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Published in:

INTERNATIONAL JOURNAL OF BUSINESS RESEARCH AND MANAGEMENT

Published: 01/11/2013

Document Version

Publisher's PDF, also known as Version of record

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Please cite the original version:

Durst, S., & Ståhle, P. (2013). Success Factors of Open Innovation - A Literature Review. *INTERNATIONAL JOURNAL OF BUSINESS RESEARCH AND MANAGEMENT*, 4(4), 111-131.
<http://www.cscjournals.org/manuscript/Journals/IJBRM/Volume4/Issue4/IJBRM-154.pdf>

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Success Factors of Open Innovation - A Literature Review

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Abstract

This paper reviews the research on the open innovation process in order to identify critical success factors. The study consists of a systematic review of 29 referred empirical articles on the open innovation process. The studies reviewed highlight different success factors for the open innovation process. These factors are grouped into nine themes: 1) relational aspects, 2) the people involved in the process, 3) governance, 4) facilitators, 5) provision of resources, 6) strategy, 7) process management, 8) leadership and 9) culture. Based upon the findings, the study proposes a number of future research directions that may stimulate more intensive investigation of this field.

Keywords: Open Innovation, Open Innovation Process, Open Innovation Practices, Success Factors, Literature Review.

1. INTRODUCTION

In the past, organizations used to conduct most of their innovative activities in-house as this was viewed as a strategic asset, and in some industries even as a market entry barrier [1]. With the increasing complexity of products and technologies, the rising costs of innovation coupled with shorter development lead times, organizations today are forced to open up their innovation activities and to enter not only into different forms of cooperation, but into new forms as well [2]. As a consequence, Chesbrough [1] argues that the innovation approach applied by organizations has shifted from a closed system to an open system. In contrast to the former, the latter focuses on the acquisition of external knowledge, blurring organizational boundaries [3]. Stähle [4][5] goes so far as to make a distinction between open systems and complex, self-organizing systems that are the bases for innovation ecosystems.

Over the years open innovation has developed into a highly debated topic. For example, EURAM 2012 in Rotterdam devoted four tracks to open innovation. Even though there exists a plethora of papers discussing the relevance of open innovation, the focus has been on theoretical contributions or insights into major multinationals such as Procter & Gamble. So far only little work has been undertaken to explore the actual implementation and use of open innovation and any challenges it may bring about in the broad mass of organizations, be they private or public [6]. This is not surprising given the novelty of the phenomenon under investigation. In order to better understand the open innovation process, however, we need to have more (empirical) studies. More information about the relevance of the term to organizations would also help in confronting its critics [7].

If the management of the innovation process in itself poses a huge challenge to organizations, this applies even more so to an open innovation approach [8]. How does knowledge flow between the organization and its external environment happen, how do organizations change from a closed innovation system to an open one, and when and why do they change? What are the implications for the organizations? These are just some of the questions that may rise in connection with open innovation, but they all address critical aspects of which we need a better understanding.

With this in mind, this paper reviews the empirical research on the open innovation process in order to identify factors that support successful implementation of the process, an area of growing interest among both academics and practitioners [9]. Our research question is as follows: What are the success factors of the open innovation process as derived from the empirical research literature?

The paper is organized as follows: In section two we briefly discuss the literature related to the research aim. Section three then describes the method employed to answer the research problem. Next, the results are presented, and in the final section, the conclusion and implications of the study are laid out.

2. THEORETICAL BACKGROUND

2.1 Open Innovation

Chesbrough [10] defines open innovation as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (p. 1). This definition suggests that organizations should put even greater emphasis on collaboration and networking [11]. “The open innovation paradigm assumes that organizations can and should use external as well as internal ideas, and internal and external paths to market, as they look to advance their technology” ([12], p. 23). In contrast to earlier concepts discussed in the academic literature, the open innovation paradigm regards internal and external knowledge as being of equivalent quality. The focal point is the business model, that is, its relevance to innovation is now considered as well. R&D evaluation is reconsidered, which means that R&D projects that do not fit in with the business model may be commercialized elsewhere, referring to the latter having outbound flows of knowledge firms can benefit through the application of external revenue models [10]. In contrast, inbound flows of knowledge refer to an outside-in process intended to acquire knowledge from external sources [8]. Additionally, it is acknowledged that knowledge is widely distributed, which requires firms to become good networkers in order to gain access to this pool of knowledge. The bilateral flow of knowledge has also contributed to a stronger role of IP management, opening up further means of revenues. Intermediaries also benefit from this new situation as they help to bring together the different actors and thus enabling transactions. Against this background it is clear that there is also a need for new approaches to measure open innovation activities [10].

Chesbrough [1] argues that the changing business environment has required organizations to turn from a closed innovation approach to an open one. This observation has paved the way for open innovation debates. Dahlander and Gann [13], however, conclude that a binary classification of open innovation systems and closed ones fails to go into sufficient depth. Instead, the authors argue that the two systems should be viewed as a continuum, making possible varying degrees of innovation systems and thus of openness.

McLaughlin [14] stresses that open innovation can only happen if there is sufficient openness and participation from all actors involved. Yet this is easier said than done. Indeed, organizations have reported serious difficulties when trying to implement open innovation activities [15][8]. Two tendencies in particular – the “not-invented-here” and “not-sold-here” attitudes – seem to have a serious impact on the successful implementation of open innovation activities (e.g. [15][16]). In this connection, West *et al.* [17] call for research efforts to better understand the meaning of incentives and organizations of R&D workers.

Buganza *et al.* [18] demonstrate the influence of industry-level variables, such as R&D intensity, strengths of the appropriability regime, turbulence and uncertainty, on the adoption and institutionalization of open innovation. This indicates that organizations need to revise their current business models and organizational structures so as to cope with the new requirements presented by open innovation [19]. In addition, as open innovation puts even greater emphasis on networking, firms have to find ways of working more closely with other partners, even competitors, without losing their competitive advantage. Thereby it is important to have a coherent strategy at hand that allows firms to integrate their collaborative activities [11]. Simard and West [20] stress the role of network ties in conjunction with open innovation, and call for studies that would shed light on informal ties in the context of open innovation. They also correctly observe that the mere existence of ties does not automatically trigger the transfer of knowledge; instead a certain level of trust must exist among the partners involved. Additionally, Simard and West [20] make reference to network portfolios which consist of complementary ties, as firms are likely to be involved in a number of different networks that need to be managed in order to meet the anticipated expectations.

To address this challenge and to link the open innovation framework to the related literature, Lichtenthaler [8] proposes an expanded definition of open innovation, which says that the term comprises “systematically performing knowledge exploration, retention, and exploitation inside and outside an organization’s boundaries throughout the innovation process” (p. 77). The intention of this definition is to more firmly anchor the concept of open innovation to related field of studies, such as knowledge management, organizational learning and firm boundaries. Feller *et al.* [2] argue that in order to fully understand organizations’ open innovation activities, it is imperative to include the economic structures, institutions and regulatory environments as well.

What is striking about the current discussion on open innovation is its preoccupation with technological innovation. This is surprising in view of the increasing relevance of service-specific innovations [21][22], but it probably reflects the still dominant economic perspective which puts the focus on technological innovation and hence on technology transfer [7]. This perspective may also explain why open innovation is still mainly discussed from the point of view of high-technology organizations [23]. In a recent paper, however, Chesbrough [24] discusses the applicability of open innovation to services, so more papers on this topic are likely to follow soon.

Dahlander and Gann [13] noted that the downsides of open innovation seem to have been underestimated so far. This may well be explained by the relative infancy of research on open innovation. On the other hand, it implies that the current discussion on and understanding of open innovation is rather unbalanced and fragmented. This is justification enough to dig deeper into the operational level and to look into open innovation processes and its antecedents.

2.2 Open Innovation Process

The open innovation process consists of different phases. In a simple model, it comprises the search for innovation opportunities, the selection of suitable opportunities that organizations want to pursue, the implementation of the projects chosen and the capture of benefits as a consequence of the innovative activities [25]. In an open innovation process firms would then make the decision on whether or not to include external sources in all or some of the phases.

“Open Innovation. Researching a New Paradigm”, a volume edited by Chesbrough *et al.* [10], identifies a number of factors influencing the open innovation process. It seems that of particular relevance are the individuals (as they come up with innovations), networks (as open innovation is by definition about collaboration between internal and external actors), governance (as these networks need to be coordinated and maintained), and national institutions and innovation systems (as they are likely to influence the ways in which innovation processes involving several actors are going to happen). Lindegaard [26] particularly highlights the role of people in conjunction with open innovation activities, emphasising the aspects of trust and having people with proper mindsets and the capacity to build relationships both internally and externally. He claims that in order to make all kinds of innovation happen, managers need to put people first.

This also implies that the individuals in charge need to understand that different people are needed for the different stages of the open innovation process. The importance of proper mindsets is confirmed by Rufat-Latre *et al.* [27]: the right mindset, they say, puts the emphasis on competencies rather than market share as a means of competing.

Lindegaard [26] further asserts that organizations need two different types of people: innovation leaders and intrapreneurs. The former are responsible for strategic and tactical issues in relation to open innovation activities, whereas the latter are responsible for operational issues. Additionally, Lindegaard stresses the relevance of having a strategy and an open innovation culture. He further emphasizes that there are certain elements that need to be put in place before organizations actually launch their open innovation initiatives, which are a clear mandate, a strategic purpose, an ideation theme, a stakeholder analysis, a communication strategy, a shared language about innovation in the organization, organizational approaches that allow the involvement and commitment of all relevant internal and external actors, and the adoption of an attitude that strives for being innovative rather than becoming innovative. Gassmann *et al.* [16] have observed that open innovation processes are still conducted in a trial and error mode rather than in a professional manner. The authors also highlight the need for suitable metrics for open innovation.

Gassmann and Enkel [28] propose three core processes that organizations can choose among in opening up their open innovation process: inside-out, outside-in and coupled. In an inside-out process an organization may generate profits by transferring internal ideas to the outside environment. In an outside-in process, organizations expand their own knowledge base through the inflow of external knowledge provided by suppliers, customers or other market actors. Finally, in a coupled process, organizations combine outside-in and inside-out processes. Given the different locus of the innovation process, each process requires different characteristics. Gassmann and Enkel [28] conclude that organizations using an inside-out process are very interested in branding and setting standards, whereas organizations employing an outside-in process focus on early supplier integration and customer co-development. Organizations using a coupled process take a relational view of the organization.

3. METHODOLOGY OF LITERATURE REVIEW

In the current review process, the authors adopted the principles of a systematic review as recommended by Jesson *et al.* [29].

First, a research plan was developed comprising the research question of interest, the keywords, and a set of inclusion and exclusion criteria. The paper's aim was to determine the current status of research on the open innovation process in order to identify success factors facilitating the process.

To help answer the research question, we specified inclusion and exclusion criteria. The inclusion criteria were: published in 2003-2012, empirical papers, peer reviewed, and English language. On the other hand grey literature such as reports and non-academic research as well as studies published in other than the English language was excluded. An excel data sheet was produced to highlight key aspects related to the research aim: name of author(s), year of publication, research aim / objectives, theoretical perspective / framework, method, main findings, and name of the journal.

Once all the relevant issues had been specified, ProQuest ABI/Inform, Web of Science and EBSCO were accessed and searched for materials using the keywords "open innovation process", "open innovation practices" and "open innovation activities". This was done in October 2012 and again in February 2013. The databases were searched for articles mentioning one of the three keywords in the abstract or title. Depending on the keyword used, different numbers of hits were generated. For example, the keyword "open innovation process" yielded 5 hits with ProQuest, 9 hits with EBSCO, and 7 hits with Web of Science, while the keyword "open

innovation practices” gave 3 hits with ProQuest, 1 hit with EBSCO, and 10 hits with Web of Science.

Next, one of the authors scanned the titles and abstracts of the articles and, if relevant, further sections of the articles, beginning with the conclusions, to make sure that they actually fell within the scope of interest. The specified criteria were met by 29 papers, which thus constituted the basis of the analysis. In the next stage the authors proceeded to discuss the findings, helping them to clarify what is known about the open innovation process. The final stage of the review process involved the writing up of the findings.

4. PRESENTATION OF FINDINGS

4.1 Studies Included

The 29 papers that formed the basis for our analysis are summarized in Table 1. The oldest publication dates from 2006 and the most recent one from 2012. The majority of papers were published in 2011 and 2012, indicating a rise in empirical research interest. This clearly shows how much time is needed by a new field of research to find its place in the research community.

Author(s)	Year	Research aim/objectives	Theoretical perspective / framework	Method (empirical / theoretical)	Main findings	Journal
Puck, Rygl & Kittler	2006	To test for the influence of cultural diversity on intra-team communication and conflict and to empirically examine the impact of the openness of intra-team communication and the intensity of knowledge transfer on the performance of multicultural process-innovation teams.	Literature related to cultural diversity and team performance	Survey among 84 team members of 20 culturally diverse process innovation teams within a German sportswear company; regression analyses	Knowledge transfer and communication openness have significant impact on different performance measures. National cultural diversity has no significant impact on intra-team communication and knowledge transfer.	Journal of Organisational Transformation and Social Change
Dodgson, Gann & Salter	2006	To examine how the use of technology supports the movement towards open innovation.	Literature related to the use of technology in the innovation process	Inductive case study approach conducted with P&G. Data were collected from interviews, participant workshops and literature.	Show how innovation technologies supported P&G to shift to an open model of innovation.	R&D Management

Buganza and Verganti	2009	To investigate the ability of firms to manage inbound knowledge flows from universities. Three research questions were addressed: Do Italian companies pursue an open innovation model? Are motivations to collaborate influenced by technology lifecycles? Are different strategies used to manage relationships with the academic world?	Literature related to open innovation	Interview-based (multiple) case study involving four Italian companies	The sample firms do acquire external knowledge from universities, but in doing so take into account the technology lifecycle and its associated phases. To manage their relationships with universities, the sample companies make different decisions vis-a-vis four main organizational variables (number of people involved in the organizational unit (OU) that is devoted to managing relationships with universities, positioning of the OU within (or outside) the firm's boundaries, degree of work specialization in the OU, and degree of process formalization).	European Journal of Innovation Management
Feller, Finnegan, Hayes & O'Reilly	2009	To explore the ways in which firms use hierarchical relationships and the market system to supply and acquire intellectual property and/or innovation capabilities from sources external to the firm	Literature related to transaction cost economics	Field study involving documents and interviews published by a list of sample firms, analysis of the companies' web-based systems for acquiring IP, secondary content (e.g. news articles), and elite interviews with key personnel	The authors present an analysis of four governance structures and discuss the influence of knowledge dispersion, uncertainty and transaction costs on the emergence of such structures.	Information Technology & People

Van de Vrande et al.	2009	To investigate if open innovation practices are also applied by SMEs	Literature related to open innovation and innovation in SMEs	Used a survey database collected by EIM, a Dutch institute for business and policy research. A total of 605 respondents passed the screening phase	Open innovation applies not just to MNEs but to a much broader group of SMEs. For technology exploitation, the data suggest that many SMEs attempt to benefit from the initiatives and knowledge of their (non-R&D) workers. For technology exploration, by far most SMEs try in some way to involve their customers in innovation processes by tracking their modifications in products, proactively involving them in market research, etc. Furthermore, external networking to acquire new or missing knowledge is an important open innovation activity among SMEs. In contrast, outward and inward IP licensing, venturing activities and external participations are only practised by a minority of the respondents. More popular practices such as customer involvement and external networking are informal, unstructured practices that do not necessarily require substantial investments.	Technovation
Lichtenthaler	2009	To address the relationship between outbound open R&D strategies and firm performance. Research question: What is the relationship between outbound open innovation strategies and firm performance under different environmental conditions?	Literature related to outbound open innovation, firm performance and environmental moderators	Involved two data sources: survey data from Lichtenthaler and Ernst's (2007) study and performance data from financial databases and annual reports	Findings showed a positive relationship between outbound open innovation strategies and firm performance.	R&D Management
Chiaroni, Chiesa & Frattini	2010	To study the process through which a firm evolves from being a closed to an open innovator. Main question posed: What changes in a firm's organizational structures and management systems does the shift from closed to open innovation entail?	Literature related to open innovation and organizational change	Multiple case study approach involving 4 Italian firms from different industries, data from interviews and secondary sources	The analysis highlights the meaning of four dimensions (inter-organizational networks, organizational structures, evaluation processes and knowledge management) with regard to the process from closed to open innovation	R&D Management

Sieg, Wallin & von Krogh	2010	What managerial challenges do companies face when attempting to solve R&D problems through an innovation intermediary?	Literature related to innovation intermediaries	Exploratory, data-rich research design involving seven cases from four countries	The findings suggest three challenges: 1) enlisting internal scientists, 2) selecting the right problems, and 3) formulating the R&D problem in order to enable novel solutions. The authors also provide remedies to these challenges	R&D Management
Chatenier, Versteegen, Biemans, Mulder & Omta	2010	To examine the competencies that professionals need in order to work in open innovation teams and to cope with the challenges they face	Concept of competence	Qualitative approach involving explorative interviews and focus group discussions. 17 interviews were conducted with professionals from the Dutch agribusiness sector. The two focus group discussions took place with representatives of multiple groups that were involved in different aspects of open innovation	The study resulted in a competence profile for open innovation professionals.	R&D Management
Niehaves	2010	To investigate the variables that impact on the qualities of open process innovation, using the public sector domain as an example. Research question: Does personnel resource scarcity impact on the involvement of customers and consultants in public sector business process management (BPM)?	Literature related to open innovation and business process management	Multi-method study: interviews with experts in local government BPM in Germany and quantitative analysis of BPM-collaboration with customers and consultants (survey approach)	Highlight that personnel resource scarcity has consequences for BPM-related collaboration. It restricts the involvement of customers.	Business Process Management
Spithoven, Clarysse & Knockaert	2010	How do companies in traditional sectors cope with the lack of absorptive capacity that is needed to effectively organize inbound open innovation activities?	Literature related to open inbound innovation and absorptive capacity	The authors collected data through interviews with CEOs and triangulated this information with member views (obtained through Internet questionnaires) and objective data on each of 12 Belgian collective research centres.	Firms lacking absorptive capacity are forced to search for alternative ways to engage in inbound open innovation.	Technovation
Colombo, Dell'Era, Frattini	2011	To investigate how an NPD service provider organizes and manages relationships with its clients in the early stages of the development process so as to facilitate the transfer and integration of knowledge into the clients' innovation process.	Literature related to open innovation, NPD service providers and inter-organizational knowledge exchange	Multiple case study approach involving three projects undertaken by a leading NPD service providers	Paper highlights the importance of trust in determining the successful completion of the kind of relationship in question.	International Journal of Innovation Management

Rönnberg Sjödin, Eriksson & Frishammar	2011	To explore the problems and opportunities faced by process firms and their equipment suppliers throughout the lifecycle stages of collaborative development projects	Lifecycle model by Lager and Frishammar (2010)	Exploratory case study approach involving two process firms from northern Europe, 28 semi-structured interviews conducted	Produced a table that summarizes data concerning opportunities, problems and the intensity of collaboration at different lifecycle stages. The findings further demonstrate that being totally open in development activities is not always the most suitable option. Instead, different degrees of openness may be suitable at different stages.	Int. J. Technology Management
Whelan, Parise, de Valk & Aalbers	2011	To understand how opportunities for innovation diffuse throughout interpersonal networks	n/a	Interviews with over 80 innovation brokers, study of social media and web 2.0 technologies usage in over 30 organizations with the help of interviews, surveys and network-analysis techniques	Highlighted the critical meaning of innovation brokers (i.e. idea scouts and idea connectors) to a successful open innovation process.	MIT Sloan Management Review
Østergaard, Timmermans & Kristinsson	2011	To investigate the relation between employee diversity and innovation in terms of gender, age, ethnicity, and education	Literature related to diversity and innovation	Innovation survey data from Danish firms and data from the IDA dataset (Integrated Database for Labour Market Research), logistics regressions	Findings showed a positive relationship between education and gender diversity and the likelihood of introducing an innovation. Age diversity was found to have a negative effect and ethnicity no significant effect of ethnicity on the firm's likelihood to innovate.	Research Policy
Westergren	2011	To examine the contextual factors that influenced an open innovation project failure	Literature related to open innovation and the concept of service development	Case study approach conducted at Power Drive (a Swedish hydraulic drive systems manufacturer); data collection through semi-structured interviews and document reviews		Inf Syst E-Bus Manage
Schiele	2011	To identify and better understand the characteristics of highly innovative suppliers	n/a	Consortial benchmarking approach	Highlights the importance of a firm establishing itself as an attractive customer to successful buyer-supplier collaboration.	Research-Technology Management

Bogers	2011	To explore the tension field of knowledge sharing and protection in R&D collaborations and to identify which strategies can be developed to cope with this tension. The research question posed is: How can firms balance knowledge sharing and protection in R&D collaborations?	Literature related to knowledge sharing and protection	Multiple case study approach involving 8 R&D collaborations, conducted a series of exploratory interviews with managers at a variety of companies (the Netherlands and Sweden), and used annual and other reports, corporate and technical journals, collaboration reports and other data sources	Provides a holistic perspective on the knowledge paradox in R&D collaboration as a coupled process of open innovation. In addition, the study presents two strategies to overcome the open innovation paradox.	European Journal of Innovation Management
Buganza, Chiaroni, Colombo & Frattini	2011	Research questions posed: How do firms operating in different industries organize themselves to streamline the adoption and the institutionalization of open innovation? What are the main reasons behind the differences in the organizational implications of open innovation?	Theoretical framework addressing external organization, internal organization and "ignition" for open innovation	Multiple case study approach involving 8 Italian "early adopters" of the open innovation principles	The findings demonstrate the influence of industry-level variables on organizations' approaches to open innovation. Some firms tend to leverage exploitative inter-organizational networks and establish units to institutionalize structured and formalized screening processes. Other firms tend to use networking relationships for explorative purposes and adopt more informal, ad hoc structures and evaluation procedures.	International Journal of Innovation Management
Bianchi et al.	2011	To investigate the adoption of open innovation in the bio-pharmaceutical industry	Literature related to open innovation. Used a framework comprising three main variables: organisational modes for open innovation, types of partners and phases of the R&D process.	Longitudinal study involving 20 leading bio-pharmaceutical companies. Data collected through expert interviews (1 round) and secondary material, i.e. annual reports, professional databases and reports	The firms in the sample have gradually modified their innovation network by including more and more external partners operating outside their core areas, thus supporting the idea that (i) a different and more "agnostic" open innovation approach (West et al., 2006) to the sources and uses of innovation has been adopted and that (ii) alliances play an increasing role among the organizational modes implemented by firms in the sample in both Inbound and outbound open innovation. This lends support to the notion that firms are more and more intensely searching for weak ties linking their innovation process to external actors in a typical open innovation approach (Dittrich and Duysters, 2007).	Technovation

Ollila & Elmquist	2011	To provide an empirical exploration of the challenges of managing an open innovation arena	Literature related to open innovation management	Longitudinal case study approach. Case is an open innovation arena involving 22 partners from academia, industry and government conducting joint research on traffic and vehicle safety	The authors identified three types of managerial challenges: challenges that arise at the interface with partner organizations, challenges related to collaboration between the partners, and challenges related to the arena itself.	Creativity and Innovation Management
Feller, Finnegan & Nilsson	2011	To explore how open innovation can transform public administration by examining how one network of Swedish municipalities transforms value creation and service delivery by collaborating with one another and external parties to accelerate the creation and exploitation of innovation.	Literature related to e-government and open innovation and Osterwalder et al.'s (2005) business model ontology	Case study approach with embedded units of analysis, focusing on the Sundsvall Region with six participating municipalities. Data sources included public domain material, interview material and documents provided by the interviewees	Based on the findings four emerging typologies of governmental transformation were identified: aggregation, syndication, consumption, and co-creation.	European Journal of Information Systems
Tranekjer & Knudsen	2012	Two research questions posed: Who and why do outsiders produce knowledge for open innovation in the first place? What motivates individuals and firms to create and freely reveal knowledge that is of use to other (even competing) innovators?	Literature related to inter-organizational relationships and open innovation in conjunction with the nature of provider firms	Cross-sectional study among Danish SMEs operating in manufacturing and R&D. 355 responses received	Providers are involved in product development projects as suppliers and benefit from providing (in the form of their own knowledge development and innovation efforts). The provider is typically a customer or a supplier to the receiver firm, but rarely a competitor.	J Prod Inno Manag
Muller & Hutchins	2012	To present open innovation at Whirlpool Corp	n/a	Case study	The authors highlight three lessons learned: maintain a balance of open innovation and internal innovation, make open innovation a win-win proposition for partners and for yourself, and innovation is messy and open innovation is messier.	Strategy & Leadership
Lee, Hwang & Choi	2012	To examine current open innovation practices in the public sector of leading countries	Literature related to open innovation in private and public sectors	Used data from secondary sources that contained information on the current open innovation practices of the public sector in selected countries, namely the USA, Canada, selected European, and Asian countries, New Zealand and South Africa.	Some countries such as the USA, Australia and Singapore developed open innovation policies at the national level, creating a favourable innovation climate. Additionally, a number of organizations and projects led by citizens helped the government to engage external knowledge in solving complex issues that are beyond its control. Outside-in strategies appear to be dominant, although there have been some attempts to exploit the value of government data through inside-out approaches.	Management Decision

Bullinger et al.	2012	To examine if and how open innovation practices are adopted by the public in the field of health care	Literature related to open innovation, open innovation in health care as well as an introduction to the open health platform representing the unit of analysis	Communication elements provided on the open health platform, e.g. personal messages and comments	Provides initial insights into open innovation practices in health care.	Health Policy
Pullen et al.	2012	To examine which combination of network characteristics leads to high innovation performance	Social system perspective and Groen's multidimensional framework	Questionnaire approach addressing Dutch SMEs operating in the medical devices sector (60 useable responses received) plus semi-structured interviews in 50 of the same companies	The findings demonstrate that a business-like way of networking and a rather closed approach towards open innovation is related to high innovation performance. The focus should be on goal-complementarity.	J Prod Inno Manag
Nakagaki, Aber & Fetterhoff	2012	To report on what is working and what is not working regarding Roche's open innovation activities	n/a	Report on Roche's work in progress regarding open innovation	Identified and discussed two important elements that affect Roche's ability to embrace open innovation: creating the compelling eureka moment that will inspire senior management to champion open innovation and changing the mindset to create an open innovation culture that pervades the organization.	Research-Technology Management
Parida, Westerberg & Frishammer	2012	To shed light on which open innovation activities SMEs can engage in to spawn their own innovation efforts.	Literature related to open innovation and SMEs, open innovation and innovation performance	Survey approach targeting technology-based SMEs in the information and technology (IT) sector in Sweden	Identified innovation performance as a suitable dependent variable for future studies on the topic of open innovation. The results suggest that inbound open innovation activities have different influence patterns on the two aspects of innovation performance (radical and incremental).	Journal of Small Business Management

TABLE 1: Overview of Empirical Papers Included in The Literature Review.

4.2 General Observations

The most common methods applied in the research reviewed are case studies (13 papers), followed by surveys (6 papers). The remaining papers employ a mixture of different methods. Overall there is a distinct emphasis on qualitative approaches. The focus on case study approaches is understandable in view of the topics under investigation inasmuch as they can help to reach a better understanding of what is going on in particular settings [30], or to build a body of knowledge in a new field of study [31].

As regards the types of organization studied, most of the papers describe open innovation in private organizations. The exceptions are the papers by Niehaves [3], Feller *et al.* [32], Bullinger *et al.* [33], and Lee *et al.* [34], which deal with public organizations. Furthermore, most papers have studied the phenomenon from a firm-level perspective, confirming the observation by West *et al.* [17] that the individual level continues to remain an under-researched topic. In addition, the review indicates that open innovation primarily takes place within the boundaries of a firm. This is interesting and suggests that organizations remain reluctant to take advantage of open innovation activities outside their controllable areas. This, however, is easy to understand in the light of the emphasis placed by many organizations on control in the wake of the financial crisis and other

corporate scandals. Besides, many organizations are quite simply not used to working in this way. The one exception here is the paper by Ollila and Elmquist [35], which focuses on an open innovation arena involving partners from different areas (academics, practitioners and policy makers) who came together for the specific purpose of this joint research.

Only one of the papers reviewed [23] discusses open innovation from the perspective of failure. This in itself is a clear indication that the field is still very much in its infancy and working to carve out its own place in the scientific community. However in order to make progress in this endeavour it will be necessary to have a more balanced research effort.

Chiaroni *et al.* [6] showed the need to align performance measures under an open innovation perspective. Traditional measures developed for closed innovation systems are no longer applicable in this new context [16].

Table 1 clearly underscores the predominance of specialist journals in the body of relevant literature. This is understandable in view of the novelty of the topic, but in order to achieve a wider acceptance it will be necessary to have a broader selection of journals in the future.

4.3 Factors Facilitating The Open Innovation Process

Table 2 shows the factors that seem to facilitate an open innovation process as reported in the papers reviewed. The factors can be grouped along the following dimensions: relational issues, people, governance, facilitators, resources, strategy and leadership, culture, and process (referring to the open innovation process per se).

Factors supporting the open innovation process	Studies
<i>Relational issues</i>	
Understanding of the nature of collaboration	Buganza et al. (2011); Bogers (2011)
Trust	Lichtenthaler (2009); Westergren (2011); Colombo et al. (2011); Schiele (2012)
Prior shared experiences & history of collaboration	Schiele (2012); Tranekjer & Knudsen (2012)
Smooth and continuous communication	Van de Vrande et al. (2009); Ollila & Elmquist (2011); Schiele (2012)
Openness	Tranekjer & Knudsen (2012)
Open communication	Puck et al. (2006)
Mutual exchanges	Tranekjer & Knudsen (2012)
Mutual support and empathy	Bullinger et al. (2012)
Compatibility of partners, e.g. shared objectives/goals, visions, mindsets	Feller et al. (2011); Westergren (2011); Rönnberg Sjödin et al. (2011); Ollila & Elmquist (2011); Schiele (2012); Muller & Hutchins (2012); Pullen et al. (2012)
Knowledge transfer	Puck et al. (2006)
Understand the distinctive characteristics of each of the partners involved	Colombo et al. (2011); Bullinger et al. (2012)
Win win situation for all actors involved	Westergren (2011); Tranekjer & Knudsen (2012)
Finding a suitable language among the actors	Sieg et al. (2010)
Effective organisation and management of relationships	Feller et al. (2011)
<i>People involved in the open innovation process</i>	
Creation of the eureka moment	Nakagaki et al. (2012)
Diversity in terms of gender, age and education	Østergaard et al. (2011)
Competencies, skills and capacities, e.g. managerial, brokering solutions, being socially competent	Van de Vrande et al. (2009); Lichtenthaler (2009); Chatenier et al. (2010)
Committed	Muller & Hutchins (2012)
Attitudinal and personality traits	Colombo et al. (2011)

Motivation	Van de Vrande et al. (2009); Feller et al. (2011)
Preparedness and willingness to develop new skills	Dodgson et al. (2006)
Involvement of people with overlapping roles to make possible the integration of different types of knowledge	Bullinger et al. (2012)
Willingness to adopt a new mindset	Nakagaki et al. (2012)
<i>Governance</i>	Feller et al. (2009)
Mechanisms and structures	Chiaroni et al. (2010); Buganza et al. (2011); Bogers (2011); Ollila & Elmquist (2011); Lee et al. (2012)
Configuration of relevant organizational unit	Buganza & Verganti (2009)
Control and coordination	Rönnberg Sjödin et al. (2011); Buganza et al. (2011)
Clear statement of the objectives of the project/problems to be solved	Sieg et al. (2010); Muller & Hutchins (2012)
Clear distribution of roles, tasks and responsibility	Van de Vrande et al. (2009); Westergren (2011)
Dedicated project-team	Muller & Hutchins (2012)
Team performance evaluation (i.e. qualitative and quantitative measures)	Puck et al. (2006)
Explicit performance measures (showing the value of OI activities)	Chiaroni et al. (2010); Rönnberg Sjödin et al. (2011); Nakagaki et al. (2012)
Application of internal and external measures of success	Westergren (2011)
Planned and organised purposefully from the outset	Rönnberg Sjödin et al. (2011)
Clear definition and selection of a problem that can be feasibly addressed	Nakagaki et al. (2012)
Clear decision-making responsibilities	Rönnberg Sjödin et al. (2011); Ollila & Elmquist (2011)
Knowledge management systems	Chiaroni et al. (2010)
Administration-related problems	Van de Vrande et al. (2009)
Adaptation of new ways of sourcing and exploiting competencies	Feller et al. (2011)
Handling of any resulting intellectual property	Feller et al. (2011)
Effective aggregation of external competence and components to deliver	Feller et al. (2011)
Contracts that make sure that agreement are met	Pullen et al. (2012)
<i>Facilitators</i>	
Innovation brokers	Whelan et al. (2011)
Relationship managers	Muller & Hutchins (2012)
Team training and coaching	Puck et al. (2006)
Open innovation champion	Chiaroni et al. (2010)
Intermediaries	Feller et al. (2009)
Collective research centres	Spithoven et al. (2010)
<i>Provision of resources</i>	
Personnel resources	Niehaves (2010)
First-class personnel and equipment	Schiele (2012)
Availability of time and resources	Dodgson et al. (2006); Van de Vrande et al. (2009); Nakagaki et al. (2012)
Balance between innovation and day-to-day management tasks	Van de Vrande et al. (2009); Nakagaki et al. (2012)
<i>Strategy</i>	Schiele (2012)
Being aware of technical and feasibility issues	Colombo et al. (2011)

Match between open innovation decisions and a firm's overall strategy	Buganza & Verganti (2009)
Being aware of the impact of industry-level variables	Buganza et al. (2011)
Clear principles that help transform the culture into an open one	Lee et al. (2012)
Alternative strategies	Dodgson et al. (2006)
<i>Open innovation process</i>	
Understand the different stages within the process	Colombo et al. (2011); Rönnerberg Sjödin et al. (2011)
Understand the phase of a technology's lifecycle	Buganza & Verganti (2009)
Understand the uniqueness of open innovation process per se	Van de Vrande et al. (2009)
Understand the influence of different types of innovation performance (radical vs. Incremental)	Parida et al. (2012)
<i>Leadership</i>	
Leaders need to take the lead in the change process	Lee et al. (2012)
Change management experienced	Dodgson et al. (2006); Feller et al. (2011)
<i>Culture</i>	
Networking and knowledge-sharing culture	Tranekjer & Knudsen (2012)
Culture that encourages personnel to move away from perceiving an outside view as an admission of failure	Nakagaki et al. (2012)

TABLE 2: Overview of success factors facilitating the open innovation process.

It is clear from the Table that the dimensions of relational aspects, people and governance are central to successful implementation of the open innovation process. As regards relational aspects, it seems that the existence of trust and partner compatibility are crucial. This is not surprising inasmuch as they have earlier been identified as critical to the implementation of cooperation, e.g. strategic alliances (e.g. [36][37]). The emphasis on governance indicates that the open innovation process benefits from structures and mechanisms, such as the coordination or measurement systems, that have been primarily developed and implemented to address open innovation activities. In reference to the measurement of open innovation activities, Westergren [23] stresses that in order to measure the success of open innovation projects, measures need to be applied that address both the external and internal environment. Measures normally applied tend to focus mainly on the internal environment. Nakagaki *et al.* [38], reflecting on their experience at Roche, add that quantifiable measures are needed that show the value of open innovation activities to organizations, as they would attract CEO attention and so are likely to increase commitment. Yet these metrics are difficult, if not impossible to develop, so at Roche the emphasis is placed on collecting "small wins (for instance, the use of an open approach to solve an internal problem or provide new knowledge to the organization)" (p. 36).

As regards the individuals involved in open innovation processes, it seems to be crucial that they have certain skills and competencies that allow them to collaborate with actors from different social and professional backgrounds. Additionally, these people are highly motivated and committed and show the preparedness and willingness to learn and adopt. Following Lindegaard [26] and Rufat-Latre *et al.* [27], Nakagaki *et al.* [38] stress the importance of having a proper open innovation mindset in organizations, although they at once admit that this is easier said than done. It is clear from these findings that the recruitment and selection process should play a vital role in the run-up to open innovation activities. This also underlines the strategic role that HRM should play in open innovation, as new strategies need to be developed to cope with the specific requirements of open innovation.

Facilitators play a crucial part in making possible the open innovation process. It seems that the main task of these individuals or specialized organizations is to bring together the different actors and their concerns and backgrounds so as to make them work together more efficiently and smoothly. Facilitators can be suggested to play the role of boundary spanners, operating as they do on the boundaries of open innovation stakeholders.

The findings concerning the dimension of strategy imply that in order to increase the likelihood of success in open innovation processes, open innovation per se needs to be included in organizations' overall strategies. This requires leaders who are willing and capable of leading the organization through this process of change.

5. CONCLUSIONS

This paper has reviewed empirical research studies exploring the open innovation process. More precisely, the purpose was to identify factors that enable successful implementation of open innovation processes. In the business environments of today and the future, effective management of open innovation possibly represents one of the main challenges facing organizations, regardless of size. Open innovation management should involve certain preparatory stages in order to increase the prospects of success in open innovation activities. The decision to open up the innovation process will therefore be accompanied by a certain lead time. Its length will vary from organization to organization, industry to industry, culture to culture and depend on the open innovation process chosen.

For this review we identified 29 empirical studies that met the selection criteria specified. This is a relatively small number, clearly underlining the limitations of our knowledge regarding this topic. It seems that research in this area is primarily driven by the personal interests of individual researchers. On this basis it can be concluded that the existing literature provides only fragmented insights into open innovation processes and their implementation in reality, which is in line with previous findings (e.g. [8][13]). Given the assumed importance of open innovation as an alternative approach to addressing current and future business challenges, there is clearly a need for more intensive research. This would also help to underpin the legitimacy of open innovation as a research field.

Our review suggests that factors promoting a successful open innovation process can be found in the areas of relational aspects, people, governance, facilitators, resources, strategy and process management. These areas show that well-researched topics are addressed. When launching open innovation activities, therefore, the individuals in charge can to a certain degree build upon previous experience and existing knowledge. The factors derived from our literature review represent the main contribution of our research.

Additionally, some research directions can also be derived from our literature review that in the authors' view warrant more attention and development:

- 1) The evaluation of open innovation processes. In times of austerity the need to legitimize investment in innovation-related projects is an even greater challenge than usually. However even during times of economic normalcy organizations will be keen to evaluate open innovation activities. Organizations need to have measures at hand that will allow them to better control and allocate their resources in different business operations. Given the scope of open innovation, these measures need to go beyond the boundaries of the organization and to address all actors involved and their concerns. Research into this area deserves particular focus and attention in the future.

- 2) The role of different types of innovation in the open innovation process. Different types of innovation may require different open innovation approaches. Future research could investigate possible differences between open innovation approaches that address technological innovations and those that address service and/or societal innovations.

3) The role of people in the open innovation process. The open innovation process involves different actors with different goals, expectations and attitudes. Therefore, following Chatenier *et al.* [39], the authors call for more research addressing the individuals concerned, as this would help us better understand and explain the successes or failures of open innovation processes.

4) The application of a variety of research designs and methods. Longitudinal designs would allow researchers to study the open innovation process as it actually unfolds in organizations. In addition, longitudinal studies provide the opportunity to observe whether the open innovation process changes over time as organizations grow older or face new challenges. The use of mixed methods would also help towards a more holistic understanding of the subject of the open innovation process than can be achieved using mono-methods approaches. Academics are therefore urged to go beyond traditional techniques, such as questionnaires, interviews and case studies, when studying this topic.

5) Country comparisons. Our understanding would also benefit from studies that take account of country differences in discussing the open innovation process. Is it plausible to assume that the open innovation process will vary from country to country, reflecting each country's culture, individual systems and institutions.

6) The estimation of possible trade-offs of having an open innovation process. Because of the novelty of the topic, open innovation is mainly discussed in terms of something positive, as something that can benefit organizations. This might well be true, but so too might the exact opposite [13][40]. A better understanding of the downsides of having an open innovation process will also help us achieve of clearer view of the trade-offs that managers have to make when pursuing an open innovation approach. Our understanding of the topic would clearly benefit from a more nuanced discussion.

7) The contribution of HRM to open innovation. Our findings have highlighted the crucial role played by people and relational issues. Therefore, the role of HRM in organizations' open innovation activities presents a promising field of study, too. What types of HRM policies are needed to help organizations prepare, execute and manage open innovation activities? What training programmes need to be applied to develop proper mindsets as well as skills and competencies?

The present study is not without its limitations. The choice of search procedure meant that we did not achieve full coverage of all the relevant empirical articles on the open innovation process. Papers may therefore have been excluded that did in fact address the open innovation process, but because of "conceptual ambiguity" ([13], p. 700) were not captured. Yet, if the "era of open innovation" really has started [1], then this procedure is certainly well justified. Finally, this paper proposes some research directions that are not exhaustive but rather represent the initial stages of a new line of inquiry.

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