

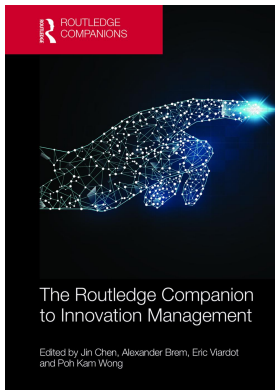
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10

BRINGING OPEN INNOVATION INTO PRACTICE

Methods and approaches

Frank Piller, Sumit Mitra, and Susanna Ghosh Mitra

Open innovation and innovating with partners

Open innovation partnerships

Open innovation (OI) is an interactive process of knowledge generation, and firms can search for external sources of innovation by collaborating with a variety of external stakeholders or by seeking out specialists with useful knowledge (Nieto and Santamaria, 2007). This includes partnering with suppliers, customers, competitors, complementors, organizations that offer similar products in different markets, organizations that offer different products in similar markets, nonprofit organizations, government organizations, universities, or others (Schilling, 2013). Collaboration can be used for many different purposes, including manufacturing, services, and marketing, as well as technology-based objectives, and involves selective collaboration strategies linking the knowledge content to specific partners to leverage the benefits and limit the costs of knowledge boundary-crossing processes (Bengtsson et al., 2015). Factors that influence the use of external sources of innovation include not only the characteristics of the external source but also internal factors such as R&D capabilities and complementary assets (Ceccagnoli, Graham, Higgins, and Lee, 2010; Teirlinck, Dumont, and Spithoven, 2010). Hence, the selection of appropriate OI partners is essential for the success of open innovation, depending on the specific project's purpose, the innovation process phase, and the required expertise or context factors, such as the confidentiality of knowledge and project results (Bengtsson et al., 2015; Todtling, Lehner, and Kaufmann, 2009).

Researchers have identified universities and research centers as specific sources of external knowledge, particularly in studies of high-technology industries (Cassiman, Di Guardo, and Valentini, 2010; Fabrizio, 2009; Vuola and Hameri, 2006). Drawing on scientific and technological knowledge bases of universities and research organizations, the commercial firms maintain flows of tacit knowledge and informal contacts with academics. Such knowledge transfers take place through a variety of mechanisms ranging from recruitment of university graduates to personnel exchanges, joint research, contract research, consulting, patents and publications, licensing, spin-off companies, industry-funded laboratories, and other facilities and informal contacts, such as meetings and conferences. An example of a collective research organization in the exploration phase is provided by Schilling (2013):

[I]n 2002, six Japanese electronics manufacturers (Fujitsu, Hitachi, Matsushita Electric Industrial, Mitsubishi Electric, NEC, and Toshiba) set up a collective research company called Aspla to develop designs for more advanced computer chips. [...] The collaborative research organization would enable the companies to share the development expense and help the Japanese semiconductor industry retain its competitive edge.

(p. 163)

Incremental innovations and the adoption of new technologies occur often in interaction with partners from the business sector.

Studies by Li and Vanhaverbeke (2009) and Schiele (2010) emphasize the role of key organizational suppliers in bringing forward product innovations, including new product technologies, reduced risks, and increased speed to market or performance advantages, and thereby attain competitive advantage. As highlighted by Chung and Kim (2003) involving suppliers is especially evident in the new product development process with benefits such as reduced lead time, reduced development costs and risks of product development, enhanced flexibility and product quality, and improved market adaptability. Collaborating with suppliers might lead to higher competitiveness due to “innovative workable parts co-developed and provided by the suppliers” (Chung and Kim, 2003, p. 600).

There is a strong focus on competitors in the open innovation literature. Co-creation, or collaborations with competitors, defined by Gnyawali and Park (2011) as “a strategy embodying simultaneous cooperation and competition between firms” (p. 650), has received a lot of attention in the last decades, especially in high-technological industries where product life cycles are shrinking, higher investments are needed, and industries’ boundaries are shifting. Miotti and Sachwald (2003) present different reasons why a company might decide to collaborate with competitors, such as R&D cost sharing, resource pooling, and faster market penetration. Malmberg and Maskell (2002) argue that monitoring competitors seems to be a more relevant mechanism for knowledge transfer and innovation than input–output links or cooperation, especially in cases where competitors in local industry clusters stimulate innovations.

Customers, too, are considered potentially valuable partners in the open innovation process. Several studies have highlighted a more active role of customers in innovation (Gassmann, Sandmeier, and Wecht, 2006; von Hippel, 2005; von Hippel & Katz, 2002, von Hippel, Ogawa & De Jong, 2011). Studies have proven that the identification of lead users and use of their information has a positive effect on innovation performance (Chatterji & Fabrizio, 2014; Roberts, Luettgens, and Piller, 2016). There is also attention drawn to the frequency and scope of customer–firm interactions to influence the performance (Gales and Mansourcole, 1995) and also the mode and kind of communication and interaction with customers in the context of innovation (Piller and Ihl, 2013)).

Collaboration arrangements can also take many forms, from very informal alliances to highly structured joint ventures or technology exchange agreements (licensing). Firms may license outside technology or intellectual property to complement their internal innovation activities (Lichtenthaler, 2011). This transfer of knowledge from vendors to clients complements the absorptive capacity generated by internal R&D, as was the case with Apple Computer, which license graphical user interface (GUI) technology from Xerox (Chesbrough, 2003b). Open innovation strategy may be implemented through strategic alliances with suppliers and competitors that allows them to quickly respond to market and technological change by leveraging the core competencies of alliance partners (Xie and Johnston, 2004), as is the case with dedicated biotechnology companies linked to large, integrated pharmaceutical companies (Grant and Baden-Fuller, 2004). A special type of strategic alliance is joint ventures, which entail “significant

structure and commitment” and involve “a significant equity investment from each partner and often results in establishment of a new separate entity” (Schilling, 2013, p. 160). Sony Ericsson, established in 2001 between Sony Corporation Japan and Swedish company Ericsson to combine Sony’s consumer electronics expertise with Ericsson’s technological knowledge regarding mobile communications, is a case in point (Trott and Hartmann, 2009). Firms may also outsource in case they do not possess the competencies or facilities to perform all the activities in the value chain to develop new innovations (Schilling, 2013), as, for instance, Dell buying some of its computer peripherals like the video display unit (VDU) from Sony.

Open innovation in social enterprises

Open innovation has become increasingly relevant recently beyond high-technology commercial industries and is considered to yield promising new entrepreneurial opportunities for diffusing knowledge and inventions, especially in the social sector. Specifically, open collaboration for innovation is emerging in the context of social enterprises (SE), which operate to provide sustainable opportunities to solve society’s major problems, including poverty (Svirina, Azbarova, and Oganisjana, 2016; Yun et al., 2017). Though a fundamental difference exists between social enterprises and commercial enterprises, researchers find open innovation processes highly relevant for social business. Unlike their commercial counterparts, social enterprises take into account social change in addition to profits and return-on-investment as the ultimate goal of their strategy. Hence, it is argued that with lower profit rates than conventional entrepreneurship, they require more sustainable models of longer payback periods but at the same time, more sustainable results and loyal customers (Chesbrough and Di Minin, 2014). Their primary goal is not profit maximization but to address issues of poverty, including education, health, technology access, and environment, that threaten individuals and society (Grameen Creative Lab, 2014). Svirina(2016) states that the rationale behind open innovation is suitable for social enterprise as it protects intellectual property, on the one hand, and seeks opportunities at lower margins, on the other. She argues that such concepts should be efficient for social entrepreneurs as long as they provide more efficient business solutions and better utilize resources, as seen in the example of Grameen-Danone. Grameen-Danone provides fortified yogurt at affordable prices to eradicate malnutrition among children in Bangladesh. It devised innovative methods to produce yogurt using solar power, while local Grameen dairy farms, corn-based biodegradable packs, and local women and cycle rickshaws distribute the yogurt locally. All were innovations in technology, sustainable scale plant, manufacturing, and business processes to meet the social objectives of an enterprise while maintaining financial viability, of which Danone, a global giant in yogurt, was partly aware.

Many scholars have argued that the logic of open innovation holds strong in the case of social enterprises. They contend that innovations in such enterprises are open and occur with an underlying assumption of open knowledge processes with a goal of solving social problems while maintaining financial viability. For instance Newth and Woods (2014) emphasize that the development of innovation in social enterprises is likely to take place in multistakeholder environments that may support or inhibit the success of the innovation. They argue that stakeholders may support the innovation process as long as it provides new knowledge and insights and through it ultimately legitimacy for the innovation, or they may have different, sometimes opposing, values and opinions regarding such innovation and thus be a source of resistance. Kong (2010) highlights the importance of social enterprises to be open to their external environment to develop successful innovations, while at the same time making sure that the development process is controlled and efficient and facilitates better decision-making. Theoretical

underpinnings of open innovation have subsequently broadened and shifted from organization-centered theories to systems-based theories to explain social enterprises-related phenomena (George, McGahan, and Prabhu, 2012).

Still, despite existing relationship between social entrepreneurship and open innovation management, the field remains underdeveloped; further studies are required on the importance of open innovation in social business development. Given the unique challenges, mission, and strategy of social enterprises, it may be interesting to compare and contrast the nature of open innovation and partnerships with those of commercial enterprises that primarily differ in the extent of competitive focus and the availability of resources to service financially weak beneficiaries, as opposed to premium pricing for customers. Other dimensions of sustainability of such businesses and demands for scaling up follow to add to the existing challenges of social enterprise and their use of OI.

Methods of open innovation

As introduced in the previous section, open innovation is a strategy in innovation management for integrating external knowledge into the innovation process. Contrary to a classic idea of R&D, the knowledge, abilities and skills of the internal R&D department are not the only ones used here. Rather, open innovation requires companies to interact closely and continuously with their environment in their innovation process. The early image of the innovative entrepreneur according to Schumpeter (1942) thus gives way to a more complex view of the innovation process as a network of different actors (Laursen and Salter, 2006). The ability of companies to innovate thus becomes the ability to establish networks with external actors and to maintain interactive relationships with them.

Based on this understanding, the extraction of external information is at the center of this approach. Basically, information required in the innovation process can be differentiated into two types: information on needs and solutions (Reichwald and Piller, 2009; Thomke, 2006). Both types of information help to reduce uncertainties in the innovation process, which are derived from the original characteristics of an innovation – novelty and complexity.

Need information is information about the preferences, wishes, satisfaction factors and purchase motives of current and potential customers or users of a service. This can be information about both explicit and latent needs. Access to need information is based on an understanding of the customer's usage and application environment and provides information about "what", or what type of customer benefit a product is intended to satisfy. This process is often referred to as recording the "voice of the customer". Improved access to need information therefore stands for an increase in effectiveness in the innovation process. If companies do not have the right need information at the beginning of the development process, the risk of failure in new product development increases drastically, since the process cannot be supported by effective action in the sense of demand-oriented development.

Solution information describes the technological possibilities and necessary potentials to transform (customer) needs into concrete performance. How, for example, does the sensor technology of a smartphone have to be created in order to efficiently address latent customer needs? It is not only necessary to generate the right solution information but also to use existing resources efficiently in finding solutions. The solution information thus determines the way "how" (customer) needs can be met in the context of a new product development. Access to solution information and the way it is procured and implemented determine efficiency in the innovation process. However, companies are often subject to the problem of local search when identifying technical solutions (Jeppesen and Lakhani, 2010). In this case, unconventional

approaches and solutions that have already proven themselves in other fields are excluded or overlooked from the manufacturer's point of view. In general, the higher the degree of innovation of the idea pursued, the greater the need for solution information from different knowledge domains.

Need and solution information are important input factors in the innovation process. Their generation and use have a decisive influence on the efficiency and effectiveness of the innovation process. To exploit this potential, however, companies need (1) access to information through appropriate methods and (2) organizational skills and structures in order to use the information profitably in the innovation process (Cassiman and Veugelers, 2006). At this point, various methods of open innovation offer a number of approaches to gain better access to need or solution information.

The innovation process consists of a multitude of activities, which are distributed over the different process phases, from the identification of needs to the market launch. In each phase, knowledge of varying quality from previous process steps is used and new knowledge is generated for subsequent activities. If a company follows an open innovation strategy, external actors can theoretically be integrated in all phases of the innovation process.

Categorization of open innovation methods

As a management approach, open innovation provides certain methods and instruments. To this end, the Internet in particular creates many opportunities to reduce the transaction costs associated with interaction. The involvement of external actors is often not based on formal contracts and agreements (e.g. in the form of traditional R&D cooperation or contract research) but through open and informal network and coordination mechanisms. Innovation processes thus become multilayered, open search and solution processes that run across company boundaries between several previously unknown actors. Open innovation does not replace the classical methods of market research and innovation management but supplements the classical forms of procuring market and technological information with additional channels.

To structure different open innovation methods, we use two dimensions: First, as introduced before, the type of information (need or solution information) acquired from external contributors. Whereas this first dimension is a rather general differentiation of activities in the innovation process, our second dimension is specific to open innovation. We suggest that open innovation (methods) be differentiated according to how external actors are identified and how collaborations are initiated (Diener and Piller, 2013). Following Erat and Krishnan (2012), a distinction can be made between an open call for participation and an open direct search (see Figure 10.1).

Open direct search: By defining openness as a balance between search breadth and depth, Laursen and Salter (2006) integrated open innovation into the search literature. In their understanding, search is directly initiated and then actively pursued: the searcher seeks external knowledge through actively scanning a broad range of possible sources for the requested information. This understanding of search has dominated most of the literature on open innovation (e.g. Laursen, 2012; Salge et al., 2013; Stockstrom et al., 2016). Extending the openness of search means here to search for external input without having made any assumptions in advance regarding the concrete information and the source of information or the collaboration partner itself. Typical examples of open innovation methods in which external actors are selected using an open search are the lead user approach (an active and broad search for lead users in analogue markets), the initialization of partnerships and research networks (as introduced in the previous section), or the netnography method (analysis of customer/user dialogues in online communities).

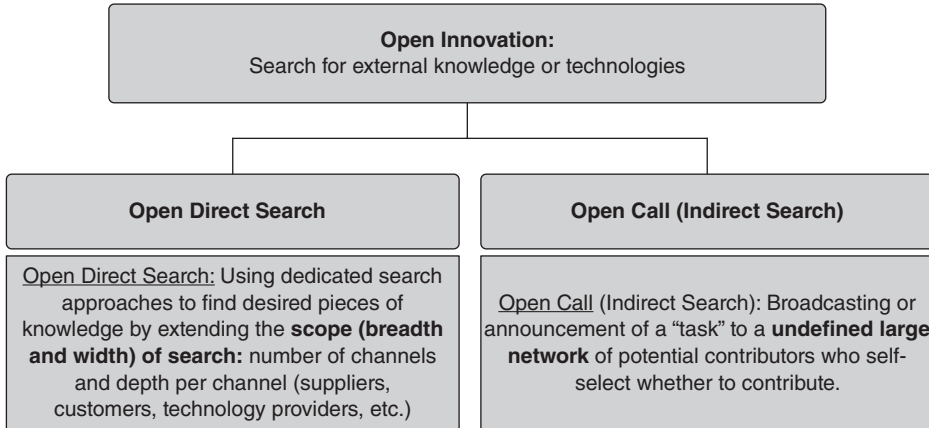


Figure 10.1 Open innovation as a process of search: two approaches

An **open call** or **indirect search** is the second mechanism used to select external actors for open innovation. Here, a problem statement is shared in the form of an open call with a large group of external actors who engage in their own search activities to find a solution and then propose it to the firm (Afuah and Tucci, 2012; Erat and Krishnan, 2012; Terwiesch and Xu, 2008). This later form builds the understanding for the literature on crowdsourcing and innovation contests in open innovation. Open call means in this context that a task to be solved is openly announced to the largest possible external network of potential contributors, who then decide by self-selection whether or not they want to participate in the process of finding a solution (this coordination mechanism also corresponds to the core of the term “crowdsourcing”, which can be seen as the central new coordination mechanism of open innovation). Examples of open innovation methods based on the principle of an open call for participation are idea competitions and crowdsourcing for technical.

If one combines the dimensions of the type of information with the way in which the external contributors are identified, and thus cooperation is initiated, the following matrix results (Table 10.1). We will introduce these four methods, which we consider to be the core methods of open innovation, when focusing on methods that go beyond established forms of collaboration like contract research, R&D alliances, or supplier innovation.

Idea competitions to generate need information via an open call

Idea contests cover core activities at the front end of innovation: (1) generating novel concepts and ideas and (2) selecting specific concepts and ideas to be pursued further (O’Hern and Rindfleisch, 2009). Both of these tasks have successfully been handed over to customers by the means of an idea contest (Ebner, Leimeister, and Krcmar, 2009; Piller and Walcher, 2006). In an idea contest, a firm seeking innovation-related information posts a request to a population of independent, competing agents (e.g. customers), asking for solutions to a given task within a given time frame. The firm then provides an award to the participant that generates the best solution. Idea contests thus address a core challenge for firms when opening the innovation process, which is how to incentivize participants to transfer their innovative ideas. A solution reward is important in the early stages of the innovation process because customers are unlikely to benefit

Table 10.1 Differentiation of open innovation methods

<i>External information to be acquired</i>	<i>Identification of external actors and initiation of the collaboration</i>	
	<i>Open direct search</i>	<i>Open call (indirect search)</i>
Need information	<i>Netnography</i> <ul style="list-style-type: none"> • Identification of consumer insights • Integration of the collected ideas into the innovation process 	<i>Idea Contests</i> <ul style="list-style-type: none"> • Call for the generation of ideas regarding a question • Integration of selected ideas or concepts
Solution information	<i>Lead User Method</i> <ul style="list-style-type: none"> • Search for solutions in analogue markets • Integration of expert knowledge and cooperation with experts 	<i>Broadcast Search (Crowdsourcing for technical solutions)</i> <ul style="list-style-type: none"> • Call to solve a specific technical problem • Integration of problem solving or cooperation with solution providers

directly from their contributions through new product availability within a short time frame, as often occurs in later stages of the innovation process.

Some companies promise cash rewards or licensing contracts for innovative ideas; others build on nonmonetary acknowledgments – promising peer or company (brand) recognition that facilitates a pride-of-authorship effect. Obviously, rewards or recognitions are not given to everyone submitting an idea, but only to those with the “best” submissions. This competitive mechanism is an explicit strategy to foster customer innovation. It should encourage more or better customers to participate, should inspire their creativity, and should increase the quality of the submissions. For instance, over 120,000 individuals around the world served as voluntary members of Boeing’s World Design Team, contributing input to the design of its new 787 Dreamliner airplane (www.newairplane.com).

Today we find a broad range of idea contests in practice. A good starting point to explore this field is www.innovation-community.de, a site listing more than 80 idea contests. These are differentiated according to the degree of problem specification, that is, does the problem clearly specify the requirements for the solution sought, or is it more or less an open call for solutions to a vaguely specified problem?

The example of Threadless.com, a company built entirely on a continuous idea contest and user voting process, shows how broadly this kind of co-creation can be used. This company and many others use customers for idea screening and evaluation, that is, customers select submissions with the highest potential. In a successful idea contest a firm might easily end up with hundreds or thousands of ideas generated by customers. They might be evaluated by a panel of experts from the solution-seeking firm and ranked according to a set of evaluation criteria, but we believe that without the integration of users in the idea screening process, large-scale idea contests are not possible. However, Toubia and Flores (2007) also propose that in light of a potentially very large number of ideas, it is unreasonable to ask each consumer to evaluate more than a few ideas. This raises the challenge of efficiently selecting the ideas to be evaluated by each consumer.

Broadcast search or technical crowdsourcing to generate solution information via an open call

In the last decade, crowdsourcing has gained relevance for both scholars and practitioners (Afuah and Tucci, 2012). Many crowdsourcing initiatives are administrated and governed by specialized

intermediaries that offer crowdsourcing as a service (Dahlander and Piezunka, 2014; Diener and Piller, 2013; Lopez-Vega et al., 2016). Crowdsourcing intermediaries support the process by engaging large established communities of potential contributors and providing an Internet-enabled communication infrastructure for the effective dissemination of their clients' technology needs.

In the area of technical development and problem solving, dedicated open innovation platforms or intermediaries play a central role. Generating connections between structurally separated fields of knowledge, crowdsourcing intermediaries act as knowledge brokers and help their clients to overcome internal limitations in terms of technical and market knowledge (Howells, 2006; Sieg, Wallin, and von Krogh, 2010). Intermediaries such as NineSigma, InnoCentive, IXC, and Yet2.com broadcast the technology needs of firms ("seekers") to a heterogeneous network of external experts (potential "solvers"), who then self-select to participate and submit solution proposals to the problem at hand (Lopez-Vega and Vanhaverbeke, 2016). So-called requests for proposals (RFPs) or problem statements make the seekers' technology needs understandable for potential contributors from other disciplines, targeting in particular apparently unrelated and distant domains. An RFP originates from a task of a "challenge owner", that is, the individual or unit in a (seeker) organization responsible for finding the respective technical knowledge or putting it into use.

Hence, similar to idea competitions, the "broadcast search" method is also based on an open call. In contrast to the ideas competition, however, the focus here is on access to solution information. The aim is to find existing technical solutions or external experts with good previous knowledge for a precisely defined technical problem (in form of the RFP) within the scope of a development task. Here, too, the problem is advertised broadly and openly, usually by involving an intermediary (Jeppesen and Lakhani, 2010). A cross-industry and international call for solutions (RFP) can usually identify solution providers that the company does not know in advance, which leads to an extension of the range of solution alternatives due to the different knowledge backgrounds of the contributors. Because the development task is not delegated to a supposedly suitable task provider (in the company or by means of classical contract research), potential problem solvers select themselves according to their preferences and abilities. This can lead to a considerable increase in the quality of the solutions, since existing knowledge that is not known to the company can often be used. Knowledge transfer is handled using traditional instruments such as R&D orders, procurement activities, or the acquisition or in-licensing of technical property rights.

Lead-user method for generating solution information via an open search

The lead user method is a qualitative, process-oriented approach that aims at actively integrating individual selected users into the innovation process (von Hippel, 1986). In practice, the lead-user method has proven itself in the search for technical solutions to a given problem, which primarily involves access to solution information. To this end, an open but focused process is used to search for a few highly specialized experts with special market and solution knowledge in analogue markets. An analogue market is similar to the target market in terms of the needs of consumers and/or the technology used, but often belongs to a completely different industry.

Experts from analogue markets have the same basic problem as the searching company, but to a greater extent or under "extreme" conditions that made a solution appear very urgent in the past. However, lead users are usually not customers from the perspective of the focal company. These experts can provide decisive support for the innovation process, as they can be used to combine knowledge from different domains and thus expand the problem-solving space. To this

end, the lead users usually work together in the form of innovation workshops to solve specific questions. The success of this method is therefore based on the same basic principle as in “broadcast search”: the identification of knowledge of “unknown third parties”.

Netnography to generate need information via an open search

Netnography means generating need information in an open search process by observing and analyzing existing contributions from users in online communities. The aim is to identify both explicitly formulated and implicit needs of customers and users of certain products and applications (Kozinets, 2002). The method is based on the idea that users express their needs more openly in the (relative) anonymity of the Internet than in the context of traditional market research measures. It has also been shown that users with lead user properties in particular participate in online communities with innovative contributions. As a result, the contributions are often also more original than in the survey of “representative” customers by market research.

An ethnographic study of online communities offers insights into the usage behavior of customers (“consumer insights”) and provides input for the early phases of the innovation process. The core activities of the implementation of a netnography include the identification and selection of suitable online communities, the observation of these communities and the storage of the customer or user dialogue. In the next step, the data obtained are evaluated in terms of content. Today, computer-supported, semi-automatic methods can also be used for this purpose, which permit scalability of the evaluations. Based on the filtered observations, the final step is to guide concrete product concepts.

Putting open innovation into practice: open innovation competences

The management literature sometimes gives the impression that open innovation is already widely applied by most companies today. However, in addition to these success stories, there are examples of companies where the use of open innovation has not led to the expected success, although these are unfortunately documented far less often. These examples show that the implementation and successful use of open innovation is by no means a matter of course, but rather requires new competencies and organizational skills.

In the course of the “My Pril – My Style” idea competition, which was launched in 2011, Henkel experienced the experience that even simple forms of the ideas competition can lead to implementation difficulties. The design competition, in which customers were asked to generate a draft label for the Pril detergent, ended in a PR debacle for Henkel. The design toolkit provided by the Group contained not only prefabricated design components that could only be rearranged by the participants, but also a free-hand drawing function. Disappointed by the limited solution space in the design tool, numerous participants submitted their joke suggestions using the freehand tool. Among them is a scrawly drawing of a grilled chicken with the inscription “Pril: Geschmack lecker nach Chähnchen”, which was quickly voted among the top ten entries by the online community. When the company did not want to take into account these contributions favored by the community, the participants in the competition felt betrayed and accused Henkel of manipulation. The result was countless negative press reports.

(Gatzweiler et al., 2017)

The cooperation with intermediaries like InnoCentive or NineSigma, an often-quoted prime example of open innovation in the context of network-based solutions to technical problems, is also no unconditional guarantee for success. Lüttgens et al. (2014) report in a qualitative study of companies utilizing NineSigma for technical crowdsourcing that four out of six companies discontinued the broadcast search method after just a few projects and completely broke off contact with the intermediary. The reasons for this were a lack of competence in the area of problem formulation and an inappropriate problem selection, as well as a lack of organizational framework conditions on the part of the tendering companies (for a similar study, Sieg, Wallin, and von Krogh, 2010).

Open innovation competence as an organizational prerequisite

These failures testify to the fact that the implementation of open innovation is not trivial even for established companies. For the innovative company, open innovation means not only focusing on its own solution competence for the R&D process but also training the ability to identify solutions from previously unknown external actors, evaluate them without prejudice, and then integrate the externally generated solution approaches into internal company processes. The literature has so far agreed that the successful implementation and implementation of open innovation requires a set of specific competences (Bogers et al., 2017). These consist of both formal and informal organizational factors.

Structures

Due to their influence on internal communication and knowledge transfer, the organizational structure and processes play a decisive role in building interaction competence. Current research (e.g. Foss, Laursen, and Pedersen, 2011) has shown that central coordination and control on a strategic level in the form of dedicated departments and/or employees significantly support the development of necessary methodological competence through the collection of experience. In addition, routinization of specific open innovation activities through formalized process descriptions promotes the provision of the experience gained across departmental boundaries. This also has positive effects with regard to the use of external knowledge.

Findings from research in fields such as alliances, mergers and acquisitions, and open innovation support the relationship between firms' investment in dedicated resources and capability development for external sourcing. Kale, Dyer, and Singh (2002) find that accumulating a firm's experience with interfirm knowledge transfer in a dedicated function is a powerful predictor of its collaboration performance. The authors suggest that the investment in a dedicated function for external knowledge search provides an important mechanism to enhance firms' ability to generate high returns from interfirm collaboration. This is of particular importance when firms seek to learn from interactions with open innovation platforms and need to align external and internal activities. Here, firms can develop the ability to effectively coordinate external services provided by crowdsourcing intermediaries, by investing in dedicated organizational resources (Rothaermel and Deeds, 2006).

Besides providing the organizational context, dedicated organizational structures have the formal recognition and organizational legitimacy to allocate critical resources to the respective projects (Kale et al., 2002). In providing formal support and leadership, firms may even not face the problems and challenges that are typically resolved via informal roles. The establishment of a formal open innovation department or work group provides legitimacy and internal

recognition, signaling to the organization the importance of utilizing external inputs for the innovation process.

Organizational information roles

Extant innovation literature has described informal roles such as champions (Chakrabarti, 1974), gatekeepers (Allen, 1977) and promoters (Gemünden, Salomo, and Hölzle, 2007) who provide informal support for innovation projects based on different sources of power when formal support and leadership are inadequate or missing. Per definition, these roles tend to emerge informally and are usually not delegated. However, research on informal roles in innovation suggested that (key) individuals with characteristics of informal roles can be identified and should be actively searched for, or appointed, to ensure that their valuable contributions are effectively harnessed (Saebi and Foss, 2015). Recently, research on open innovation has discussed distinct informal roles that facilitate the use of external knowledge (Pollok, Lüttgens, and Piller, 2019). Organizational roles such as moderators (Beretta et al., 2017), or idea connectors (Whelan et al., 2011) have been found to contribute to the utilization of knowledge inflows and the development of open innovation-related capabilities at the firm level.

These new roles, however, resemble the traditional roles discussed in the earlier innovation literature. They identify opposition and overcome internal resistance and help to disseminate the application of external knowledge by making use of their own network of internal contacts and their skills in selling ideas to senior management. These key individuals further display high levels of personal involvement, informally secure technical and financial resources for initiatives that are not formally accepted in the respective firm (Markham et al., 2010) and possess the relevant expertise necessary to manage new processes and tasks. In the open innovation context, these characteristics enable individuals who take on informal organizational roles to support the transition process from closed to open innovation and enable the firm to more effectively make use of external knowledge (Saebi and Foss, 2015).

Recent research on crowdsourcing has indicated that the presence of these informal roles is an important success factor. Lüttgens et al. (2014) investigated implementation barriers and sources of resistance in crowdsourcing pilots and found that individuals with promoter characteristics overcome major problems (e.g. communication barriers, insufficient resource commitments, not-invented-here attitudes), which may, if left unresolved, lead to project failure and prevent the repeated application of crowdsourcing in seeker firms.

Preventing not-invented-here

Previous research has demonstrated that open innovation is not an easy task. There is not just a lack of organizational structure and roles, but also organizational inertia and structural rigidities challenge the transfer and utilization of outside knowledge on the level of the organization (Zahra and George, 2002). In most instances, however, knowledge is actually transferred, absorbed and put into practice on an individual level (Rogan and Mors, 2014). Here, previous research has identified multiple heuristic concepts influencing and biasing knowledge utilization and decision-making on the level of the individual, including representativeness, anchoring and availability (Kahneman and Tversky, 1979), or an endowment effect (Plott and Zeiler, 2005). Other literature, especially research in social psychology, has shown that in situations characterized by interactions and exchanges with external entities or external objects, the attitudes of individuals often affect decision-making and lead to biased behavior (Ajzen, 2001).

When it comes to absorbing external knowledge for innovation, the most frequently mentioned bias influencing individual decision-making is the not-Invented-here syndrome (NIH) (Antons and Piller, 2016). It can be best conceived of as a profound attitude-based bias towards knowledge (ideas, technologies) derived from a source or contextual background that is considered “outside” or “external” from the perspective of the individual (Katz and Allen, 1982). There are ample reasons why knowledge in this context is perceived as “external”, including a developer talking to a team member who has a different disciplinary background, a colleague from a neighboring department suggesting an idea, an external technology provider offering a technical solution or a customer from a different cultural tradition. Research on NIH postulates that individuals have a generally negative attitude towards such knowledge, ideas or technologies of external origin. When this predisposition holds irrespective of the objective value of an external input, an individual is said to be affected by the NIH syndrome. For an innovating organization, this bias becomes economically damaging when knowledge is rejected or underutilized despite having considerable potential value (Kathoefler and Leker, 2012).

When NIH hinders the reception of knowledge, negative consequences are likely to occur. There are many accounts of closely knit in-groups within companies considering their “insider” knowledge superior to outside knowledge. Apple Computer had such a mind-set in the early 1990s, when managers rejected good external ideas and lived in what was widely known as their own “reality distortion field” (Burrows, 2000). To prevent NIH and overcome the resistance of the organizational members towards external knowledge and input, firms need to work on an adequate *corporate open culture* and implement adequate incentive schemes.

A culture for open innovation

Corporate culture refers to the totality of all norms, values and attitudes within a company. The focus here is on the willingness to learn, the willingness to change, the handling of external knowledge and its significance within the company, as well as the importance of cooperation with internal and external partners. An open corporate culture postulates the inter- and intra-organizational transfer of knowledge as a relevant basis for organizational action. In particular, intraorganizational knowledge transfer, understood as the verbal and nonverbal exchange of information between persons or departments, is cited as a success-relevant factor, especially with regard to the development of network competence (Ritter and Gemünden, 2003). The development of an (open) corporate culture also requires an adjustment of internal incentive systems.

At the same time, the involvement of external actors requires clear rules and mutual respect. More or less arbitrary calls for participation can harm the company in the long term. Companies must be aware that the voluntary use of users and external experts is a valuable and often unique knowledge resource. The understanding of the requirements for cooperation in partnership is increasingly becoming an original success factor with more intensive use of open innovation.

Internal incentive systems include all incentives deliberately set by company management for the purpose of influencing behavior and motivating employees in a targeted manner. Individual motivation plays an essential role in the successful transfer of knowledge. Employees do not per se have a preference for external knowledge (Szulanski, 1996). Therefore, systematic incentives must contribute to overcoming the negative attitudes of one’s own employees with regard to the acquisition and use of external knowledge (cf. Chesbrough, 2006). It should be noted that these are set in accordance with the definition of incentives for external contributors. For example, when companies address a broad mass of unknown external actors in the form of an “open call”, the motives of these actors are not always known and are not necessarily conflict-free in terms of the goals of the company. The identification and consideration of these motives in the form of

special incentive mechanisms are of central importance for the success of interactions between a company and its employees and external knowledge carriers.

Conclusion

Open innovation is a promising complement to existing practices in innovation management. The core of the approach is to improve access to needs and solution information from sources previously unknown to the company, often from other industries or technological domains. However, open innovation does not represent a dominant approach in innovation management. Rather, the use of open innovation should be situational; that is, according to the question or innovation task, individual methods make more or less sense – or even the opening to the outside world itself. There will still be areas where the internal organization and implementation of innovation activities have an advantage over open innovation processes. Examples of this are technologies that fall under the company's core competencies or projects with high confidentiality requirements.

Open innovation also does not want to abolish the internal development department – quite the opposite. The task of internal researchers and developers is changing. Their focus is not so much on solving small technical problems at great expense, but rather on creating application knowledge. They need to coordinate a complex innovation process and absorb, evaluate and reintegrate the contributions of external actors. Above all, however, they must ask the right questions and formulate problems that can then be outsourced by means of crowdsourcing. Similarly, in areas where knowledge is very context specific and based on learning effects, such as in the case of improvement innovations and product modifications, internal handling of product development is often the most efficient and effective approach.

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