively.

Short papers will be distributed in class to enrich the discussion

Modularity – Basic paper:

Baldwin C-Y, Clark KB. 1997. Managing in an age of modularity. *Harvard Business Review*: 84-93

Questions:

- What is Baldwin and Clark's definition of modularity?
- What are the reasons why modularity is important?
- What are the different dimensions of modularity? (internal, external)
- What are the consequences of modularity on the competition?

Texts to be distributed

The dangers of modularity

Lee F, Sorenson O. 2001. The Dangers of Modularity. *Harvard Business Review* **79**(8)

Questions :

- What is the balance between innovativeness and modularity?
- What are the main questions/problems about modular design?
- Modularity and collaboration

Evans P, Wolf B. 2005. Collaboration rules. *Harvard Business Review* **July-August**: 96-104

Questions:

- What are the very advantages of modularity for collaboration? What is the organisation of collaboration? Hierarchical? Collaboration amongst peers?
- What are the conditions for developing modular systems?
- Modularity and time to market

Eisenhardt K, Brown SL. 1998. Time Pacing: Competing in markets that won't stand still. *Harvard Business Review* **March-April**: 59-69

Questions:

- Using the case of Sony walkman, what are the effects of modularity on time to market?
- Imagine what can be the effects on the division of work within the firm? Inside/outside the firm?

Additional questions to be examined

- Modularity and product life cycle
- Modularity and appropriation

Commodization – Basic paper:

Insulin Case, in Christensen C. 2001. *The innovator's Dilemma*. HarperCollins: New York, p 224-225

- How does Christensen define the commodization process?
- What does it mean for competition? First mover advantage, technological breakthrough?
- How to avoid commodization?

Discussion: Davenport TH. 2005. The coming commodization of processes. *Harvard Business Review*(June): 101-108

CLASS 5: LEAD USERS AND USER INTEGRATION

Aims: This class aims at exploring how users are integrated in the development of new products. It highlights the very role of users as innovators. It discusses how to integrate users in the development of innovation. Different examples are presented.

Key concepts: user involvement, lead user, impact of user involvement, user innovator

Course outlines:

Groups of students are asked to find and prepare examples of user involved in the innovation process. The format would be the following: Find a case of user innovators, be innovator for their community, start-up founders or in a firm. Describe the case:

- What are the conditions for such an innovation to emerge?
- Are user-innovators isolated?
- Are they selling their innovation?
- What is the reaction of incumbents?
- What happened with the innovation?
- Draw managerial consequences

Reading

Financial time, 21 Sept 2005, Digital business

Franke N, Shah S. 2003. How communities support innovative activities: an exploration of assistance and sharing among end-users. *Research Policy* **32**(1): 157-178

Franke N, von Hippel E. 2003. Satisfying heterogeneous user needs via innovation toolkits: the case of Apache security software. *Research Policy* **32**(7): 1199-1215

Harhoff D, Henkel J, von Hippel E. 2003. Profiting from voluntary information spillovers: how users benefit by freely revealing their innovations. *Research Policy* **32**(10): 1753-1769

Lakhani KR, von Hippel E. 2003. How open source software works: "free" user-to-user assistance. *Research Policy* **32**(6): 923-943

Lilien GL, Morrison PD, Searls K, Sonnack M, von Hippel E. 2002. Performance assessment of the lead user idea-generation process for new product development. *Management Science* **48**(8): 1042-1059

Luthje C, Herstatt C, Von Hippel E. 2005. User-innovators and "local" information: The case of Mountain Biking. *Research Policy* **34**: 951-965

Riggs W, von Hippel E. 1994. Incentives to innovate and the sources of innovation: the case of scientific instruments. *Research Policy* **23**: 459-469

Shah S. 2005. Open Beyond Software, AoM 2005 Meeting: A New Vision of Management in the 21st Century: Honolulu, Hawaii, (USA)

Von Hippel E. 1976. The dominant role of Users in the Scientific Instrument Innovation Process. *Research Policy* **2**(5): 212-239

Von Hippel E. 1994. Sticky information and the locus of problem solving: implications for innovation. *Management science* **40**: 429-430

Von Hippel E. 2005. *Democratizing Innovation*. MIT Press: Boston, Massachusetts

Von Hippel E, Urban G. 1988. Lead User analyses for the Development of Industrial Products. *Management Science* **34**(5): 569-582.

CLASS 6: MANAGEMENT OF INNOVATION WITHIN A FIRM.

Aims: This class aims at presenting product development principles. It will present different solutions of product development organisations and their consequences on the learning process, rapidity and so on.

Aims: the class explores the traditional tensions about innovation and R&D management:

- exploration of new fields /exploitation of existing results
- Outsource of R&D, alliances, learning
- Project management versus learning
- Basic R&D versus targeted innovation projects
- Non Invented here syndrom

Then two persons from France telecom will present modalities to integrate user feedbacks in the development of new products

Key concepts: exploration/exploitation, R&D, collaboration, NIHs, R&D project

Readings

Birkinshaw J. 2002. Managing internal R&D networks in global firms - What sort of knowledge is involved? *Long Range Planning* **35**(3): 245-267

Cohen WM, Levinthal DA. 1990. Absorptive capacity, a new perspective of learning and innovation. *Administrative Science Quarterly* **35**: 128-152

Questions

Course outlines:

9h00-10h00 : Presentation of the key concepts and the main tensions – V. Mangematin

10h00-10h30: Presentation by students of FT case

10h45-12h15: Discussion of the case with FT people

A group of 2 to 3 students prepare the case and make a short presentation to introduce the firm and the guest speaker.

CLASS 7: IN-HOUSE, ALLIANCES AND CORPORATE VENTURING

Aims: The aims of this class are : (1) exploring the tensions between exploration of new concepts, new technologies and exploiting existing competences (specifically in start-ups); (2) understanding the formation of alliances; (3) exploring the emergence and the rationales of new business models.

Key concepts: Alliance; competition for learning; learning strategies; knowledge base; business models

Course outlines:

The course starts with the discussion of Protein'Expert case. Students have to read the text. Questions must be prepared.

Key concepts will be presented.

Discussion of the case:

Genet, C.; Mangematin, V. 2005, PROTEIN'EXPERT: Business model and strategic options in a high-tech SME

This case presents the strategic choice of a biotech start-up in France. It underlines how a firm may combine different business models, the consequences in term of growth rates, visibility, risk.

Questions:

- Can you tell Protein'Expert story?
- What are the different ways to make money in the biotech industry?
- What is the position of PX?
- What are the main competitors? Start-ups or large firms? On which markets? On what they can make money?
- Which are the ways to make money in each market? To finance day to day activity?

Readings

Christensen C, Raynor ME, Verlinden M. 2001. Skate to where the money will be. *Harvard Business Review* **Nov**: 72-81

O'Reilly C, Tushman ML. 2004. The Ambidextrous Organization. *Harvard Business Review* **Avril**: 74-81

CLASS 8: PRODUCT DEVELOPMENT AND DESIGN

Aims: This class aims at presenting product development principles. It will present different solutions of product development organisations and their consequences on the learning process, rapidity and so on.

Readings

Ravasi D, Lojaco G. 2005. Managing design and designers for strategic renewal. *Long Range Planning* **38**: 51-77

Valtonen A. 2004. Six decades and six different roles for industrial designer.

Wheelwright S, Clark K. 1992. Creating Project Plans to Focus Product development. *Harvard Business Review* **March-April**

Wheelwright S, Sasser W. 1989. The new product development map. *Harvard Business Review* **May**