

## **Introduction**

# **Why We Need a Tighter Theory and More Critical Research on Open Innovation**

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The concept of open innovation is currently popular in the management and policy literature on technology and innovation. However, despite the large volume of empirical work, many of the prescriptions being proposed are fairly general, rather than specific to particular contexts and contingencies. The proponents of open innovation tend to offer universal, and often universally positive, prescriptions whereas research suggests that the specific mechanisms and outcomes of open innovation models are very sensitive to context and contingency. This is not surprising because the open or closed nature of innovation is historically contingent and does not entail a simple shift from closed to open as often suggested in the literature. Research shows that patterns of innovation differ fundamentally — by sector, firm, and strategy. Therefore there is a need to examine the mechanisms that help to generate successful open innovation. This book contributes to a shift in the debate from potentially misleading general prescriptions, and provides conceptual and empirical insights into the precise mechanisms and potential limitations of open innovation research and management practice.

The open innovation model emphasizes that firms should acquire valuable resources from external firms and share internal resources for new product/service development, but the question of when and how a firm

sources external knowledge and shares internal knowledge is less clear. The concept of open innovation is popular in innovation management research and practice, but can be criticized for being too vague and prescriptive.

The original idea of open innovation was that firms should (also) exploit external sources and resources to innovate, a notion that is difficult to contest,<sup>1</sup> but this is not a new idea, simply a repackaging of existing research and practice.<sup>2</sup> However, wider dissemination of the concept shows that it is difficult to research and implement, to the point that it has now become ‘all things to all people’, lacking explanatory or predictive power. There have been numerous studies of open innovation, but still the empirical evidence on the utility of open innovation is limited and practical prescriptions are overly general. Research ranges from individual case studies which are difficult to generalize, to simple survey-based counts of external sources and partners, which reveal little about the conditions, mechanisms or limitations of open innovation.<sup>3</sup>

This collection of leading research on open innovation is more critical and nuanced than most, and is organized in four sections:

1. Taxonomies and Modes
2. Context and Contingencies
3. Sector and Industry Studies
4. Limitations and Constraints

## **Taxonomies and Modes**

Valentina Lazzarotti and Raffaella Manzini begin the section with a framework which reveals four basic ways to collaborate. Two variables are considered that represent the degree of openness for a company: (i) the number/type of partners with which the company collaborates, briefly labelled as ‘partner variety’; (ii) the number/type of phases of the innovation process that the company opens to external contributions, briefly labelled as ‘innovation funnel openness’. By crossing these two variables, four basic modes of open innovation are identified: closed innovators, open innovators, specialized collaborators and integrated collaborators. The framework is tested by means of an empirical study conducted in Italy, which shows that, in some cases, being totally open in innovation activities is not the only and most suitable option, but that different degrees and ways of ‘openness’

can be implemented successfully, including opting for the totally closed method.

Peter T. Gianiodis, S.C. Ellis and E. Secchi provide a critical review of previous research on the conceptualization, antecedents and consequences of open innovation. We then offer a typology describing four open innovation strategies: (i) innovation seeker, (ii) innovation provider, (iii) intermediary, and (iv) open innovator, which emerge through unique combinations of sources of innovation, firm attributes, mechanisms of inter-organizational exchange and produce varying outcomes.

Ellen Enkel and Karoline Bader examine the links between open innovation and strategy. They develop the Miles and Snow strategy typology of three proactive strategies and one non-proactive strategy to analyse the link between strategy and innovation activities. The non-proactive strategy is known as the reactor and the proactive strategies are called prospectors, analysers and defenders. Based on previous empirical studies, the three proactive strategies are revisited via quantitative and qualitative data with regard to an innovation orientation and are re-labelled as the opportunity-seeking prospector, the dual-oriented analyser and the market segment securing defender.

## **Context and Contingencies**

Fiona Schweitzer, Oliver Gassmann and Kurt Gaubinger look at the impact of open innovation on new product success and investigate the moderating role of environmental dynamics on this relationship. The authors argue that open innovation strategies assist companies in navigating through turbulent times as they facilitate the acquisition of new and relevant information on technologies and markets and facilitate the integration of this knowledge into the innovation process. They use data from 103 industrial firms to analyse the impact of open innovation activities on innovation performance. Open innovation proves in general to have a positive influence on performance in dynamic settings. A closer look at the different contributions from various types of external sources reveals that customers are central when market dynamics are high, suppliers are important in technologically challenging environments, and the inclusion from companies of other industries is effective irrespective of the setting.

Hanna Bahemia and Brian Squire abstractly examine open innovation at the project level rather than the firm level. They develop a conceptual framework of inbound open innovation at the new product development (NPD) project level to assess factors that help determine the degree of openness along three dimensions. They argue that the margin of managerial action is not only constrained to the decision to open up the NPD project to a wide range of different types of external partners (the breadth dimension), but that it is equally important to consider the depth of the relations with different types of external partners (the depth dimension) and the balance between the development of new and long-standing relations with these external partners (the ambidexterity dimension). The calibration of these three dimensions represents the levers when managing an inbound open innovation strategy during an NPD project. They find that the appropriate calibration of the three dimensions of inbound open innovation is determined by the type of innovation (radical versus incremental), product complexity (discrete versus complex) and the appropriability regime (tight versus weak).

Kuo-Nan Hsieh and I compare the development of two types of service across two contrasting approaches to new service development. The first approach could be characterized as the more conventional or closed, whereas the other approach is much more open. The two types of service vary by the degree of novelty. Based upon 52 interviews with those directly involved in the new service development projects, including partners and suppliers, we identify the influences of project novelty on open approaches to innovation. We find that higher levels of project novelty are associated with a higher intensity of interaction between actors and the use of richer mechanisms for knowledge-sharing. This suggests that open innovation is not a universal prescription, but may be more relevant to more novel development projects. Moreover, it demonstrates that simple counts of external sources and types of external innovation do not fully capture open innovation practices.

Fang Huang and John Rice extend open innovation beyond the usual product focus to include process innovations — generally organizational innovations aimed at improving the nature of organizational value adding and factor transformative systems. In this study they assess the impact of openness on products, services and processes, drawing on a large-scale sample of Australian firms. They find that open innovation models are useful for firms seeking to innovate in processes, as well as products and services,

but that openness to external information sources may, after a time, lead to decreasing marginal returns as measured by innovation performance. The proposed complementarities between internal and external knowledge sources are generally only evident as precursors to the introduction of new products and services and may not be as beneficial in stimulating process innovations. They also show that investment in absorptive capacity has a declining marginal effect on the innovation performance of new processes, but not on the introduction of new products and services.

Wim Vanhaverbeke, Jingshu Du and Maximilian von Zedtwitz investigate the international dimension of external technology sourcing. Open innovation analyses why and how companies source external knowledge and, while the majority of the open innovation studies apply to large multinationals, the geographical dimension is largely neglected. Their search and development (R&D) globalization theory, on the contrary, explicitly deals with the geographical dimension of R&D in multinational enterprises (MNE). In particular, they show that introducing the geographical perspective in open innovation turns the open innovation paradigm into a more pragmatic framework for MNE management. Similarly, introducing some insights from the open innovation perspective into the R&D globalization literature generates a set of research questions that can reinvigorate the R&D globalization debate.

## **Sector and Industry Studies**

Anne-Laure Mention and Anna-Leena Asikainen investigate the effects of openness on the different stages of the innovation process and on performance at firm level. More specifically, they focus on inter-firm cooperation and information sourcing practices, which embody the implementation of an inbound open innovation strategy. They also contrast cooperation and information sourcing from market actors with cooperation and information sourcing from competitors. The effects of these simultaneous practices on the innovation process are investigated in service sector firms. They find that cooperation with and information sourcing from the market reduce innovation expenditures while they positively affect innovative sales, thus suggesting that such practices reduce direct innovation expenditures and shorten time to market for novelties. On the other hand, collaboration

and information sourcing from competitors appears to be more resource-intensive, but also increases innovative sales.

Björn Remneland-Wikhamn, Jan Ljungberg, Magnus Bergquist and Jonas Kuschel review open innovation in the mobile phone industry, through a comparative case study of the iPhone and Android. The notion of generative capacity is highlighted in the research on open innovation, suggesting that it is generativity rather than openness that drives the platforms' aggregated wealth. These two cases from the smartphone industry illustrate that innovation initiatives can successfully approach generativity in different ways and that both openness and control are important elements to facilitate stakeholder contributions.

Tom Poot, Dries Faems and Wim Vanhaverbeke contribute to a more dynamic perspective on open innovation by conducting a longitudinal analysis of the adoption of open innovation strategies using three comparable waves of the Dutch Community Innovation Survey, which were conducted in 1996, 2000 and 2004. They find that this paradigm shift tends to occur in shocks instead of manifesting itself as a continuous process over time and show that the timing of these shocks differs across industries. The study also supports the assumption that internal and external innovation strategies are complements instead of substitutes.

Tommaso Buganza, Davide Chiaroni, Gabriele Colombo and Federico Frattini identify differences in how firms belonging to different industries implement open innovation. They compare the organizational and managerial approaches that a sample of eight large Italian firms belonging to different industries adopts when it comes to putting open innovation into practice. They find that some firms tend to leverage exploitative inter-organizational networks characterized by strong ties and by the presence of several heterogeneous actors such as customers, suppliers and universities. Moreover, they establish dedicated organizational units to institutionalize structured and formalized screening processes for managing open innovation projects. Other firms enter instead into networking relationships mainly for explorative purposes, establishing weak ties with public research centres or universities. They adopt more informal, *ad hoc* structures and evaluation processes, usually embedded in the already existing R&D departments. The paper proposes that such differences are due to a set of industry level variables, i.e. R&D intensity, strength of the appropriability regime, turbulence and uncertainty.

## **Limitations and Constraints of Open Innovation**

Paul Trott and Dap Hartmann argue that the proponents of open innovation create a false dichotomy between open and closed approaches and they systematically examine and critique the six principles of open innovation. They agree that the notion is undoubtedly partially correct in the limitations of so-called closed innovation, but also misleading in conveying the wrong impression that firms today follow these principles.

Torsten Oliver Salge, Thomas Marc Bohné, Tomas Farchi and Erk Peter Piening develop and test a firm level contingency model of inbound open innovation in an attempt to contribute to explaining the substantial disparities in open innovation payoff that exist between firms. Integrating elements from the resource- and knowledge-based views and the absorptive capacity literature, they propose that specific innovation management activities can play an important moderating role as they are likely to enhance firms' capacity to identify, assimilate and utilize external knowledge inputs. Drawing on longitudinal data from 1,170 German manufacturing and service firms, econometric analyses reveal that returns from open innovation are greatest when firms maintain their internal research capacity, employ a dedicated incentive system for innovation and advocate strong cross-functional collaboration. Decision-makers are thus well advised not to take positive returns from open innovation for granted. Rather, they need to achieve excellence in key innovation management activities if their firm is to fully harness the value of openness.

In the final chapter, Michael Hopkins, Paul Nightingale and I identify two short-comings of the practical application of open innovation. First, the precise mechanisms supporting open innovation in different industrial contexts are poorly specified. Second, it is not clear under what circumstances they might become dysfunctional. We identify how the interaction of meso- and micro-level mechanisms contribute to project-based user-centric innovation, based on a detailed characterization of the business activities of eight technology and engineering consultancies (TECs) working across a range of sectors. We develop and illustrate the notion of generative interaction which describes a series of mechanisms that produce a self-reinforcing ecology favouring innovation and profitability. At the same time, we observe the opposite dynamics of self-reinforcing degenerative interaction which may produce a cycle of declining innovation

and profitability. In the specific context of project-based firms, we show that user-centric and open innovation can negatively affect performance and we provide insights into the consequences (positive and negative) of different patterns of interaction with clients.

We can conclude from this collection of research that the simple dichotomy between open and closed approaches is unhelpful and not realistic. Instead we need to explore the different degrees and types of openness and the extent to which a firm can benefit from external and internal resources and knowledge in the innovation process. This provides an opportunity to investigate the use of various collaboration strategies and the types and contexts of sources of innovation. Managing different types and degrees of inter-firm relationship with external companies, in order to create value, will involve different degrees of openness for innovation.<sup>4</sup> Many of the challenges of applying open innovation are common to innovation networks, but there are other issues to manage in addition (Table 1):

- Conditions and context e.g. environmental uncertainty and project complexity<sup>5</sup>
- Control and ownership of resources<sup>6</sup>
- Coordination of knowledge flows<sup>7</sup>
- Creation and capture of value<sup>8</sup>

Table 1. Potential benefits and challenges of applying open innovation.

Six principles of open innovation	Potential benefits	Challenges to apply
Tap into external knowledge	Increase the pool of knowledge Reduce reliance on limited internal knowledge	How to search for and identify relevant knowledge sources How to share or transfer such knowledge, especially tacit and systemic
External R&D has significant value	Can reduce the cost and uncertainty associated with internal R&D, and increase depth and breadth of R&D	Less likely to lead to distinctive capabilities and more difficult to differentiate External R&D also available to competitors

*(Continued)*

Table 1. (Continued)

Six principles of open innovation	Potential benefits	Challenges to apply
Do not have to originate research in order to profit from it	Reduce costs of internal R&D, more resources on external search strategies and relationships	Need sufficient R&D capability in order to identify, evaluate and adapt external R&D
Building a better business model is superior to being first to market	Greater emphasis on capturing rather than creating value	First-mover advantages depend on technology and market context Developing a business model demands time-consuming negotiation with other actors
Best <i>use</i> of internal and external ideas, not <i>generation</i> of ideas	Better balance of resources to search and identify ideas, rather than generate	Generating ideas is only a small part of the innovation process Most ideas unproven or no value, so cost of evaluation and development high
Profit from other's intellectual property (inbound open innovation) & others use of our intellectual property (outbound IP)	Value of intellectual property (IP) very sensitive to complementary capabilities such as brand, sales network, production, logistics, and complementary products and services	Conflicts of commercial interest or strategic direction Negotiation of acceptable forms and terms of IP licenses

Table taken from Tidd, J. and Bessant, J. (2013). *Managing Innovation: Integrating Technological, Market and Organizational Change*, 5th edition, Chichester, John Wiley & Sons.

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4. For useful typologies and taxonomies of open innovation see:
- Lazzarotti, V. and Manzini, R. (2009). Different modes of open innovation: A theoretical framework and an empirical study, *International Journal of Innovation Management*, 13, 615–636.
- Lichtenthaler, U. (2008). Open innovation in practice: An analysis of strategic approaches to technology transactions, *IEEE Transactions of Engineering Management*, 55, 148–157.
5. The utility of open innovation will depend upon context, such as industry, and contingency, such as degree of project novelty:
- Bahemia, H. and Squire, B. (2010). A contingent perspective of open innovation in new product development projects, *International Journal of Innovation Management*, 14(4), 603–627.
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6. The governance and ownership of resources in open innovation is under-researched, but see:

Klioutch, I. and Leker, J. (2011). Supplier involvement in customer new product development: New insights from the supplier's perspective, *International Journal of Innovation Management*, 15(1), 231–248.

Remneland-Wilkhamn, B., Ljungberg, M., Bergquist, M. and Kuschel, J. (2011). Open innovation, generativity and the supplier as peer, *International Journal of Innovation Management*, 15(1), 205–230.

7. More research is necessary to identify the specific mechanisms and processes which support or hinder open innovation:

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Fredberg, T., Elmquist, M. and Ollila, S. (2008). *Managing open innovation — Present findings and future directions*, VINNOVA Report VR 2008:02, Stockholm, VINNOVA - Verket för Innovationssystem/Swedish Governmental Agency for Innovation Systems. Available online: <http://www.vinnova.se/upload/EPiStorePDF/vr-08-02.pdf> [Accessed 22 December 2012].

8. It is too often assumed to be self-evident that open innovation results in the creation of value, but much depends on the nature of the relationships between organizations:

Hopkins, M.M., Tidd, J., Nightingale, P. and Miller, R. (2011). Generative and degenerative interactions: Positive and negative dynamics of open, user-centric innovation in technology and engineering consultancies, *R&D Management*, 41(1), 44–60.

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