Korea Advanced Institute of Science and Technology
School of Business and Technology Management
Course Syllabus, Fall 2019

Course Information

- Course Title: **Innovation Management Strategy**
- Course Number: **MSB510**
- Prerequisites: (None)
- Meeting Time: Thursday, 14:30 – 17:00
- Classroom: Building N22, Room 102
- Course Web Pages: http://klms.kaist.ac.kr/

Instructor Information

- Name: Jae-yong, Choung
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- Office Hours: By appointment
- TA: Mr. Dong-In Kang, Building N22 4th floor, E-mail: eastin2002@kaist.ac.kr

Course Description and Learning Objectives

This course is designed to provide a framework for understanding and managing technological innovation. In particular, this course has the following objectives:

- To develop a conceptual framework for business managers and policy planners that will improve their ability to manage technological innovation effectively at the firm and national level;
- To examine the sources of competitive advantage available to firms—competitive advantages from their industrial activities, product/process innovation, their specific dynamic capabilities.
- To provide an understanding of the innovation management process and strategies such as disruptive innovation, Standards strategy, Organisational strategies etc.

Therefore this course provides an understanding of the sources, process, and strategy of technological innovation.

Expected Learning Outcomes

- Students are expected identify Innovation management issues
- Students are expected to understand innovation related theories and its applications
- Students are expected to understand current gap and build qualitative/ quantitative evaluations
- Students are expected to present the current innovation management issues and possible innovation strategies
- Students are expected to build effective leadership, communication skills and

collaboration through term projects

Course Materials

Required Text Book

- Reading Materials/Cases provided in the course packet

Additional Reading

1. Joe Tidd, John Bessant(2012), Managing Innovation: Integrating Technological, Market and Organizational Change, 4th Edition (2012)
2. Burgelman, R.A.; Christensen, C.M.; Wheelwright, S.C. (2009): *Strategic Management of Technology and Innovation*. McGraw-Hill Irwin, ISBN 0072536950.
3. James M. Utterback(1996) Mastering the Dynamics of Innovation, Harvard Business School Press
4. Dodgson, M., Gann, D. M., & Salter, A. (2008). *The management of technological innovation: strategy and practice*. Oxford University Press on Demand.
5. 정재용 외(2006) 공학기술과 경영, 지호

Grading Policy

Class participation	10%
Weekly quiz (5)	30%
Final Exam	30%
Term Project	30%
Total	100%

Course Requirements

The course relies heavily on case materials (mostly developed by Tinno Lab at KAIST), analysis and innovation theories. Your preparation and participation in the discussion will be essential to the success of the class in identifying and analyzing problems. Every lecture, the reading assignments will not be discussed specifically in class. I will, however, give occasional lectures to supplement the case material and summarize concepts.

Program of the Module:

Course Management :

1. Lectures are based on theory and on the discussion of case studies and articles.
2. To participate each discussion session students are required to read at least one or two papers from reading list.
3. Midterm examination is replaced by weekly quiz (taken in the beginning of class) on materials covered in the previous week. This **quiz-based assessment will be based on materials covered up to the midterm examination week**.
4. The another piece of assessment will be a written final examination (90 minutes). This **exam-based assessment will be based on materials covered during week 9-14**.
5. Emerging technologies and innovation strategy term project: Completion of course involves a group project allow you to design and suggest 'original' innovation strategy

Term project

In 2019 the World Economic Forum's Expert Network reported top 10 emerging technologies that are either likely to be prevalent or set to dramatically improve our planet.

- (download report [pdf] at) https://www.weforum.org/reports/top-10-emerging-technologies-2019

Each group (consists up to 5 students) will develop innovation strategy (for effective diffusion and commercialization, overcoming the risk and barriers). 1) Select industries, 2) understand innovation, industry characteristics, major players, 3) identify expected problems (technological and non-technological, etc.), 4) suggest innovation strategies.

- **Due Date:** PPT file by Dec. 11 2019 (by 18:00 to TA)
- **Deliverable:** PPT file only (20min presentation) in English.
- **Originality/Plagiarism:**
- The writing and findings should be original with due credits to findings and works of others. "Zero tolerance on plagiarism" is assured.

Tentative Course Schedule

Week	Date	Topic	Reading, Assignment
1	Sep 05	**Module 1-1. Innovation management** **:** Course overview and historical perspective **Module 1-2. What is innovation management:** : Exploration of innovation studies (what and how)	See "Detailed Schedule" Below
2	Sep 12	Cancelled (Chuseok holiday)	
3	Sep 19	**Quiz (Module 1-1, 1-2)** **Module 2-1. Key issues in innovation management** : Issues addressed in management and policy societies **Module 3-1. Understanding innovation:** : Key concepts, characteristics of innovation	
4	Sep 26	**Quiz (Module 2-1, 3-1)** **Module 3-2 Innovation studies past and future** : Literature on innovation and challenges for the future **Module 4-1. Big picture: Techno-economic paradigm** **:** Theory of techno-economic paradigm and its changes	

5	Oct 3	Cancelled (Gaecheonjeol, National Foundation Day)
6	Oct 10	**Quiz (Module 3-2, 4-1)** **Module 4-2. National Innovation System** : Overview of key elements of NIS **Module 5-1. Sectoral characteristics of innovation** **:** Sector and innovation, core elements of sector-specific innovation
7	Oct 17	**Quiz (Module 4-2, 5-1)** **Module 5-2. Actors of innovation: Entrepreneurship** : Individual, corporate, state entrepreneurship **Module 6-1. Innovation capability of firms** : Dynamic innovation capabilities
8		Midterm examination week
9	Oct 31	**Quiz (Module 5-2, 6-1)** **Module 6-2, 7-1. Key success factors of New Product Development Strategy** : NPD process, fuzzy front end, innovation strategy **Module 7-2. Innovation life cycle** **:** Product life cycle theory
10	Nov 7	**Module 8-1. Product innovation strategy: Complex Product System** : Innovation in mass vs. complex products' sectors **Module 8-2. Technology and organization** : Organizational and Technological linkages, Organizational Structure and Capabilities, Core Rigidities
11	Nov 14	**Module 9-1. User innovation** : Concepts related to user innovation **Module 9-2. Technology strategies and marketing** **:** types of technology strategy, technology marketing
12	Nov 21	**Module 10-1. Measurement of innovation** : Utilization of patents as outcome of R&D output, measuring innovation **Module 10-2. Latecomers' innovation strategy** : Innovation strategies and capability building process
13	Nov 28	Cancelled (Undergraduate Admission Interviews)
14	*Dec* 5	**Module 11. Latecomers' innovation strategy** : Latecomers' mass and CoPS development strategies, new innovation patterns in Korea (Post catch-up) **Module 12-1. Wrap-Up & Conclusion** **:** The current scene of Innovation Management, What the future beholds? Possible strategies to cope!
15	*Dec* 12	Student Project Presentation
16	*Dec 19*	**Final Examinations**…Good Luck!!! **(Module 6-2~Module 12-1)_**

This schedule is subject to change if necessary.

Detailed Schedule

Module 1-1: Innovation Management (Course Overview)

Objectives:

1. Course introduction of R&D and innovation management
2. Importance of Innovation Management: Firm and Government
3. Assessment methods: Term Projects, Exams

Module 1-2 :What Is Innovation Management

Objectives:

1. Jargon clearance: 1)Technology and Innovation Management, 2)Science/Technology and Innovation Policy, 3)Innovation: Economics, Management, Sociology perspective
2. Evolution of Innovation Management and Innovation Policy

Core Readings:

1. Anders Drejer. (1997), 'The discipline of management of technology, based on considerations related to technology', *Technovation*, 17(5), 253-265.
2. Mark Dodgson and John Bessant,(1996), Ch. 3, the challenges of innovation support policy, in Dodgson and Bessant,(eds), Effective innovation policy: a new approach, Chapman and Hall, in chapter 3

Supplementary Readings:

1. Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega*, *25*(1), 15-28.
2. Tushman, M. L. (2004). From engineering management/R&D management, to the management of innovation, to exploiting and exploring over value nets: 50 years of research initiated by the IEEE-TEM. IEEE Transactions on engineering management, 51(4), 409-411.
3. Lundvall, B. Å., & Borrás, S. (2005). Science, technology, and innovation policy. In *Oxford handbook of innovation* (pp. 599-631). Oxford University Press.

Module 2-1: key issues in innovation management

Objectives:

1. Topic and issue coverage on management and policy(IAMOT: International association of Mgt of Tech; Schumpeter Society; DRUID, SPRU conference)
2. 1)http://www.iamot.com/, 2)https://druid.dk/

Core Readings:

1. Industrial Research Institute. (2017). 2017 R&D Trends Forecast: Results from the Industrial Research Institute's Annual Survey: Slowing economies slow R&D investments and mute optimism. *Research-Technology Management*, *60*(1), 18-25.

Supplementary Readings:

1. *IRI(2015)* 2015 R&D Trends Forecast: Results from the Industrial Research Institute's Annual Survey, Research-Technology Management, 58:1, 24-33.
2. Mariann Jelinek, Alden S. Bean, Richard Antcliff, Erik Whalen-Pedersen & April Cantwell (2012) *21st-Century R&D*, Research-Technology Management, 55:1, 16-26

Module 3.1: Understanding innovation

Objectives:

1. Key concepts, characteristics of innovation: Product and process of innovation, Chain link, demand pull and technology push, technology regime.

Core Readings:

1. Fagerberg, J. (2005), 'Innovation – A Guide to the Literature', in Fagerberg et al. (eds), *The Oxford Handbook of Innovation*, Oxford: Oxford University Press
2. Tidd, J., and J. Bessant (2009), 'Chapter 1. Key Issues in Innovation Management', in Tidd et al. (eds), *Managing Innovation*, John Wiley & Sons: UK.

Supplementary Readings:

1. Jan, F. (2015). *Innovation–a New Guide*. Working Paper, University of Oslo, Centre for Technology, Innovation and Culture (available online at: http://www. sv. uio. no/tik/InnoWP/tik_working_ paper_20131119. pdf)

Module 3-2: Innovation studies past and future

Objectives:

1. Exploration of innovation studies: 1)Most important contributions to the literature on

innovation, 2)list of challenges for innovation studies over coming decades

Core Readings:

1. Martin, B. R. (2016). Twenty challenges for innovation studies. *Science and Public Policy*, *43*(3), 432-450.

Supplementary Readings:

2. Fagerberg, J., Martin, B. R., & Andersen, E. S. (2013). Innovation Studies: Towards a new agenda. *Innovation Studies: Evolution and Future Challenges*, 1-20.
3. Lundvall, Bengt-Åke(2013). "Innovation studies: A personal interpretation of the state of the art." Fagerberg, Jan, Ben R. Martin, and Esben S. Andersen. "Innovation Studies: Towards a new agenda." *Innovation Studies: Evolution and Future Challenges, 21-71*
4. Fagerberg, J., & Verspagen, B. (2009). Innovation studies—The emerging structure of a new scientific field. *Research policy*, *38*(2), 218-233.

Module 4-1:Big picture: Techno-economic Paradigm

Objectives:

1. To learn about the theory of techno-economic paradigm and its changes

Core Readings:

1. Perez, C. (2003). Chapter 7, Financial capital and Production Capital in *Technological revolutions and financial capital*. Edward Elgar Publishing.

Supplementary Readings:

1. Perez, C. (2009). Technological revolutions and techno-economic paradigms. *Cambridge journal of economics*, *34*(1), 185-202.
2. Perez, C. (2013). Unleashing a golden age after the financial collapse: Drawing lessons from history. *Environmental Innovation and Societal Transitions*, *6*, 9-23.

Module 4-2: National Innovation System

Objectives:

1. Overview of the key elements composing national innovation system
2. Debate: https://vimeo.com/155650827
   Is the systems of innovation approach no longer a promising line of research? (DRUID 2013 debate: YES: Maryann Feldman and Ammon Salter; NO: Dan Breznitz and Martin Kenney)

Core Readings:

1. OECD(1997), 'National Innovation Systems', http://www.oecd.org/science/inno/2101733.pdf
2. Lundvall, B-A. (2007), National innovation systems—analytical concept and development tool. *Industry and innovation*, *14*(1), 95-119.

Supplementary Readings:

1. Watkins, Andrew, et al. "National innovation systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: A critical review of the literature." *Research Policy* 44.8 (2015): 1407-1418.
2. Hekkert, Marko P., et al. "Functions of innovation systems: A new approach for analysing technological change." *Technological forecasting and social change* 74.4 (2007): 413-432.
3. Lundvall, B. Å., Joseph, K. J., Chaminade, C., & Vang, J. (Eds.). (2011). *Handbook of innovation systems and developing countries: building domestic capabilities in a global setting*. Edward Elgar Publishing.

Module 5-1: Sectoral Characteristics of Innovation

Objectives:

1. To establish the link between sector and innovation
2. To develop the core elements of sector specific innovation

Core Readings:

1. Pavitt, K. (1984), 'Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory', *Research Policy*, 13(6), 343-373.
2. Malerba, F. (2002), 'Sectoral systems of innovation and production', *Research Policy*, 31, 247-264.

Supplementary Reading:

1. Malerba, F., & Mani, S. (Eds.). (2009). *Sectoral systems of innovation and production in developing countries: actors, structure and evolution*. Edward Elgar Publishing.

Module 5-2: Actors of Innovation: entrepreneurship

Objectives:

1. Exploration of actors of innovation: large firms, SMEs, entrepreneurships
2. Individual, Corporate, State entrepreneurships

Core Readings:

1. Roy Rothwell (1989), 'Small firms, innovation and industrial change', *Small Business Economics*, *1*(1), 51-64.
2. Keith Pavitt(1991), 'Key Characteristics of the Large Innovating Firm'. *British Journal of Management*, *2*(1), 41-50.

Supplementary Readings:

1. Mazzucato, M. (2015), "The Entrepreneurial State – Debunking Public vs. Private Sector Myths", Anthem Press, ISBN 978-0-857282-52-1.
2. Guth, W. D., & Ginsberg, A. (1990). Guest editors' introduction: Corporate entrepreneurship. *Strategic management journal*, 5-15.

Module 6-1: Innovation Capability of Firms

Objectives:

1. To understand the dynamic innovation capabilities of technology based firms
2. To identify core elements and mechanisms of DFC (Dynamic Firm Capabilities)

Core Readings:

1. Teece, D., G. Pisano, and A. Shuen (1997), 'Dynamic Capabilities and Strategic Management', *Strategic Management Journal*, 18(7), 509-533.

Supplementary Readings:

1. Teece, D. (2007), 'Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance', *Strategic Management Journal*, 28, 1319-1350.
2. Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. Strategic Management Journal, 36(6), 831-850.

Module 6-2, 7-1: Key Success Factors of New Product Development and strategy

Objectives:

1. To understand the basics of new product development (NPD) process and innovation strategies
2. To understand the concept of fuzzy front end in product development
3. To identify firm specific product development and innovation strategy

Core Readings:

1. Brown and Eisenhardt (1995), 'Product Development: Past Research, Present findings, and Future Directions', *Academy of Management Review*, 20(2), pp.343-378
2. Khurana, A., & Rosenthal, S. R. (1997). 'Integrating the fuzzy front end of new product development', *Sloan management review*, *38*, 103-120.

Supplementary Readings:

1. Krishnan, V. and K. Ultich (2001), 'Product Development Decisions: A Review of the Literature', *Management Science*, 47(1), 1-21.
2. MacCormack, A., W. Crandall, P. Henderson, and P. Toft (2012), 'Do You Need a New Product-Development Strategy?', Research Technology Management, 55(1), 34-43.
3. Kim, J., & Wilemon, D. (2002). Focusing the fuzzy front–end in new product development. *R&D Management*, *32*(4), 269-279.

Module 7-2: Innovation Life Cycle

Objectives:

1. To understand product life cycle theory

Core Readings:

1. Utterback, J. and W. Abernathy (1975), 'A Dynamic Model of Process and Product Innovation', *The International Journal of Management Science*, 3(6), pp.639-656

Supplementary Readings:

1. Utterback, J. and F. Suarez (1991), 'Innovation, competition, and industry structure',

Research Policy, 22, 1-21.
2. Peltoniemi, M. (2011). Reviewing industry life-cycle theory: Avenues for future research. International Journal of Management Reviews, 13(4), 349-375.

Module 8-1: Product Innovation Strategy: Complex Product System

Objectives:
1. To understand the characteristics of innovation in mass vs. complex products sectors
2. To distinguish between innovation processes for mass production and complex systems type products

Core Readings:
1. Hobday, M., & Rush, H. (1999), 'Technology management in complex product systems (CoPS)-ten questions answered', *International Journal of Technology Management*, *17*(6), 618-638.

Supplementary Readings:
1. Hobday, M. (1998), 'Product complexity, innovation and industrial organisation', *Research Policy*, 26, 689-710.
2. Huenteler, J., Schmidt, T. S., Ossenbrink, J., & Hoffmann, V. H. (2016). Technology life-cycles in the energy sector—Technological characteristics and the role of deployment for innovation. Technological Forecasting and Social Change, 104, 102-121.

Module 8-2. Latecomers' Mass and CoPS Innovation Strategy

Objectives:
1. To understand latecomers' mass and CoPS development strategies

Core Readings:
1. Hobday, M. (1995). East Asian latecomer firms: learning the technology of electronics. *World development*, *23*(7), 1171-1193.
2. Choung, J. and H. Hwang (2007), 'Developing the complex system in Korea: the case study of TDX and CDMA telecom system', *International Journal of Technological Learning*, Innovation, and Development, 1(2), 204-225.

Mid-term Examination

Module 9-1. Technology and Organization

Objectives:
1. To learn about the organizational and technological linkages, organizational structure and capabilities, core rigidities

Core Readings:
1. Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative science quarterly*, 439-465.
2. Tushman, M. and C. O'Reilly (1996), 'Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change', *California Management Review*, 38(4), 8-30.

Supplementary Readings:
1. Leonard-Barton, D. (1992). 'Core capabilities and core rigidities: A paradox in managing new product development'. *Strategic management journal*, *13*(S1), 111-125.
2. Chang, Y. C., Chang, H. T., Chi, H. R., Chen, M. H., & Deng, L. L. (2012). How do established firms improve radical innovation performance? The organizational capabilities view. Technovation, 32(7-8), 441-451.

Module 9-2. User innovation

Objectives:
1. To learn about the concept of user innovation

Core Readings:
1. Von Hippel, E. (2009). Democratizing innovation: the evolving phenomenon of user innovation. *International Journal of Innovation Science*, *1*(1), 29-40.
2. Lundvall, B. (1988). À (1988);" Innovation as an interactive process: from user-producer interaction to the national system of innovation. *Technical Change and Economic Theory. Pinter Publishers, United Kingdom*, 349-369.

Supplementary Readings:

1. Bogers, M., Afuah, A., & Bastian, B. (2010). Users as innovators: a review, critique, and future research directions. Journal of management, 36(4), 857-875.

Module 10-1. Technology Strategies and marketing

Objectives:

1. To learn about the types of technology strategy
2. To learn about the concepts related to technology marketing

Core Readings:

1. Chiesa, V., Manzini, R., & Tecilla, F. (2000). 'Selecting sourcing strategies for technological innovation: an empirical case study'. *International Journal of Operations & Production Management*, *20*(9), 1017-1037.
2. Moore, G. (2004), 'Darwin and the Demon'. *Harvard Business Review*, *82*(7/8), 86-92.

Module 10-2. Measurement of Innovation

Objectives:

1. To understand how we can utilize patents as an outcome of R&D output
2. To identify the means of measuring innovation

Core Readings:

1. Smith, K. (2005), 'Measuring Innovation', in Fagerberg et. al. (eds), *The Oxford Handbook of Innovation*, Oxford: Oxford University Press

Supplementary Readings:

1. Morris, L. (2008), 'Innovation Metrics: The Innovation Process and How to Measure It', *An Innovation Labs White Paper*, 1-19.

Module 11-1. Latecomers' Innovation Strategy

Objectives:

1. To understand the innovation strategies and capability building process

Core Readings:

1. Bell, M. and P. Figueiredo (2012), 'Innovation capability building and learning mechanisms in latecomer firms: recent empirical contributions and implications for research', *Canadian Journal of Development Studies*, 33(1), 14-40.
2. Hobday, M., H. Rush, and J. Bessant (2004), 'Approaching the innovation frontier in Korea: the transition phase to leadership'. *Research Policy*, 33, 1433-1457.

Module 11-2 Latecomers' Innovation Strategy – Post Catch-up

Objectives:

1. To understand the new innovation patterns in Korea

Core Readings:

1. Choung, J. Y., Hwang, H. R., & Song, W. (2014). 'Transitions of innovation activities in latecomer countries: An exploratory case study of South Korea'. *World Development*, *54*, 156-167.
2. Lee, K., & Malerba, F. (2017). Catch-up cycles and changes in industrial leadership: Windows of opportunity and responses of firms and countries in the evolution of sectoral systems. *Research Policy*, *46*(2), 338-351.

Wrap up and Conclusion

Students Presentations

Final Examination

기술혁신/연구관리/기술경영과 관련된 학술잡지

1. Research/Technology Management
2. Management Science
3. IEEE Transactions on Engineering Management
4. R&D Management
5. Harvard Business Review
6. Research Policy

7. Journal of Product Innovation Management
8. Journal of Engineering and Technology Management
9. International Journal of Entrepreneurship and Innovation Management
10. Technovation
11. International Journal of Technology Management
12. International Journal of Innovation Management
13. Technological Forecasting and Social Change
14. Journal of Business Venturing
15. Long-range Planning
16. Journal of Business Venturing
17. Sloan Management Review
18. Strategic Management Journal
19. Journal of Business Strategy
20. Journal of High-Tech Management Research
21. 경영과학회지
22. 기술혁신연구 (기술경영경제학회지)
23. 경영학연구 (경영학회지)
24. 중소기업연구
25. 벤처경영연구

유용한 Web Sites

1. 과학기술정보통신부: www.msit.go.kr
2. 한국산업기술진흥협회(Korea Industrial Technology Association: http://www.koita.or.kr
3. 과학기술정책연구원: http://www.stepi.re.kr/
4. 삼성경제연구소: http://www.seri.org/
5. 국가과학기술전자도서관: http://ndsl.or.kr/
6. MIT Management of Technology Program: http://mitsloan.mit.edu/execed/mot/
7. MIT Center for Innovation in Product Development: http://cipd.mit.edu
8. 미국 IRI (Industrial Research Institute): http://www.iriinc.org/web/
9. EIRMA (European Industrial Research Management Association): http://www.eirma.asso.fr/
10. New Product Development: http://www.eas.asu.edu/~kdooley/nsfnpd/practices.html
11. National Science Foundation: http://www.nsf.gov/
12. Center for Innovation Management Studies: http://cims.ncsu.edu/
13. National Academy of Engineering: http://www.nae.edu/
14. The TRIZ Journal: http://www.triz-journal.com/
15. Center for Entrepreneurship (National University of Singapore): http://www.fba.nus.edu.sg/

Academic Honor Code of BTM (School of Business and Technology Management)

Academic integrity and honesty are critical values of KAIST community. It is essential to the academic integrity of this community that students do their own work and properly acknowledge the ideas, sources, and assistance upon which that work is based. As a member of KAIST BTM community, all students including those who take BTM courses are expected to adhere to the

principles of truth, integrity, and respect. Failure to comply with the Honor Code may result in disciplinary action including failure of the course.

Academic dishonesty includes but is not limited to the following:

- **Cheating**: Copying from another's examination paper, solutions, assignments, or allowing another to copy from one's own.
- **Plagiarism**: Using another person's original work without giving appropriate credit to or acknowledging the authors or sources
- **Self-plagiarism**: Submitting one piece of work in more than one course without the explicit permission of the instructors involved.
- **Misrepresentation of authorship**: Submitting work as one's own which has been prepared by or purchased from another.
- **Unpermitted collaboration or aid**: Giving or receiving unpermitted aid on exams or assignments.

Any member of the BTM community who believes that violation of academic dishonesty has occurred should bring the matter to the attention of the department chair. The department chair will assign members of Academic Review Committee (학사심의회) to conduct a thorough investigation and, if necessary, request a due process to university.