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## TECHNOLOGY AND INNOVATION MANAGEMENT

Period: a.y. 2023/24 – II sem.

Instructor:

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

Prof. Gianmario Verona  
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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
- stimulate their research creativity to investigate rigorously relevant questions that are still unanswered.

### 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, along the following lines:

- research question and why it is relevant;
- an evaluation of the theory and methods used in the paper;
- a critical evaluation of the overall 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 the development of an RQ 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 holds the Romeo and Enrica Invernizzi Chair in Innovation Management. His research, teaching and advisership 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 and executive. Prof. Gianmario Verona obtained his bachelor degree in Business Administration in 1994 and his PhD in Business Administration and Management 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 7 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, was co-editor of *Strategic Organization* (2012-2016) and he is currently Associate Editor of *Strategic Management Journal*.

## Session 1-2.

### Science, Innovation and Theory Development

- Whetten D. 1989. What constitutes a theoretical contribution. *Academy of Management Review* Park M. <https://www.jstor.org/stable/258554x>
- Corley KG Gioia DA 2011 Building Theory about Theory Building: What constitutes a theoretical contribution. *Academy of Management Review* <https://aom.org/uploadedFiles/Publications/AMR/CorleyGioiaBuildingTheory.pdf>
- Colquitt JA, Zapata Phelan CP 2007, Trends in Theory Building and Theory Testing: A five decade study of the Academy of Management Journal. *Academy of Management Journal* <https://leeds-faculty.colorado.edu/dahe7472/colquitt%20and%20zapata-phelan%202007.pdf>
- Bettis R., Gambardella A., Helfat C., Mitchell W 2014. Theory in Strategic Management. *Strategic Management Journal*.
- Geman D. Geman S. 2016. Science in the age of selfies. *PNAS*, August 23 (34) 9384-9387 -- <https://www.pnas.org/doi/10.1073/pnas.1609793113>
- Park M. Leahey E., Funk R.J. 2023. Papers and patents are becoming less productive over time. *Nature*, Geman D. Geman S. 613 138-144 <https://www.nature.com/articles/s41586-022-05543-x>
- Barney J., 1986 Strategic Factor Markets: Expectations, Luck, and Business Strategy. <https://www.jstor.org/stable/2631697>
- Barney J., 1991 Firm resources and sustained competitive advantage. *Journal of Management* [https://josephmahoney.web.illinois.edu/BA545\\_Fall%202022/Barney%20\(1991\).pdf](https://josephmahoney.web.illinois.edu/BA545_Fall%202022/Barney%20(1991).pdf)
- Teece, Pisano, Shuen 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, Vol. 18:7, 509–533 [https://onlinelibrary.wiley.com/doi/pdf/10.1002/\(SICI\)1097-0266\(199708\)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z](https://onlinelibrary.wiley.com/doi/pdf/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z)
- Eisenhardt KM, Martin J. 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, 21(10-11): 1105-1121.

#### Preparation questions:

- What does theory mean in social sciences and in management?
- What does theory mean in technology and innovation?
- Is there a theory crisis in science and innovation?
- What should research do?

## Session 3-4

### Our understanding of technology and innovation so far: Technological and Industrial Evolution

- Abernathy WJ, Utterback JM. 1978. Patterns of Industrial Innovation. *Technology Review*, June-July: 40-47.
- Dosi G. 1982. Technological paradigms and technological trajectories. *Research Policy*, 11: 147-162.
- Nelson R., Winter S. 1982. The Shumpeterian Tradeoff revisited. *American economic review*. <https://www.jstor.org/stable/1808579>
- Klepper S. 1996. Entry, exit, growth, and innovation, over the product life cycle. *American Economic Review*. <https://www.jstor.org/stable/2118212>
- Argyres N., Bigelow L., Nickerson Jack A. 2013 Dominant designs, innovation shocks, and the follower's dilemma <https://doi.org/10.1002/smj.2207>
- Arora A., Belenzon S., Sheer L. 2021. Knowledge spillovers and corporate investment in

scientific research (With Sharon Belenzon, Lia Sheer). *American Economic Review*. 111(3), pp.871-98

- Ashish Arora, Sharon Belenzon, Konstantin Kosenko, Jungkyu Suh & Yishay Yafeh 2023. The Rise of Scientific Research in Corporate America <https://www.nber.org/papers/w29260>
- Audretsch D. and Feldman M., 1996. R&D spillovers and the geography of innovation and production *American economic review*. <https://www.jstor.org/stable/2118216>
- Fagerberg, J., Verspagen, B. 2009. The emerging structure of a new scientific field. *Research Policy*, 38(2): 218- 233.
- 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:*

- What is the link between paradigms and innovation?
- How do science evolve?
- How can we measure paradigms? And innovation trajectories? And scientific productivity?
- What does technology-push and demand-pull mean?
- How can we measure if an innovation is demand pull or technology push? And is it interesting?

## Session 5-6

### Our understanding of technology and innovation so far: New product development

#### (a) 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.

#### (b) Operations, Marketing, and Entrepreneurship 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.
- Rubera G., Kirca AH. 2012. Firm innovativeness and its performance outcomes. A meta analytic review and theoretical integration. *Journal of Marketing*, 76: 130-147.
- 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?
4. What is still missing?



## Session 7-8.

### Innovation and inertia

- Tushman ML, Anderson P. 1986. Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, 31: 439-465.
- Anderson and Tushman 1990 Technological discontinuities and dominant designs. A cyclical model of technological change. *Administrative science quarterly*. <https://www.jstor.org/stable/2393511>.
- 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.
- Leonard Barton D.L. 1992. Core capabilities and core rigidities: a paradox in management innovation. *Strategic management journal*. <https://onlinelibrary.wiley.com/doi/10.1002/smj.4250131009>
- 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:

1. Why is inertia important?
2. What are the core sources of technological inertia?
3. Are there other sources of inertia?
4. What is an architectural competence? What is the difference between a competence-destroying change and an architectural change?
5. What is a disruptive innovation?

## Session 9-10.

### Innovation and competences

- von Hippel, E. 1976. The dominant role of users in the scientific instrument innovation process. *Research Policy*, 5 (3): 212-39.
- 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.
- Danneels E. 2002 The dynamics of product innovation and firm competences. *Strategic Management Journal*, 23 (12): 1095-1121.
- Bloom N, Van Reenen JV 2007. Measuring and Explaining Management Practices across Firms and Countries. *The Quarterly Journal of Economics*. Vol. 122, No. 4, pp. 1351-140. <https://www.jstor.org/stable/25098879>

- Bloom N, Brynjolfsson E, Foster L, Jarmin R, Patnaik M, Saporta-Eksten I, Van Reenen J 2019 What Drives Differences in Management Practices? *American Economic Review* 109(5): 1648–1683 <https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.20170491>
- Acemoglu D., Akcigit U., Alp Celik M. 2022. Radical and Incremental Innovation: The Roles of Firms, Managers, and Innovators. *American Economic Journal: Macroeconomics* <https://economics.mit.edu/sites/default/files/2022-09/Radical%20and%20Incremental%20Innovation%20-%20The%20Roles%20of%20Firms,%20Managers%20and%20Innovators.pdf>

*Preparation Questions:*

1. What is competence? And how can we measure it?
2. What are the drivers of differential response of incumbents to tech change?
3. What kind of complementary capabilities might help companies survive technological change?

**Session 11-12.**

**What's next? The future of TIM, my view, and course Wrap-Up.**

- 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.
- Giada Di Stefano, Andrew A. King, and Gianmario Verona (2014), "Kitchen confidential? Norms for the use of transferred knowledge in gourmet cuisine." *Strategic Management Journal*, Volume 35, Issue 11: pp. 1645–1670.
- Danneels E., Verona G., Provera B. 2018. Overcoming the inertia of organizational competence: Olivetti's transition from mechanical to electronic technology. *Industrial and corporate change*.
- Stadler C., Helfat C., Verona G. 2022. Transferring knowledge by transferring individuals: Innovative technology use and organizational performance in multiunit firms
- Cozzolino A. Verona G. 2022. Cozzolino and Verona: Responding to Complementary Asset Discontinuities *Organization Science*, pp. 1–28
- Zanella P, Cillo P, Verona G (2022) Whatever you want, whatever you like: How incumbents respond to changes in market information regimes. *Strategic Management Journal* 43(7): 1258–1286.
- Cillo P., Verona G. 2022. The Strategic Management of Innovation: State of the Art and Emerging Challenges. *Strategic Organization*. 20 (4): 743-756.

