
TECHNOLOGY AND INNOVATION MANAGEMENT

Period: a.y. 2022/23 – II sem.

Instructor:

Class times: Room 101. Thursday:
08:30-11:50

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Course Objective

The objectives of the course are to:

- provide participants with an understanding of the key concepts of technology and innovation, their relationship with economics and with the organizational environment, and their overall impact on management and organizations;
- equip participants with the conceptual frameworks and analytical tools needed to do research on themes and topics of the Technology and Innovation Management field;
- expose participants to a hybrid set of methods to understand the wide array of approaches to do research in the field of Technology and Innovation.

Course Method and Grading

A typical session will be characterized by an introduction of the main topic under discussion, the discussion of related papers, and a conclusion on the topic. The instructor has provided preparation questions that are listed after the readings list for each session. These questions are meant to orient and support your thinking about the day's topic and thus facilitate your preparation. You need not hand in a written answer to these questions, but you should consider them as overview questions that should help you make sense of the readings individually and relative to each other. It is understood that there may be many other interesting questions about the papers, so feel free to pursue and discuss other thoughts too! Of course, in your own preparation, you should go beyond repeating the questions we have listed.

Assignments

I will randomly select students to introduce and discuss the assigned materials, so be prepared to summarize and critically evaluate each paper:

- research question and why it is relevant;
- an evaluation of the theory and methods used in the paper;

- a critical overall evaluation of the paper emphasizing its strengths and weaknesses;
- personal thoughts on what you would change if you were to re-write the paper or expand the research;
- implications for theory and practice.

Other Course Requirements and Grading

Grading will be based on:

- a written paper on a topic of your choice related to TIM 50%
- paper reviews and presentations 30%
- class participation and contribution 20%.

Additional information on TIM

TIM as a field finds support in a division of the Academy of Management. The Technology and Innovation Management Division of the Academy of Management was formed in 1987 to bring together scholars interested in innovation, research and development, and the management of technology-based organizations.

TIM scholars publish in leading General Management outlets such as The Academy of Management Review, The Academy of Management Journal, Management Science, Organization Science, Administrative Science Quarterly, Strategic Management Journal. They also publish in specialized journals such as: Research Policy; Industrial and Corporate Change; Technology Analysis and Strategic Management; Journal of Product Innovation Management; Technological Forecast and Social Change; R&D Management; Industry and Innovation.

TIM concepts, theories and models are also summarized in influential textbooks/monographs, whose reading will help students better engage in the analytics of research. What follows is a list of some of the most influential books in the field:

- Afuah A., Innovation Management. Oxford University Press.
- Burgelman R. Christensen C., Maidique M., Wheelwright S. 2007, Strategic Management of Technology and Innovation. McGraw Hill
- Crawford J. Di Benedetto, A. New Products Management. McGraw Hill.
- Schilling M. Strategic Management of Technological Innovation. McGraw Hill.
- Shane S. Technology Strategy for Managers and Entrepreneurs. McGraw Hill.
- Tidd J., Bessant J. Managing Innovation, Wiley.
- Tushman, Michael L., and Philip Anderson, eds. Managing Strategic Innovation and Change: A Collection of Readings. 2nd ed. N.Y.: Oxford University Press, 2004.
- Ulrich S., Eppinger S. Product Design and Development. McGraw Hill

Faculty Bio.

Professor Gianmario Verona is a Professor of Management whose research, teaching and consulting are focused on the strategic management of technology and innovation, marketing strategies and digital transformation. He has been Rector of Bocconi University between 2016 and 2022. Since 2022 he is President of Human Technopole, a European research center based in Milan and specialized in personalized and preventive medicine. Over the years he has collaborated with many Global500 companies, innovative multinationals and newly founded startups in terms of applied research, executive education and consulting activity. Prof. Gianmario Verona obtained his bachelor

degree in Business Administration in 1994 and his PhD at Bocconi University in 1999. He became Full Professor at Bocconi University in 2008. Between 2007-2013 he was Winter Term Visiting Professor at the Tuck School of Business at Dartmouth College and in 1997-1998 he was Visiting Scholar at the Sloan School of Management at the Massachusetts Institute of Technology (MIT). He is author of 80+ articles and 6 books on technology strategy and new product development, including the international volume “Collaborating with Customers to Innovate: Conceiving and Marketing Products in the Networking Age” (Edward Elgar). He has published in all leading academic international management outlets and he’s also a contributor to practitioners’ journals such as the Harvard Business Review, MIT Sloan Management Review, California Management Review. He has been member of the editorial board of four academic journals and was co-editor of Strategic Organization (2012-2016).



5. Course Content

PART I: INTRODUCTION AND PERSPECTIVES ON TIM

In the first part of the course, students will be exposed to some of the papers that originated the field at the “macro” (where sectors and technology are the core focus of papers) and “micro” level (where organizations and new product development are at the center of the research questions). They will also be exposed to the classic debate that contrasts a demand-pull approach to strategy with a more classic technology-push orientation. This debate will be particularly useful to have a comprehensive view of independent variables used to understand innovation and technology.

Session 1-2.

Paradigms, Cycles, and Waves of Scientific, Technological, and Industrial Evolution

- Dosi G. 1982. Technological paradigms and technological trajectories. *Research Policy*, 11: 147-162.
- Abernathy WJ, Utterback JM. 1978. Patterns of Industrial Innovation. *Technology Review*, June-July: 40-47.
- Fagerberg, J., Verspagen, B. 2009. Innovation studies — The emerging structure of a new scientific field. *Research Policy*, 38(2): 218- 233.

Technology-Push Innovation and Demand-Pull Innovation.

- von Hippel, E. 1976. The dominant role of users in the scientific instrument innovation process. *Research Policy*, 5 (3): 212-39.
- Priem R., 2007. A consumer perspective on value creation. *Academy of Management Review*, 32(1): 219-235.
- Di Stefano G., Gambardella A., Verona G. Technology push and demand-pull perspectives in innovation studies: Current findings and future research directions. *Research Policy*, 41: 1283-1295.

Preparation questions:

1. What is the link between paradigms and innovation?
2. How can we measure paradigms? And innovation trajectories?
3. What does technology-push and demand-pull mean?
4. Has the distinction a conceptual value – i.e., is it important for the field?
5. How can we measure if an innovation is demand pull or technology push?

Session 3-4

New Product Development: Organization and Strategy View

- Brown S, Eisenhardt KE. 1995. Product Development. Past Research, Present Findings, Future Directions. *Academy of Management Review*, 20: 343-378.
- Verona G. 1999. A Resource-based View of Product Development. *Academy of Management Review*, 24 (1): 132-142.



New Product Development: Operations and Marketing View

- Krishnan VV, Ulrich K. 2001. Product Development Decisions: A Review of the Literature. *Management Science*, 47/1: 1-21.
- Hauser J, Tellis GJ, Griffin A. 2006. Research on Innovation: A Review and Agenda for Marketing Science. *Marketing Science*, 25 (6): 687-717.

New Product Development: Entrepreneurship View

- Scott A. Shane, Karl T. Ulrich. 2004. 50th Anniversary Article: Technological Innovation, Product Development, and Entrepreneurship. *Management Science* Vol. 50, No. 2, pp. 133-144.

Preparation questions:

1. How many fields have been studying innovation in the last fifty years? Is it important to have different disciplines studying innovation – wouldn't it be better to have one only?
2. What did each discipline bring to the understanding of innovation?
3. What are the commonalities in studying innovation between the different disciplines?

PART II: COMPETENCE-DESTROYING CHANGE

Firms have problems in transiting from one technology to another, especially when the change is not incremental but radical and “disruptive”. In this second part of the course, students will learn the fundamental models that explain the failure of incumbent organizations in favor of entrants.

Session 5-6.

Technological Competences and Organizational Inertia

- Tushman ML, Anderson P. 1986. Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, 31: 439-465.
- Henderson R, Clark KB. 1990. Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, 35: 9-30.
- Christensen C, Bower JL. 1996. Customer Power, Strategic Investment, and the Failure of the Leading Firms. *Strategic Management Journal*, 17: 197-218.
- Tripsas M, Gavetti G. 2000. Capabilities, Cognition, and Inertia: Evidence from Digital Imaging. *Strategic Management Journal*, 21 (10/11): 1147-1161.
- Benner MJ. 2010. Securities Analysts and Incumbent Response to Radical Technological Change: Evidence from Digital Photography and Internet Telephony, *Organization Science*, 21 (1): 42-62.

- Vuori T., Hui NO. 2016. Distributed Attention and Shared Emotions in the Innovation Process: How Nokia Lost the Smartphone Battle. *Administrative Science Quarterly*, 61 (1): 9-51.

Preparation Questions for sessions:

1. What is a technological competence? How can we measure it?
2. What is the link between a competence and the process of innovation?
3. What is an architectural competence? What is the difference between a competence-destroying change and an architectural change?
4. What is a disruptive innovation, really?
5. What are the core sources of technological inertia?
6. Are there other sources of inertia?

PART III: GOVERNING TECHNOLOGICAL CHANGE

Firms that learn how to change in complex technological environments are able to blend exploration processes with exploitation ones. In this third part of the course we will review core papers on incumbents' response to technological change and on the role of complementary assets in favoring or hampering adaptation.

Session 7-8. Incumbents' Response to Technological Change and the Role of competences and Complementary Assets

- Henderson R, Cockburn I. 1994. Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management Journal*, 15:63-84.
- Helfat CE. 1997 Know-how and asset complementarity and dynamic capability accumulation: the case of R&D. *Strategic Management Journal*, (18): 5, 339-360.
- Tripsas M. 1997. Unravelling the process of creative destruction: Complementary assets and incumbent survival in the typesetter industry. *Strategic Management Journal*, 18: 119-142.
- Cozzolino A. Verona G. 2022. Cozzolino and Verona: Responding to Complementary Asset Discontinuities *Organization Science*, Articles in Advance, pp. 1-28
- Eggers J.P., Park K.F., 2017. Incumbent Adaptation to Technological Change: The Past, Present, And Future of Research on Heterogeneous Incumbent Response. *Academy of Management Annals*, Vol. 12(1): 357-389.

Preparation Questions:

1. What are the drivers of differential response of incumbents to tech change?
2. What kind of complementary capabilities might help companies survive technological change?
3. What can be the role of competences and how can we measure them?

Session 9-10. Dynamic Capabilities and Ambidexterity

- Teece DJ. 2007. Explicating dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal* 28 (13): 1319-1350.
- Eisenhardt KM, Martin J. 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, 21(10-11): 1105-1121.
- Danneels E. 2002 The dynamics of product innovation and firm competences. *Strategic Management Journal*, 23 (12): 1095-1121.
- Verona G, Ravasi D. 2003. Unbundling Dynamic Capabilities: An Exploratory Study of Continuous Product Innovation. *Industrial and Corporate Change* 12 (3): 577-606.
- Stadler C., Helfat C., Verona G. 2013. The impact of dynamic capabilities on resource access and development. *Organization Science*, 14 (6): 1782-1804.
- Rosenkopf L, Nerkar A. 2001. Beyond Local Search: Boundary-spanning, Exploration, and Impact in the Optical Disk Industry. *Strategic Management Journal*, 22: 287-306.
- Katila R, Ahuja G. 2002. Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction. *Academy of Management Journal*, 45(6): 1183-1194.
- O'Reilly C., Tushman M., 2008. Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma. *Research in Organizational Behavior*, 28: 185-206.
- Schulze A., Brusoni S. 2022. How dynamic capabilities change ordinary capabilities: Reconnecting attention control and problem-solving. *Strategic Management Journal* 43 (12): 2447-2477.

Preparation Questions:

1. At which level dynamic capabilities act?
2. How can we measure (and study) dynamic capabilities?
3. What are the links between exploration, exploitation and dynamic capabilities?

PART IV: WHAT'S NEXT?

Despite the broad knowledge cumulated in the last thirty years, the field has been recently stimulated by the challenges induced by the digital transformation and the ESG agenda. While discussing the future of the field we will investigate the research ideas that come out from the students at the end of the course.

Sessions 11 & 12

The future of TIM and Course Wrap-Up.

- Cillo P., Verona G. 2022. The Strategic Management of Innovation: State of the Art and Emerging Challenges. *Strategic Organization*. 20 (4): 743-756.

