



Open innovation: State of the art and future perspectives

Eelko K.R.E. Huizingh

University of Groningen, Faculty of Economics and Business, Department of Innovation Management & Strategy, P.O. Box 800, 9700 AV Groningen, The Netherlands

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ABSTRACT

Open innovation has become one of the hottest topics in innovation management. This article intends to explore the limits in our understanding of the open innovation concept. In doing so, I address the questions of what (the content of open innovation), when (the context dependency) and how (the process). Open innovation is a rich concept, that can be implemented in many different ways. The context dependency of open innovation is one of the least understood topics; more research is needed on the internal and external environment characteristics affecting performance. The open innovation process relates to both the transition towards open innovation, and the various open innovation practices.

As with any new concept, initial studies focus on successful and early adopters, are based on case studies, and descriptive. However, not all lessons learned from the early adopters may be applicable to following firms. Case study research increases our understanding of how things work and enables us to identify important phenomena. They should be followed by quantitative studies involving large samples to determine the relative importance of factors, to build path models to understand chains of effects, and to formally test for context dependencies. However, the evidence shows that open innovation has been a valuable concept for so many firms and in so many contexts, that it is on its way to find its final place in innovation management.

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1. Introduction

Open innovation has become one of the hottest topics in innovation management. A search in Google Scholar on open innovation provides over 2 million hits, Henry Chesbrough's 2003 book has gathered more than 1,800 citations in just seven years (Google Scholar, July 2010), and surprisingly a wide range of disciplines, including economics, psychology, sociology, and even cultural anthropology (von Krogh and Spaeth, 2007) have shown interest in it. When zooming in on a revolution, it often turns out to be more of an evolution. The same is true with open innovation. After Chesbrough's revolutionary publications of almost a decade ago, most notably Chesbrough (2003a, 2003b, 2003c), it rapidly became clear that the roots of open innovation go far back in history (e.g., Christensen et al., 2005; Gann, 2005). Neither using the input of outsiders to improve internal innovation processes, nor searching for outside commercialization opportunities for what has been developed internally is new. Most of these activities have been implemented by many companies over many decades. In an extensive literature review, Dahlander and Gann (2010) found many references to concepts such as absorptive capacity (Cohen and Levinthal, 1990), complementary assets (Teece, 1986), and the exploration versus exploitation discussion (March, 1991). Pleas for integrating customers in the innovation

process echo von Hippel's (1986) led user concept and open innovation culture studies focus on the not invented here (NIH) syndrome of Katz and Allen (1982). Mowery (2009) even suggests that closed innovation might have been the exception in a history characterized mostly by open innovation practices. One example is Allen's (1983) discussion of the iron production industry in 19th century, England. Most probably, open innovation practices are from all times. So, what is new (Linstone, 2010)? Why did the term Open Innovation fall in so fertile grounds?

The basic premise of open innovation is opening up the innovation process. One of its most often used definition is: 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively' (Chesbrough et al., 2006: 1). The first process is called inbound open innovation and the second outbound open innovation. Open innovation is usually contrasted with closed innovation, supposedly its predecessor, where companies generate their own innovation ideas, and then develop, build, market, distribute, service, finance, and support them on their own (Chesbrough, 2003a, p. 20). Although in reality, not many firms followed a fully closed innovation approach, a multitude of developments within and outside the innovation arena made it necessary to make innovation processes more open. Relevant developments in the wider innovation environment include social and economical changes in working patterns, increased labor division due to globalization, improved market institutions for trading ideas, and the rise of new technologies to collaborate across

E-mail address: k.r.e.huizingh@rug.nl

geographical distances (Dahlander and Gann, 2010). In this sense, innovation management was more of a follower of other management areas. Trends such as outsourcing, agility, and flexibility had already forced companies to reconsider their strategies and processes in other areas, and to become network organizations. The 'do-it-yourself' mentality in innovation management just became outdated (Gassman, 2006).

What made Chesbrough's early 2000 works so attractive for both scholars and practitioners? As is the case with the rise of other management concepts, some of the reasons are quite straightforward. First of all, Chesbrough assigned a single term to a collection of developments. By giving it a label, it got a face, and the following stream of studies gave it a body too. Open innovation became the umbrella that encompasses, connects, and integrates a range of already existing activities. This enabled both academics and practitioners to rethink the design of innovation strategies in a networked world. Second, the timing was great, coinciding with the current interest for outsourcing, networks, core competences, collaboration, and the internet. For example, Dodgson et al. (2006) documented the important facilitating role of information and communication technologies at Procter and Gamble's open innovation adoption. Third, Chesbrough's work offers ample opportunities for extension by developing, e.g., integrated theory (e.g., with other innovation management concepts or related management concepts), measurement instruments (how open is an innovation process?) and management toolboxes (how to do it?), which in turn will further stimulate proliferation. Managers can use measurement instruments as yardsticks and starting points for improvement. Finally, Chesbrough connected the processes of acquiring external knowledge and exploiting internal knowledge externally by placing them both under the open innovation umbrella with the labels inbound and outbound open innovation. Traditionally, external technology commercialization was more of an ad-hoc than a systematic activity (Tschirky et al., 2000). Open innovation integrates outbound innovation by offering a framework in which any intermediate product of innovation processes is considered as an economically good that can be exploited internally and/or externally. External commercialization can be done as a replacement of internal commercialization or in addition to it.

The primary goal of this first article in the Special Issue on Open Innovation is to explore the limits in our understanding of the open innovation concept. These limits are challenges for both practitioners and academics as they represent less understood areas. They require management attention and offer fruitful ideas for further academic research. In discussing them, I follow the distinction between content, context, and process made by Pettigrew (1990) in his discussion of organization change research. In short, I address the questions of what (the content of open innovation, Section 2), when (the context dependency of open innovation, Section 3) and how (the process of open innovation, Section 4). This paper ends with a brief conclusion and outlook into the future.

2. Content of open innovation

Open innovation is a relatively new and rich concept. Not surprisingly, Dahlander and Gann (2010) conclude, after reviewing 150 open innovation papers, that researchers tend to use different definitions and focus their research on different aspects which makes it hard to build a coherent body of knowledge (di Benedetto, 2010). This section addresses three content aspects of open innovation. First, to show the richness of the concept, several classifications of openness are discussed. Next, the two main activities of inbound versus outbound open innovation are

addressed, and finally, the focus shifts to the various aspects of open innovation effectiveness.

2.1. Classification of openness

Open innovation is not a clear cut concept. Open innovation comes in many forms and tastes, which adds to the richness of the concept but hinders theory development. Therefore, it is necessary to develop open innovation frameworks. Different sets of open innovation practices can be contrasted to develop matrices distinguishing various forms of open innovation. A first way of doing so is by recognizing that open innovation reflects much less a dichotomy (open versus closed) than a continuum with varying degrees of openness (Dahlander and Gann, 2010). Open innovation also encompasses various activities, e.g., inbound, outbound and coupled activities (Gassmann and Enkel, 2004), and each of these activities can be more or less open. Open innovation measurement scales should therefore reflect this multi-dimensional nature and allow the dimensions to be not (fully) correlated.

Second, Dahlander and Gann (2010) use the dimensions of inbound versus outbound open innovation and pecuniary versus non-pecuniary interactions. The four cells in the matrix are labeled as acquiring, sourcing, selling, and revealing. This model may be a good starting point for empirical research to better understand the activities comprising each of the four strategies and their effectiveness for different organizations and in different contexts.

Third, another perspective is to consider the various knowledge flows in open innovation. Lichtenthaler and Lichtenthaler (2009) distinguish between three knowledge processes (knowledge exploration, retention, and exploitation) that can be performed either internally or externally. In this way they construct a 3×2 matrix to identify six knowledge capacities. An interesting issue for further research, and briefly addressed in their paper, is to what extent companies need to develop all capacities or whether the capacities can compensate for each other, thereby enabling companies to choose for a specific and differentiated innovation strategy. This is related to Dahlander and Gann's (2010) conclusion that internal R&D is a necessary complement to openness for outside ideas, but that it is less clear whether the outside ideas can be substitute for internal R&D.

Fourth, open innovation practices can also be grouped by distinguishing between process and outcome. This model links discussions in innovation management with those in IT/IS management, where much research has been focused on open source software, see also von Hippel (2010). Both the process and the outcome of innovation can be closed or open, leading to a 2×2 matrix, see Fig. 1. Closed innovation reflects the situation, where a proprietary innovation is developed inhouse (Chesbrough, 2003a),

Innovation Process:	Innovation Outcome:	
	Closed	Open
Closed	1. Closed innovation	3. Public Innovation
Open	2. Private Open Innovation	4. Open Source Innovation

Fig. 1. Various ways of innovation based on the openness of both the process and the outcome of innovation.

both the process and the outcome are closed. In the second category of private open innovation the outcome is closed (a proprietary innovation) but the process is opened up, either by using the input of external partners or by externally exploiting an internally developed innovation. Many well-known case studies belong to this category, such as Procter & Gamble (Huston and Sakkab, 2006). According to the second dimension, the outcome of the innovation process is either proprietary (closed) or available to others (open). Recently, the interest for this dimension is growing, as it has become clear that advantageous appropriability regimes do not always be equal to strong intellectual property protection (Pisano, 2006). Devoting scarce resources to innovation and then to give away the outcome for free seems highly unlikely for economists (e.g., Lerner and Tirole, 2005; Kogut and Metiu, 2001), but in some cases it makes good economic sense (von Hippel and von Krogh, 2006). A classical example of such public innovation is standard setting, where the original innovators do not exclude others to use an innovation in order to reap the benefits of a de facto market standard, examples include the introduction of JVC's VHS videotape in 1976 and the IBM PC in 1981. The final cell is labeled as open source innovation and refers to instances, where both the innovation process and the outcome are open. Open source software is the best known example of this category.

2.2. Inbound versus outbound innovation

Inbound open innovation refers to internal use of external knowledge, while outbound open innovation refers to external exploitation of internal knowledge. This relates to the three knowledge processes of knowledge exploration, retention, and exploitation that can be performed either inside or outside a firm's boundaries (Lichtenthaler and Lichtenthaler, 2009). As open innovation research mostly deals with the exploration and exploitation processes across boundaries, we focus on these two processes. Both inbound and outbound open innovation includes multiple activities, for e.g., Bianchi et al. (this issue) identified three inbound and outbound activities, namely licensing agreements (in and out), non-equity alliances, and technical and scientific services (purchase and supply). Empirical studies have consistently found that companies perform more inbound than outbound activities (e.g., Chesbrough and Crowther, 2006; Bianchi et al., this issue; Cheng and Huizingh, 2010; Chiaroni et al., this issue), suggesting that firms fail to capture potential benefits (Chesbrough, 2003a; Van de Vrande et al., 2009) of a fairly large magnitude (Lichtenthaler, 2010). Procter & Gamble reportedly only uses 10 percent of its technologies (Huston and Sakkab, 2006) and Motorola estimates the potential of licensing out as \$10 billion annually (Lichtenthaler, 2007). Possible explanations for external under exploitation include historical reasons, the possibility to use existing relationships, and the fear of diffusing relevant knowledge (Rivette and Kline, 2000) and to give away corporate 'crown jewels' (Kline, 2003). Recent studies observed a rise in efforts of companies to license out their technologies (Fosfuri, 2006; Granstrand, 2004). Further research should show whether this trend persists or whether some companies have good reason for not exploiting their knowledge externally.

Chesbrough and Crowther (2006) make an interesting observation that every inbound effort by one organization by definition generates a reciprocal outbound effort from another organization. Why do empirical studies then find so much more use of inbound open innovation? One possibility is that while many organizations use external knowledge, only a few provide it, other potential explanations are that either the measurement scales, the respondents, or the samples in these studies are biased. Further research could clarify these issues.

2.3. Effectiveness

Another interesting issue is what aspects of open innovation activities make the concept effective. For example, Tomlinson (2010) found that vertical cooperation has a positive impact on innovative performance, however, it is the strength of such ties and not just their existence that is important. Laursen and Salter (2006) found a curvilinear relationship between open innovation and performance, which suggests that too much open innovation hurts firm performance. Insights like these are important when developing open innovation measurement scales, as they indicate that not all activities are beneficial and that their relationship with effectiveness may be nonlinear. More empirical research is also needed involving the costs of open innovation. Advocates of a new phenomenon tend to stress benefits, implying that we currently have a limited understanding of the costs of openness (Dahlander and Gann, 2010).

Other research may focus on open innovation effectiveness by going beyond the obvious consequences of lower costs, shorter time to market and more sales. For example, effectiveness could be a multi-dimensional construct, involving aspects such as innovativeness, number of innovations, financial benefits, or nonfinancial benefits (Cheng and Huizingh, 2010). Effectiveness could also include soft and intermediate benefits, such as an improved way of measuring the true value of an innovation or to clarify the core competences of a company (Rigby and Zook, 2002). Such research may lead to a chain of open innovation effects, from immediate to long term, strategic consequences. Examples of strategic benefits of outbound open innovation include getting access to new markets and enhancing the firm's technological position (Lichtenthaler, 2007; Nagaoka and Kwon, 2006).

In line with the plea for more research on the costs of openness, it would be interesting to explore possible strategic risks of open innovation as well. For example, it seems to be obvious that licensing technologies increases company profits. However, an alternative line of reasoning may maintain that shifting the focus towards exploiting resources outside the company's own market may dilute the firm's focus at the expense of its customers. Increased attention to outbound open innovation may then have a positive effect on short term profits and a negative effect on long term profits. As Peter Drucker has often stressed, to create and satisfy customers is the purpose of a business, and profit is the reward for doing that well. Outbound open innovation makes the reward the goal, instead of customer satisfaction. See for a similar discussion, the current discussion on the role of banks in initiating the economic crisis.

Yet another approach to study open innovation effectiveness is to investigate the reasons why firms open up their innovation processes. One distinction is for offensive motives (e.g., stimulating growth) or for defensive motives (e.g., decreasing costs and risks). Both Chesbrough and Crowther (2006) and Van de Vrande et al. (2009) found in empirical studies that offensive reasons were more important than defensive reasons. However, Keupp and Gassmann (2009) only considered innovation impediments related to information capabilities and risk, and found that both factors are strongly related to using open innovation. Further research could explore this issue in more detail and also investigate whether having an offensive or defensive strategy is related to the timing of open innovation adoption, e.g., early adopters versus late adopters.

Finally, it may be interesting to identify and investigate failure cases, firms where open innovation practices did not enhance performance. Did they implement the approach wrongly or was open innovation the wrong approach? Vanhaverbeke et al. (2008) stress the importance of more research on the disadvantages. Lichtenthaler and Ernst (2009) find that many firms seem to be

reluctant to open up their innovation processes. [de Wit et al. \(2007\)](#) also find limited use of open innovation practices and conclude that this may be for a good reason. They maintain that globalization has led companies to focus on short term results, thereby cutting expenses for long-term research towards radical innovation. [Keupp and Gassmann \(2009\)](#) refer to the transaction costs of using external knowledge sources and intellectual property considerations as factors that may negatively affect the feasibility of open innovation.

3. Context of open innovation

As there is in medicine no panacea, a remedy curing all diseases, it is unlikely that a management concept has positive effects in any situation, implying that the effectiveness of open innovation must be context dependent. A contingency approach is needed ([Gassman, 2006](#)) that focuses on the context characteristics determining open innovation effectiveness. Context in this sense can be characterized by both the internal and external environment.

3.1. Internal context characteristics

Internal context characteristics include company characteristics related to demographics and strategies. Demographics include number of employees, sales, profits, age, location, market share, and ownership type. Strategy characteristics include strategic orientation, aspects or goals of the innovation strategy, incumbents versus new entrants, organizational culture, as well as other purposeful acts that could be related to open innovation performance. Even employee characteristics may matter, as [Harison and Koski \(2010\)](#) found that the adoption of open source software supply strategies among software companies is related to having highly educated employees.

Size is the most obvious and most often studied company characteristic in open innovation. Small companies can gain a lot by open innovation as both their resources and market reach are limited. Also, their innovation efforts already have an external focus and open innovation is not new to them ([Lee et al., 2010](#)). However, they also have less resources to build and maintain collaborative networks and to create and enforce intellectual property rights. Several empirical studies in multiple countries confirm the suggestion ([Chesbrough, 2003a](#)) that most open innovation adopters are larger firms ([Bianchi et al., this issue](#); [Keupp and Gassmann, 2009](#); [Lichtenthaler and Ernst, 2009](#); [Van de Vrande et al., 2009](#)). The size effect has been found for both inbound and outbound activities ([Lichtenthaler and Ernst, 2009](#); [Bianchi et al., this issue](#)). Nevertheless, smaller companies do practice open innovation activities extensively and they are increasingly doing so ([Van de Vrande et al., 2009](#)). Further research is needed to determine whether structural characteristics enable larger firms to benefit more from open innovation or whether the observed differences in adoption rate are temporary and that some companies just need time to catch up.

Strategic orientations, e.g., market orientation or resource orientation, influence the strength and direction of an outward looking focus. In a strongly inward looking organization the low fit with open innovation may prevent open innovation from being effective. [Lichtenthaler and Ernst \(2009\)](#) found that technology aggressiveness has a negative effect on inbound open innovation, but a positive effect on outbound open innovation. Other aspects of innovation strategies may be relevant as well, such as incremental versus radical innovations, the stage in the innovation process, and the stage in the product life cycle. One may assume a larger impact

of inbound activities in the early innovation stages, since the earlier in the process, the larger the potential cost and time savings. [Lee et al. \(2010\)](#) note that open innovation practices at smaller companies are more common in the later innovation stages, especially the commercialization stage, suggesting that outbound activities are more effective at latter innovation stages when the company has something concrete to offer. [Laursen and Salter \(2006\)](#) focus on the depth and breadth of external search and found that external search depth was greatest early in the product life cycle, while in the latter stages innovative firms scan across a wider number of search channels.

While most open innovation success stories are based on new product development, [West and Gallagher \(2006\)](#) wonder to what extent open innovation can improve process innovation. Obviously, many process innovations are based on knowledge originally developed externally. However, compared to product innovations, knowledge about hard and soft organizational issues is much more important and the details of processes are also much less visible to outsiders, thereby limiting the potential added impact of external support.

3.2. External context characteristics

The most obvious external context characteristic is industry. Many open innovation studies focus on specific industries, such as consumer electronics ([Christensen et al., 2005](#)), food ([Sarkar and Costa, 2008](#)), financial services ([Fasnacht, 2009](#)), automotive ([Ili et al., 2010](#)), and biotechnology ([Fetterhoff and Voelkel, 2006](#); [Bianchi et al., this issue](#)). Other studies confirmed that there are minor differences in adoption rate between industries (e.g., [Chesbrough and Crowther, 2006](#); [Keupp and Gassmann, 2009](#); [Lichtenthaler, 2008](#); [Lichtenthaler and Ernst, 2009](#); [Van de Vrande et al., 2009](#)), whereas [Gassman \(2006\)](#) suggests the nuclear and military industries as typical examples of closed innovation industries. This does not necessarily mean that the adoption process is similar across industry. [Poot et al. \(2009\)](#) observed a trend towards open innovation across industries, but found that this trend is not continuous but composed of shocks, and that the timing between the shocks differs between industries. Applying open innovation seems to be more a matter of business strategy than a matter of industry trends ([Keupp and Gassmann, 2009](#)), suggesting that for explaining open innovation adoption the internal environment in firms is more important than the external environment.

Going beyond industry, [Gassman \(2006\)](#) suggests that open innovation is more appropriate in contexts characterized by globalization, technology intensity, technology fusion, new business models, and knowledge leveraging. However, more systematic empirical research is needed to determine the impact of these and other external context characteristics. Possible other relevant characteristics include typical innovation risk patterns ([Bianchi et al., this issue](#)), goods versus services, the importance of patenting and other forms intellectual property protection, market turbulence, technological turbulence, and competitive intensity.

The importance of context factors can be studied in multiple ways. First, they can be related to the adoption level of open innovation, e.g., in contexts with a high degree of globalization, companies are likely to use open innovation strategies more often. Second, the context characteristics can be related to the application of particular open innovation practices. For example in contexts with a high technology intensity, inbound open innovation may be important as even large companies are able to cope with or afford to develop technology on their own ([Gassman, 2006](#)), but the same may not necessarily be the case for outbound open innovation. Finally, the context may moderate the relationship between open

innovation and performance. This implies that open innovations (practices) are more effective in one context than in another. For example, outbound open innovation may be a more profitable strategy in contexts where intellectual property protection is relatively straightforward compared to situations where it is hard to protect inventions.

4. Open innovation process

Two open innovation processes are relevant. First, the process that leads to open innovation, this is the process of opening up innovation practices that formerly were (more) closed. The second process refers to the practices of open innovation: how to do open innovation?

4.1. Towards open innovation

The transition process from closed to open innovation details the steps through which firms open up their innovation process. According to [Gassman et al. \(2010\)](#) open innovation often starts with outsourcing to contract service organizations, to be followed by more strategic modes of open innovation. In an historical analysis of four Italian firms [Chiaroni et al. \(2010\)](#) identify four organizational dimensions, i.e., inter-organizational networks, organizational structures, evaluation processes and knowledge management systems, along which firms need to make the change from closed to open innovation. In another paper, the same authors ([Chiaroni et al., this issue](#)) apply [Lewin's \(1947\)](#) model of organizational change with the three stages unfreezing, moving and institutionalizing, and show how a leading cement manufacturer moved through this process. Other findings, such as the enabling role of top management and the promotional role of a champion underscore that the transition process can be considered as an example of organizational change. [Vanhaverbeke et al. \(2008\)](#) propose a stepwise process of real options theory to gradually improve a firm's absorptive capacity, which is an important prerequisite for open innovation. Most studies in this area are exploratory case studies, more systematic research with larger samples is needed to better understand how firms manage the transition towards open innovation.

4.2. Open innovation practices

The second open innovation process is related to the 'how to do it' question. Open innovation requires managers to make new decisions in developing and exploiting innovation activities. When, how, with whom, with what purpose, and in what way should they cooperate with outside parties? The outside players range from suppliers, customers, and competitors, to research institutions and organizations in very different industries that either have solutions that can improve the company's innovations or that can exploit solutions the company has developed. These collaborations may last for a significant period (e.g., when jointly developing a new technology), are likely to be repeated, involve different groups of organizations, can have different initiators (e.g., the supplier invites the customer to explore applications of a new technology or the customer invites the supplier to participate in a project to reduce waste), require different roles of the organization (e.g., project leader versus project participant), and include different departments (going beyond R&D and marketing by including production, logistics, and even finance as well). New decision-making tools need to identify the decisions to be made, structure their order and content, highlight important factors and enable

managers to quickly and competently navigate through lesser known areas.

One approach for identifying effective open innovation processes is by taking a typology from literature, e.g., the distinction between inbound, outbound and coupled activities ([Gassmann and Enkel, 2004](#)), and then defining various practices for each of these activities. Case studies (e.g., [Huston and Sakkab, 2006](#); [Dittrich and Duijsters, 2007](#)) can provide suggestions for best practices. [Van de Vrande et al. \(2009\)](#) distinguished between the processes of technology exploitation and technology exploration and defined various practices for each of them. [Lichtenthaler \(2010\)](#) developed an integrated technology exploitation roadmap to support outbound decisions.

Other models focus on the stages in open innovation. [Fetterhoff and Voelkel \(2006\)](#) propose a model including the following five stages: (1) seeking opportunities, (2) evaluating their market potential and inventiveness, (3) recruiting potential development partners, (4) capturing value through commercialization, and (5) extending the innovation offering. [Wallin and von Krogh \(2010\)](#) focus on managing knowledge integration and define a different five stages process, namely (1) define the innovation process, (2) identify innovation-relevant knowledge, (3) select an appropriate integration mechanism, (4) create effective governance mechanisms, and (5) balance incentives and controls. Especially Stage 4 is related to managing open innovation projects. Important governance issues in this stage include partner selection, evaluation of contributions, ownership of intellectual property, division of profits and losses, group decision-making, and conflict management ([Wallin and von Krogh, 2010](#)). To evaluate external contributions the six-C's model of [Fetterhoff and Voelkel \(2006\)](#) is useful, the model distinguishes six assessment dimensions, including company (fit with strategy), customer utility, competition (uniqueness of the opportunity), commerce (market size), capital cost, and copyright (intellectual property).

Establishing partnerships is both an essential and time-consuming issue in open innovation. The question is whether firms should do this by themselves. [Lee et al. \(2010\)](#) propose an intermediated network model, where the intermediary organizes the network and builds trust between network members. [Spithoven et al. \(2010\)](#) discuss the role of collective research centers in building absorptive capacity within their client firms to facilitate inbound open innovation. Not only smaller firms but also larger organizations may benefit from intermediaries, especially for outbound open innovation. Despite the widespread recognition of its potential for both inbound and outbound open innovation (e.g., [Gwyne, 2007](#)), using intermediaries comes with new management challenges ([Sieg et al., 2010](#)).

Another issue becomes apparent when changing the time perspective. From a long term perspective it is important to maintain a diverse partner base over time. [Dahlander and Gann \(2010\)](#) refer to inertia in the search process and consistent collaborations over time due to socialization which may have a negative long term effect on partner diversity. Managing collaborations becomes even more difficult when partners are motivated by very different incentives. When firms aim to activate and exploit the 'wisdom of the crowd' ([Surowiecki, 2004](#)), they have to motivate and manage volunteers ([Wallin and von Krogh, 2010](#)), who have their own interests, unknown to the firm and potentially in conflict with firm interests. Several researchers explored this issue in the context of open source software. [Lerner and Tirole \(2005\)](#) distinguish between short- and long-run benefits for open source contributors, other studies in this area are [Lakhani and von Hippel \(2003\)](#) and [Chakaravarty et al. \(2007\)](#). [Berthon et al. \(2008\)](#) focused on the motivations of customers creating ads. From a managerial point of view, [West and Gallagher \(2006\)](#) identify four

strategies firms employ to motivate outsiders, while [Kogut and Metiu \(2001\)](#) suggest that the real issue is less about motivating and more about attracting highly motivated and highly capable individuals.

Another important process issue is how to capture value from innovation. Firms can use both formal methods (such as patent, trademark, or copyright protection) and informal methods (lead times, first mover advantages, and lock-ins) for innovation appropriation ([Dahlander and Gann, 2010](#)). When to use formal methods and when to use informal methods? In practice, firms consider managing intellectual property as very challenging when other actors are involved ([Luoma et al., 2010](#)). This issue is further complicated by the fact that these decisions need to be made at an early stage, when product markets estimates are still highly uncertain, let alone the outbound opportunities. Next, after deciding about protection, firms need to capture the potential benefits, which are not easy either ([Strukova, 2009](#)). As many examples have shown that the most profitable protection is not always strong protection, companies need to develop conscious strategies for appropriation ([Pisano, 2006](#)). [Henkel \(2006\)](#) makes a strong point when stressing that in the past we may have assumed to easily that exclusivity is desirable and therefore focused on the protection of innovations, while what actually matters is appropriations of profits from innovation. This may call for different, more open strategies.

As can be concluded from this section, many studies have focused on various aspects of the open innovation process. They offer useful insights and propose various frameworks to support managerial decision-making. Nevertheless, [Gassman et al. \(2010\)](#) recently noted that the internal process by which companies manage open innovation is still more trial and error than a professionally managed process. What is missing is a decent cookbook, an integrated framework that helps managers to decide when and how to deploy which open innovation practices. In what stage of the innovation process is collaboration most effective? With which parties to collaborate, and how to find and select them? What is the best way to capture value in collaborative networks, especially when formal protection methods are less feasible, e.g., with service innovations or small firms? These and many other issues require more systematic research.

5. Conclusion

Open innovation is a concept that has recently attracted a lot of attention, both in practice and in academia. One of the main reasons is that the concept fits very well with many trends in the broader management arena. Many studies published in the past decade provide lots of useful insights, and many more studies are currently available as working papers. Since the early works of Chesbrough almost a decade ago, we have learned a lot about the content, context and process of open innovation. Nevertheless, much more research is needed.

As with any new concept, initial studies tend to focus on successful and early adopters (e.g., [Huston and Sakkab, 2006](#); [Chesbrough and Crowther, 2006](#)), are based on case studies, and descriptive by nature. However, not all lessons learned from the early adopters may be applicable to following firms. Followers may be more reluctant to organizational change, but they could also have sound reasons for delaying adoption: may be the new concept is less attractive to them, making it inappropriate to merely copy the lessons learned from early adopters.

Case study research is very useful as it increases our understanding of how things work and it enables us to identify important concepts and phenomena, e.g., effective open innovation practices

and crucial context characteristics. Such studies should be followed by quantitative studies involving large samples in various industries and countries, not only in the US and Europe but also in Asia, to determine the frequency and importance of various practices and context factors.

Initial studies tend to be descriptive, which helps in understanding the concept. Next stage studies should also include performance measures, regardless of whether they involve case studies or surveys. A common implicit assumption of descriptive studies is that what we observe more frequently, is more important. For example, [Bianchi et al. \(this issue\)](#) find that among various inbound and outbound activities, alliances are most frequently applied, but are alliances also the most effective way of conducting open innovation? [Lee et al. \(2010\)](#) observe that open innovation practices at smaller companies are more common in the latter innovation phases, especially the commercialization phase. Normative research could determine the performance implications of early versus late phase open innovation. Second stage case studies may contrast high and low performing open innovation adopters to increase our understanding of why and how the effectiveness of certain practices is context dependent. Large scale quantitative studies can be based on surveys, patent data, financial data or content analysis of, e.g., press releases, news articles or company reports. Such studies involving rich data and a large number of observations enable us to quantify the relative importance of practices and factors, to build path models including mediators to understand larger chain of effects, and to estimate more complex models including moderators to formally test for context dependencies.

Finally, what will be the future of open innovation? My prediction is that we should not be surprised to learn that within a decade, the term will fade away. Not because the concept has lost its usefulness, but, on the contrary, because it has been fully integrated in innovation management practices. Which organization can afford to assume it has nothing to learn nor gain from the rest of the world (e.g., [Badawy, this issue](#))? Time will come that we cannot imagine we have ever lived without open innovation, assuming we ever did. This is a logical development. Once, currently accepted tools and practices were novel, such as the telephone and the internet, empowerment and accountability. In their novel stages, they got labeled and studied as separate topics in management, such as telephone marketing and e-business. This is an important stage in the life cycle of any new concept. It enables us to understand the new concept, to study its strengths and weaknesses, to relate it to and integrate it with traditional concepts (e.g., supply chain management ([Groen and Linton, 2010](#))), and to promote it among practitioners and academics. In this stage, the new concept is complementary to 'business as usual'. For example, [Chesbrough and Crowther \(2006\)](#) found that early adopters of open innovation do not create new processes and metrics, they tend to layer an open innovation perspective onto existing processes. Not before the next stage, the new concept gets fully integrated into traditional concepts ([Huizingh, 2002](#)). It gets absorbed in existing theories and toolkits and loses its distinctiveness. The new 'business as unusual' becomes 'business as usual'. This is the inevitable destiny of any successful new concept. Open innovation as discussed in the academic literature and implemented in most companies is not at that stage yet. We need more integrated theories, see for example [Lichtenthaler and Lichtenthaler \(2009\)](#). It also explains [Chesbrough's \(2007\)](#) appeal for making fundamental changes to a company's business model, which goes far beyond merely adopting a few new innovation practices. Some companies have already made the change, well-known examples include DSM ([Kirschbaum, 2005](#)), IBM ([Chesbrough, 2007](#)) and Procter & Gamble ([Huston and Sakkab, 2006](#)). However, there are still many open innovation issues that we need to understand better, in order to

absorb the new concept fully in integrated (innovation) management theories and existing management toolkits. We still lack knowledge about how to do it and when to do it. However, open innovation has proved to be a valuable concept for so many firms and in so many contexts, that I feel confident to predict: open innovation is on its way to become innovation.

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Elko Huizingh is an Associate Professor of Innovation Management at the Faculty of Economics and Business, University of Groningen, the Netherlands. Dr. Huizingh is Vice President, Scientific Affairs of ISPIM (International Society for Professional Innovation Management). His research focuses on the intersection of marketing, innovation and information technology. He has (co-)authored over 300 articles, which have appeared in *Marketing Science*, *Marketing Letters*, *European Journal of Innovation Management*, *International Journal of Innovation Management*, *International Journal of Technology Management*, *International Journal Entrepreneurship and Innovation Management*, *Decision Support Systems*, *Information & Management*, *Organizational Behavior and Human Decision Processes*, *Socio Economic Planning Sciences*, *Journal of Retailing*, *Journal of Marketing Management*, and *European Journal of Marketing*. Dr. Huizingh was the guest editor of several special issues of *Technovation*, *International Journal of Innovation Management*, and *International Journal of Entrepreneurship and Innovation Management*. Recently, Sage published his book *Applied Statistics with SPSS*.