

**PhD in Business Administration and Management  
Technology and Innovation Management - Advanced II  
a.y. 2018 - 2019**

Instructor first part: prof. Dovev Lavie

Instructor second part: prof. Cedric Gutierrez Moreno



## **Exploration and Exploitation**

### **A PhD Course in Business Administration and Management**

**Bocconi University**

**2019**

**Instructor: Dovev Lavie**

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## COURSE OBJECTIVES

This course exposes students to advanced topics in innovation and technology management, with emphasis on the learning literature and the exploration-exploitation framework.

The objectives of the course include:

- Provide students with the foundations of research on exploration-exploitation, while enhancing understanding of the key concepts.
- Understand the environmental, organizational, and behavioral antecedents and performance consequences of learning behaviors.
- Equip students with the conceptual frameworks and analytical approaches needed to critically review the literature and conduct research on the themes covered in the course.
- Expose students to a varied set of research methods that can be used in the study of topics in the field of innovation and technology management, while identifying their respective merits and limitations.

## ABOUT THE INSTRUCTOR

Dovev Lavie is a Professor of Strategy in the Department of Management and Technology at Bocconi University. He earned his Ph.D. in Management at the Wharton School and served as an Assistant Professor at the University of Texas at Austin and a Full Professor and Vice Dean for MBA Programs at the Technion. He also held visiting positions at the London Business School, UCL and BI Norway. Lavie is a Sloan Industry Studies Fellow, a recipient of the Strategic Management Society's Emerging Scholar Award, and winner of the INFORMS TMS Best Dissertation Award and the Academy of Management Newman Award. His research interests include the evolution and performance implications of alliance portfolios, the balancing of exploration and exploitation, and applications of resource-based theory in interconnected technology-intensive industries. His work has been published in leading journals, such as the Strategic Management Journal, Academy of Management Review, Academy of Management Journal, and Organization Science. Lavie served as an Associate Editor of the Academy of Management Journal and the Strategic Management Journal. He has taught PhD courses, undergraduate courses, and Executive MBA courses and custom corporate programs focusing on exploration and exploitation, competitive strategy, corporate strategy, and cooperative strategy.

## COURSE DESCRIPTION

This course covers advanced issues in innovation and technology management, focusing primarily on research on the phenomenon of exploration and exploitation at the organizational level. The course begins with the theoretical foundations which are rooted in the learning literature and the behavioral theory of the firm. It focuses on the processes by which firms search for new knowledge and rely on their existing knowledge, identifying the organizational and behavioral constraints and drivers that shape that learning behavior. The framework of exploration and exploitation has built on these foundations to become central to the study of organizational learning, innovation, and performance. At the most basic level exploration entails generating new knowledge whereas exploitation involves refining and applying existing knowledge. Nevertheless, this framework has been extended to various other contexts and levels of analysis. The paradox of exploration and exploitation is that both activities are essential for performance but there are inherent tradeoffs that make it challenging for firms to maintain balance between them. In this course we will study the alternative definitions, assumptions, and



perspectives used in research on exploration and exploitation. We will identify the environmental and organizational antecedents that drive firms' tendencies to explore versus exploit. This will be followed by considering the consequences of exploration and exploitation, underscoring implications for organizational performance. Next, attention will be paid to the notion of balance between exploration and exploitation. We will assess alternative approaches for balancing exploration and exploitation and consider their performance implications. The course readings cover some fundamental contributions to the literature rather than the most recent articles, which can be read subsequently.

## METHOD AND EXPECTATIONS

The course will be delivered in a seminar format, expecting students to be highly involved in discussion of the assigned articles. Students will be expected to demonstrate critical review skills and identify the contributions and limitations of the assigned articles. In the first two sessions, I will lead the discussion to cover the foundations and establish norms for analysis and contemplation. In the remaining sessions, students will take the lead and play a more proactive role. When reading the articles in preparation for class discussion, try to identify the motivation for the study; assess its positioning relative to prior research; understand the underlying logic behind the hypotheses; evaluate the research design including data, sample, operationalization of the variables, and analysis techniques; examine the validity and interpretation of the results; and consider the implications of the study and how it relates to other studies. When evaluating the set of articles assigned to a particular session, compare and contrast the studies, identify points of agreement and disagreement, and come up with ideas for how to integrate and reconcile them. Finally, think about ideas for future research that extend the research or build on its arguments. For each session, several lead questions have been listed. These are fundamental questions that should be considered in preparation for class discussion. Note that these are only suggested questions, while the discussion itself will be more extensive in scope and depth. Students are encouraged to prepare their own questions for class, including clarification questions about issues that were not straightforward in the articles and questions concerning their methodologies. Given the intensity of the course, students are advised to read the articles in advance and use the included review form for summarizing the main aspects of each article.

During sessions, I will offer some introductory remarks, following which each of the assigned articles will be discussed in turn. At the beginning, either I or one of the students assigned as a lead discussant of the article will offer a 10-minute presentation that provides an overview of the article. As a lead discussant, a student should provide copies of his or her presentation slides to all other participants in the session. The purpose of the presentation is mostly to make sure that everyone is on the same page. The presentation should highlight the motivation, theory, research design, results, and intended contributions of each article, with limited interpretation. Please reserve your reflections and synthesis to the subsequent class discussion. After each presentation, we will critically discuss the article. This will be followed by an overall discussion of the session's theme and conclusions from the set of assigned articles. During class discussion, feel comfortable to share thoughts and relate to other students' ideas. We seek to establish a supportive learning environment in which everyone feels free to share and exchange ideas. At the end of the session I may offer some concluding remarks that provide an integrative view of the theme.



## COURSE ASSIGNMENTS AND GRADING

Course grading will be based on the following assignments and deliverables:

30% - Submission of 12 review forms for all the assigned articles. No need to submit review forms for the self-preparation articles and for the *HBR* and *AMR* articles assigned to Sessions 3 (these articles are marked with “\*”). The completed form is limited to 2 pages. These forms will not be graded. You will receive the full grade for submitting them. Please submit via email before the corresponding session.

45% - Lead discussant presentation. You will be assigned as a lead discussant of three articles (see Course Schedule and Reading Assignments). I will grade your presentation based on its delivery in class. Make sure you can deliver each presentation in 10 minutes. Please submit your presentation slides to me and to all other students via email prior to the corresponding session. Bring your presentation on a memory stick for backup.

25% - Contribution to class discussion. I will assess your contribution to class discussion following each session. Contribution is assessed based on quality rather than quantity. Dominating class discussion without offering meaningful contribution in the form of insights, integration, thoughtful questions etc., is discouraged. Listening and relating to others’ ideas is a valid contribution. Nevertheless, unless you actively participate in the discussion, you cannot contribute.



## REVIEW FORM - EXAMPLE

Authors (Year)	Mitchell & Singh (1993)
Title	Death of the lethargic - effects of expansion into new technical subfields on performance in a firms base business
Abstract	This paper finds that industry incumbents that do not expand into new technical subfields tend to fare poorly in their established businesses, even if the market for the established products continues to exist. Firms that expand from their established businesses survive longer and achieve greater subsequent market share than competitors that do not expand. By some measures, however, a failed attempt to expand into a new subfield may be even more harmful to a base business than non-expansion. The study employs conventional and accelerated event-time regression models to analyze market share and survival. The sample, which includes 371 incumbents in four base subfields of the medical diagnostic imaging industry between 1953 and 1989, examines performance following the emergence of five new technical subfields of the industry.
Theoretical framework	Population ecology theory
Sample	371 incumbents in four base subfields of the medical diagnostic imaging industry (x-ray, nuclear, ultrasound, and CT) between 1953 and 1989, in the U.S. (100 of which expanded into emerging subfields, 81 exiting by acquisition and 106 by dissolution.)
Unit of analysis	Firms
Dependent variables [measures]	- Survival [the length of a firm's continued participation in the base subfield in number of years] - Performance [the subfield dollar revenue market share held by a pre-introduction incumbent during years 4, 8, and 16 after the emergence of the new subfield]
Independent variables [measures] + moderators	Exit [by dissolution or by acquisition]
Controls [measures]	Incumbent's prior subfield market share firm size [natural log of total corporate sales during the year before a new subfield emerged] nationality [0-1 indicator of firm majority ownership]
Definition of key construct	[provide the definition of exploration-exploitation in the reviewed paper]
Hypothesis	Hypothesis 1a. A pre-introduction incumbent that expands into the new subfield will have longer survival in its base subfield than firms that do not expand. Hypothesis 1b. A pre-introduction incumbent that expands into the new subfield will attain greater subsequent market share in its base subfield than firms that do not expand but survive. Hypothesis 2a. The greater the industry-wide market share held by a pre-introduction incumbent, the longer its continued survival in its base subfield. Etc.
Results	<ul style="list-style-type: none"><li>• Hypothesis 1a and 1b are supported</li><li>• Hypothesis 2a partially supported, Hypothesis 2b supported</li><li>• Hypothesis 3b supported for years 4 and 8 only</li><li>• Hypothesis 4a supported, 4b supported and 4c not supported</li></ul> <p>Etc.</p>
Implications and Limitations	[Here you should identify remaining research gaps, weaknesses of the paper, suggestions for improvement, implications of the study, and how it relates to other papers you have read]



## COURSE SCHEDULE AND READING ASSIGNMENTS

### Self-preparation for the course

#### **Topic: Foundations of Exploration and Exploitation**

##### **Reading Assignments:**

- \*March, J. G. 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2: 71-87.
- \*Levinthal, D. A., & March, J. G. 1993. The myopia of learning. *Strategic Management Journal*, 14 (special issue): 95-112.
- \*Gupta, A. K., Smith, K. G., & Shalley, C. E. 2006. The interplay between exploration and exploitation. *Academy of Management Journal*, 49: 693-706.
- \*Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. 2009. Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4), 685–695.
- \*Lavie, D., Stettner, U. & Tushman, M. 2010. “Exploration and Exploitation within and across Organizations“, *Academy of Management Annals*, Vol 4, 109-155.

##### **Discussion Questions:**

1. How should we define “exploration” and “exploitation”?
2. Are exploration and exploitation independent or interdependent?
3. Are exploration and exploitation complementary or contradictory activities?
4. Should firms pursue both exploration and exploitation or specialize only in one activity?
5. How should firms effectively engage in both exploration and exploitation?

### Session 1

#### **Topic: Antecedents of Exploration and Exploitation**

##### **Reading Assignments:**

- Nohria, N., & Gulati, R. 1996. Is slack good or bad for innovation? *Academy of Management Journal*, 39(5), 1245–1264 (Presentation – AKTAN Can)
- Sidhu, J.S., Volberda, H.W., & Commandeur, H.R. 2004. Exploring exploration orientation and its determinants: Some empirical evidence. *Journal of Management Studies*, 41(6), 913–932. (Presentation – CORINA Margherita)
- Jansen, J.J.P., Van den Bosch, F.A.J., & Volberda, H.W. 2006. Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, 52(11), 1661–1674. (Presentation – FRIEDMANN Jens-Christian)
- Voss, G.B., Sirdeshmukh, D., & Voss, Z.G. 2008. The effects of slack resources and environmental threat on products exploration exploitation. *Academy of Management Journal*, 51(1), 147–164. (Presentation – YOON Hyoungwon)

##### **Discussion Questions:**

1. What motivates firms’ efforts to explore and exploit?
2. How do environmental factors drive exploration and exploitation?
3. How do organizational factors affect exploration and exploitation?
4. What are some boundary conditions to the antecedents identified in the literature?
5. What drives firms toward balance versus imbalance of these activities?



## Session 2

### **Topic: Consequences of Exploration and Exploitation**

#### **Reading Assignments:**

- Auh, S., & Menguc, B. 2005. Balancing exploration and exploitation: The moderating role of competitive intensity. *Journal of Business Research*, 58(12), 1652–1661 (Presentation – AKTAN Can)
- Sigelkow, N., & Rivkin, J. 2006. When exploration backfires: Unintended consequences of multilevel organizational search. *Academy of Management Journal*, 49(4), 779–795. (Presentation – CORINA Margherita)
- He, Z.L., & Wong, P.K. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization Science*, 15(4), 481–494. (Presentation – FRIEDMANN Jens-Christian)
- Jansen, J.J.P., Simsek, Z. & Cao, Q. 2012. Ambidexterity and Performance in Multi-unit Contexts: Cross-level Moderating Effects of Structural and Resource Attributes. *Strategic Management Journal*, 33(11), 1286-1303. (Presentation – YOON Hyoungwon)

#### **Discussion Questions:**

1. How do the consequences of exploration and exploitation differ?
2. Do the consequences of exploration depend on exploitation or vice versa?
3. Under what conditions can a firm maximize the effects of exploration and exploitation?
4. How does balancing exploration and exploitation maximize performance?

## Session 3

### **Topic: Balancing Exploration and Exploitation**

- Gibson, C.B., & Birkinshaw, J. 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2), 209–226. (Presentation: AKTAN Can)
- \*O'Reilly, C. A., Tushman M.L, 2004. The Ambidextrous Organization. *Harvard Business Review* 82 (4), 74–81.
- \*Benner, M. J. and Tushman M.L, 2003. Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, 28: 238-256.
- Brown, S.L. & Eisenhardt, K.M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1), 1–34. (Presentation – CORINA Margherita)
- Lavie, Dovev, Kang, Jingoo & Rosenkopf, Lori. 2011. Balance within and across Domains: The performance Implications of Exploration and Exploitation in Alliances. *Organization Science*, 22(6), 1517-1538. (Presentation: FRIEDMANN Jens-Christian)
- Stettner, U. & Lavie, D. (2014) "Ambidexterity under Scrutiny: Exploration and Exploitation via Internal Organization, Alliances, and Acquisitions", *Strategic Management Journal*, 35(13), 1903-1929. (Presentation: YOON Hyoungwon)

#### **Discussion Questions:**

1. What does balance between exploration and exploitation mean? How can we measure it?
2. What are the assumptions of alternative approaches for balancing exploration and exploitation?
3. In what dimensions do these approaches differ?
4. Are these alternative or complementary approaches for maintaining balance?
5. What skills and techniques can firms adopt to effectively balance exploration and exploitation?

# **PhD Seminar – Behavioral perspectives on innovation and entrepreneurship**

## **COURSE GOALS**

This doctoral-level seminar is designed to expose PhD students to some behavioral concepts and their applications to research questions on innovation and entrepreneurship topics.

During the first session, we will look at the behavioral roots of entrepreneurship. In particular we will focus on the role of attitudes toward uncertainty. In the second session, we will explore the topic of confidence and in particular look at the effects of overconfidence on innovative activity. In the third session, we will study reference dependent theories (prospect theory and aspiration-level theory) and in particular the role of aversion to losses in entrepreneurship and innovation. Finally, in the last session, we will look at some temporal perspectives in entrepreneurship and innovation.

## **COURSE PROFESSOR**

**Cédric Gutierrez** ([cedric.gutierrez@unibocconi.it](mailto:cedric.gutierrez@unibocconi.it)) – Assistant Professor of Management and Technology. His research interests are situated at the intersection of behavioral decision making, entrepreneurship and strategy. His work explores the behavioral foundations of entry into entrepreneurship and incentives. In particular, he examines how behavioral mechanisms (e.g. ambiguity aversion, perception of time) and cognitive biases (e.g. overconfidence) influence entrepreneurs and managers' willingness to take risk. Empirically, he uses methods and models from experimental economics and decision sciences. Cédric can be found at B2-04.

## **COURSE ASSIGNMENTS AND GRADING**

Course grading will be based on the following assignments and deliverables:

40% - Short research proposal. You will have to provide a brief research proposal (5 pages) on a novel idea related to one of the concepts studied in this course. The proposal should contain a specific research question, detail what the propositions are, convince the reader that it is an important question and explain how you plan to address it (e.g., what data could potentially be used?). The research proposal will be due 2 weeks after the last session.

40% - Lead discussant presentation. You will be assigned as a lead discussant of four articles (one per session). I will grade your presentation based on its delivery in class. Make sure you can deliver each presentation in 10 minutes. You will have to share your slides with me and the other students prior to the corresponding session.

20% - Contribution to class discussion. I will assess your contribution to class discussion following each session.

## **READINGS**

### **Session 1 – Attitudes toward uncertainty**

#### **Background readings**

- Åstebro, T., Herz, H., Nanda, R., & Weber, R. A. (2014). Seeking the roots of entrepreneurship: Insights from behavioral economics. *Journal of Economic Perspectives*, 28(3), 49-70.
- Hamilton, B. H. (2000). Does entrepreneurship pay? An empirical analysis of the returns to self-employment. *Journal of Political Economy*, 108(3), 604-631.
- Kihlstrom, R. E., & Laffont, J. J. (1979). A general equilibrium entrepreneurial theory of firm formation based on risk aversion. *Journal of political economy*, 87(4), 719-748.

#### **Readings**

- Åstebro, T. (2003). The return to independent invention: evidence of unrealistic optimism, risk seeking or skewness loving?. *The Economic Journal*, 113(484), 226-239.
- Hvide, H. K., & Panos, G. A. (2014). Risk tolerance and entrepreneurship. *Journal of Financial Economics*, 111(1), 200-223.
- Koudstaal, M., Sloof, R., & Van Praag, M. (2015). Risk, uncertainty, and entrepreneurship: Evidence from a lab-in-the-field experiment. *Management Science*, 62(10), 2897-2915.
- Wu, B., & Knott, A. M. (2006). Entrepreneurial risk and market entry. *Management science*, 52(9), 1315-1330.

### **Session 2 – Biased beliefs: overconfidence**

#### **Background readings**

- Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological review*, 115(2), 502.

#### **Readings**

- Camerer, C., & Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *American economic review*, 89(1), 306-318.
- Galasso, A., & Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science*, 57(8), 1469-1484.
- Herz, H., Schunk, D., & Zehnder, C. (2014). How do judgmental overconfidence and overoptimism shape innovative activity?. *Games and Economic Behavior*, 83, 1-23.
- Hirshleifer, D., Low, A., & Teoh, S. H. (2012). Are overconfident CEOs better innovators?. *The Journal of Finance*, 67(4), 1457-1498.

### **Session 3 – Reference dependent preferences and loss aversion**

#### **Background readings**

- Bromiley, P., Rau, D., & Zhang, Y. (2017). Is R&D risky?. *Strategic Management Journal*, 38(4), 876-891.

- Holmes, R. M., Bromiley, P., Devers, C. E., Holcomb, T. R., & McGuire, J. B. (2011). Management Theory Applications of Prospect Theory: Accomplishments, Challenges, and Opportunities. *Journal of Management*, 37(4), 1069–1107.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263–291.
- March, J. G., & Shapira, Z. (1992). Variable risk preferences and the focus of attention. *Psychological Review*, 99(1), 172.
- Shinkle, G. A. (2012). Organizational Aspirations, Reference Points, and Goals Building on the Past and Aiming for the Future. *Journal of Management*, 38(1), 415–455.

### **Readings**

- Chen, W. R. (2008). Determinants of firms' backward-and forward-looking R&D search behavior. *Organization Science*, 19(4), 609-622.
- Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D investments of family and nonfamily firms: Behavioral agency and myopic loss aversion perspectives. *Academy of management Journal*, 55(4), 976-997.
- Greve, H. R. (2003). A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of management journal*, 46(6), 685-702.
- Lim, E. N. (2015). The role of reference point in CEO restricted stock and its impact on R&D intensity in high-technology firms. *Strategic Management Journal*, 36(6), 872-889.
- Tyler, B. B., & Caner, T. (2016). New product introductions below aspirations, slack and R&D alliances: A behavioral perspective. *Strategic Management Journal*, 37(5), 896-910.

## **Session 4: Temporal perspectives**

### **Background readings**

- Frederick, S., Loewenstein, G., & O'donoghue, T. (2002). Time Discounting and Time Preference: A Critical Review. *Journal of Economic Literature*, 40(2), 351–401.
- Reilly, G., Souder, D., & Ranucci, R. (2016). Time horizon of investments in the resource allocation process: Review and framework for next steps. *Journal of Management*, 42(5), 1169-1194.

### **Readings**

- Bluedorn, A. C., & Martin, G. (2008). The time frames of entrepreneurs. *Journal of Business Venturing*, 23(1), 1-20.
- Ederer, F., & Manso, G. (2013). Is pay for performance detrimental to innovation?. *Management Science*, 59(7), 1496-1513.
- Grenadier, S. R., & Wang, N. (2007). Investment under uncertainty and time-inconsistent preferences. *Journal of Financial Economics*, 84(1), 2-39.
- Nadkarni, S., & Chen, J. (2014). Bridging yesterday, today, and tomorrow: CEO temporal focus, environmental dynamism, and rate of new product introduction. *Academy of Management Journal*, 57(6), 1810-1833.
- Souder, D., Reilly, G., Bromiley, P., & Mitchell, S. (2016). A behavioral understanding of investment horizon and firm performance. *Organization Science*, 27(5), 1202-1218.