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What does it mean to be open? A typology of inbound open innovation strategies and their dynamic capability requirements

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ABSTRACT

The benefits of inbound open innovation are widely acknowledged, but not all companies are successful in their attempts to leverage external sources of innovation. Those with dynamic capabilities perform better, but developing and maintaining such capabilities generates costs. Therefore, a given company needs to find out which capabilities are worth investing in. In the current study, I adopt a contingency approach to inbound open innovation. I focus on distinct open innovation strategies that vary according to their approaches to innovative search and accessing complementary knowledge. I develop a typology of six inbound open innovation strategies based on the dimensions of managerial attention (proactive/reactive) and locus of innovation (internal/shared/external). I further report their requirements for four dynamic capabilities: sensing capability, impression management capability, absorptive capacity, and collaboration capability. The findings bring attention to often-ignored reactive strategies for inbound open innovation and provide a nuanced view of how the division of development responsibilities in different phases of the innovation process affects requirements for dynamic capabilities. The study supports managers in implementing successful inbound open innovation strategies by helping them choose a strategy that supports their organization's overall objectives and strike a balance between underinvestment and overinvestment in dynamic capabilities.

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Introduction

Inbound open innovation¹ – the use of purposive inflows of knowledge to accelerate internal innovation (Chesbrough, 2006) – has been found to help companies increase their performance (Hung & Chou, 2013). Consequently, more and more companies have begun to adopt open innovation practices (Chesbrough, 2020; Chesbrough & Crowther, 2006), and those who have been at it for longer are now doing it more intensively than before (Chesbrough & Brunswicker, 2014). Nevertheless, almost every other company has been reported to experience difficulties benefiting from open innovation (Enkel et al., 2009). Large firms are broadly dissatisfied with their practice of open innovation

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(Chesbrough, 2020; Chesbrough & Brunswicker, 2014), and many open innovation projects are abandoned due to managerial difficulties (Greco et al., 2020; Lhuillery & Pfister, 2009). Consequently, a stream of research has focused on how companies could manage open innovation effectively.

A dominant view is that to succeed in open innovation, companies need to develop dynamic capabilities for sensing and seizing innovation opportunities from external sources and transforming their organisations accordingly (Bogers et al., 2019; Hung & Chou, 2013; Sisodiya et al., 2013; Teece, 2020). Previous research has identified dynamic capabilities required for inbound open innovation, such as sensing capability, absorptive capacity, and collaboration capability (Grimaldi et al., 2013; Saebi & Foss, 2015; Vanhaverbeke et al., 2008). Several studies have also addressed the costs of engaging in open innovation, arising from building and maintaining dynamic capabilities (Greco et al., 2019; Salge et al., 2013; Winter, 2003; Zollo & Winter, 2002). Investments in open innovation are found to be associated with diminishing marginal returns (Katila & Ahuja, 2002; Laursen & Salter, 2006), and their optimal level to be dependent on contingency factors (Almirall & Casadesus-Masanell, 2010; Grimpe & Sofka, 2009; Salge et al., 2013).

The specific inbound open innovation strategy that a company adopts is a significant such contingency (Appleyard & Chesbrough, 2017; Bogers et al., 2019). However, the relationship between specific strategies and dynamic capability requirements has been poorly addressed (Carmona-Lavado et al., 2021; Greco et al., 2019; Huizingh, 2011; Lakhani et al., 2013; Randhawa et al., 2016; Teece, 2020; Tidd & Bessant, 2018). By focusing on dynamic capabilities that are essential for a specific strategy, companies could avoid overinvesting in ‘unnecessary’ capabilities that are not a strategic priority. The definition of inbound open innovation entails that companies need to formulate strategies that enable them to facilitate inflows of knowledge that accelerate internal innovation efforts (Chesbrough, 2006). Consequently, strategies need to address the exploration of potential knowledge flows, i.e. innovative search (Katila & Ahuja, 2002; Laursen & Salter, 2006), and the selection of specific complementary knowledge that benefits a company’s internal innovation activities (Bogers et al., 2019; Felin & Zenger, 2020; Saebi & Foss, 2015). In this study, I aim to shed light on the relationship between dynamic capabilities and open innovation by answering the following research question: Given a specific inbound open innovation strategy, defined by approaches to innovative search and accessing complementary knowledge, what dynamic capability requirements does a firm need to meet?

Dynamic capabilities as investments

When engaging in inbound open innovation, managers face the dual challenge of becoming good at integrating external knowledge while making sure that they act efficiently and do not generate too high costs. This is reflected in a study by Enkel et al. (2009), where 43% of European companies report having difficulties finding the right open innovation partners, while 48% of them identified high coordination costs as an impediment to benefiting from open innovation. A survey of large firms in Europe and North America reveals that, on average, top managers are only moderately satisfied with their open innovation performance (Chesbrough, 2020).

Adopting open innovation practices requires significant organisational changes as managers need to integrate and combine internal and external technologies (Chesbrough, 2003, 2020). This radically extends the number of potential configurations of resources that can be ‘orchestrated’ to solve problems (Bogers et al., 2019). New capabilities are needed to succeed in this process (Vanhaverbeke & Cloudt, 2014).

Previous studies have paid particular attention to *dynamic capabilities* that enable companies to integrate, develop, and reconfigure internal and external resources: recognise new business opportunities in changing environments, develop new products, services and production methods, and choose and implement strategies (Bogers et al., 2019; Teece, 2007, 2020; Teece et al., 1997). Several dynamic capabilities have been found to help companies implement inbound open innovation. A sensing capability is needed to identify new business opportunities by scanning and monitoring new technologies and assessing changes in customer needs (Grimaldi et al., 2013; Teece, 2007). Absorptive capacity enables the acquisition and utilisation of external knowledge within a company (Cohen & Levinthal, 1990; Foss et al., 2011; Vanhaverbeke et al., 2008). A collaboration capability makes a company good at creating and managing inter-organisational relationships, both formal and informal (Saebi & Foss, 2015; Sisodiya et al., 2013).

However, dynamic capabilities are large constellations of organisational routines, structures, and resources (Dosi et al., 2000), and their development is a slow and costly process that involves long-term commitments to specialised resources (Winter, 2003; Zollo & Winter, 2002). Both building and using capabilities generate costs. Once a capability has been developed, benefiting from it requires committed resources and oversight to identify, access, and evaluate new knowledge, coordinate interactions, and facilitate sensemaking among the collaborating parties (Dobusch et al., 2015; Greco et al., 2019; Salge et al., 2013). Chesbrough (2020) cautions against ignoring the ‘back end’ of open innovation. Just deciding to engage in open innovation is not enough; it calls for dedicated people, development budgets, and senior management support.

Research suggests that it is possible to go overboard and put too much effort into open innovation so that the costs end up exceeding the benefits. Investments in open innovation are subject to diminishing returns, meaning that at some point, the benefits will not compensate additional costs (Belderbos et al., 2010; Laursen & Salter, 2006; Salge et al., 2013). If certain capabilities are used only rarely, their expenditures are not justified (Zollo & Winter, 2002). Companies may alternatively rely on ad hoc problem solving, where external opportunities are managed with ‘a high-paced, contingent, opportunistic and perhaps creative search’ for satisfactory behaviours and solutions (Winter, 2003, p. 992). Unlike dynamic capabilities, ad hoc problem solving is not routinised or systematic; problems are often unanticipated, and the firm is forced to search for new responses to external triggers on a case-by-case basis.

These experiences suggest that deliberation is needed when deciding to invest in developing and maintaining dynamic capabilities for open innovation. As Huizingh (2011) points out, it becomes of interest to investigate whether all capabilities are needed or whether they can compensate for each other.

A contingency view of inbound open innovation strategies

Several studies suggest that the extent to which open innovation has an impact on performance and which capabilities are needed must be considered to be context-dependent (Carmona-Lavado et al., 2021; Cheng & Huizingh, 2014; Huizingh, 2011; Kobarg et al., 2019; Lopes & de Carvalho, 2018). Some of the contingency factors are out of managers' hands as they are limited in their means to influence issues such as globalisation or the technology intensity of their industry, which often drive open innovation (Gassmann, 2006). Nevertheless, it can be observed that even within the same industry, some companies overtake others by mastering open innovation (Keupp & Gassmann, 2009). In a given industry, differences in the use of open innovation can be explained by strategic choices.

Open innovation is often used as an umbrella term that includes a range of different inter-organisational arrangements (Stanko et al., 2017). The variety of different innovation strategies is reduced into two simplistic alternatives: open and closed (Lakhani et al., 2013), which may be misleading. As Dahlander et al. (2021, p. 9) argue, 'the question is not if to use open innovation, but when to use it'. Hence, a firm seeking to engage in open innovation needs to define a distinct strategy that justifies its participation in open initiatives by outlining how open innovation is linked to its overall objectives (Appleyard & Chesbrough, 2017; Vanhaverbeke & Cloudt, 2014). Formulating an open innovation strategy is important, as the challenges that managers face differ from one strategy to another (Keinz et al., 2012), and the organisational approach needs to be matched with a company's strategic objectives (Chesbrough, 2020).

Successful inbound open innovation relies on identifying external knowledge that can be used to accelerate internal innovation (Chesbrough, 2006). The first part of this definition addresses innovative search: the identification of potential knowledge flows. Companies need to be aware of what external knowledge and technologies exist to make informed decisions regarding the orchestration of internal and external assets. Approaches to innovative search have been found a distinguishing factor of companies' innovation performance (Katila & Ahuja, 2002; Laursen & Salter, 2006). This strategic issue can be conceptualised with the idea of managerial attention: the 'focus of time and effort by the firm on a particular set of issues, problems, opportunities, and threats' (Ocasio, 1997, p. 188). In other words: how much attention does a company pay to external sources of knowledge? As a rule of thumb, allocating attention to many external sources provides an excellent view to emerging opportunities but is arduous to manage (Dahlander & Gann, 2010; Kim et al., 2016).

The latter part of the definition of inbound open innovation pays attention to how external contributions accelerate internal innovation. The value of external contributions depends on how they enable a company to produce desirable products and services. Therefore, a strategy should include consideration whether external knowledge is complementary to a company's internal assets (Bogers et al., 2019; Saebi & Foss, 2015). External contributions may refer to ideas and knowledge or mature technologies (West & Bogers, 2014), and there is a difference between innovation benefits arising from the ability to create new technologies or the ability to develop existing technologies into new products (Laursen, 2012). Since openness is costly, it is most effective when companies know what they are looking for (Felin & Zenger, 2020). Hence, open innovation

strategies should cover what is done in-house and what is sourced externally (Bogers et al., 2019; Chesbrough & Appleyard, 2007). The variety of options is captured by the idea of the *locus of innovation*, which refers to who has the primary responsibility and contributes the most to the innovation, that is, where most of the innovation takes place (Lakhani et al., 2013; Lifshitz-Assaf, 2018). Next, I discuss different positions companies can adopt with regards to managerial attention and locus of innovation. Central concepts regarding different strategies are collected in Table 1.

Managerial attention

To a large extent, companies' actions are determined by their top decision-makers, which are limited in the issues they can focus on (Ocasio, 1997). Managerial attention, therefore, becomes an essential resource in how companies adapt to their changing environments by innovating. Two main kinds of attention may be identified: proactive and reactive (Dahlander & Piezunka, 2014). Proactive attention entails an active role in drawing contributions from external actors. Proactive companies put more effort into identifying relevant innovations, interacting with external contributors intensively (Dahlander & Piezunka, 2014), and requesting new technologies from them (Wagner & Bode, 2014). Reactive attention, in contrast, consists of responses to others' suggestions (Dahlander & Piezunka, 2014). In this case, the initiative that triggers open innovation activities comes from external actors who may, for example, propose new ideas and technologies (Wagner & Bode, 2014), which are then evaluated on a case-by-case basis.

Proactive strategies, where a company is an active party that takes the initiative to request innovations from external parties, are widely reported. Somewhat less is known about settings where innovations are independently offered to a company (Chesbrough, 2020; Huizingh, 2011), who may reactively respond to the opportunity. However, strategies that depend on others' unprompted innovation sharing are gaining interest in sectors such as automotive (Henke & Zhang, 2010) and manufacturing (Wagner & Bode, 2014).

Table 1. Key concepts and their definitions.

Dimensions	Categories	Definitions	Theoretical connections
Managerial attention (Ocasio, 1997)	Proactive	Systematic routines for identifying and exploiting external innovation opportunities.	Sensing capabilities (Grimaldi et al., 2013; Teece, 2007).
	Reactive	Ad hoc decision making based on innovation opportunities proposed by external actors.	Ad hoc decision making (Winter, 2003), attractiveness (Hüttinger et al., 2012), impression management, cultural entrepreneurship (Lounsbury & Glynn, 2001)
Locus of innovation (Lifshitz-Assaf, 2018)	Internal	Internal R&D is complemented with external knowledge.	Absorptive capacity (Cohen & Levinthal, 1990).
	Shared	Innovation is based on joint problem solving by internal and external parties.	Co-creation (Pralhad & Ramaswamy, 2004; Tekic & Willoughby, 2019).
	External	Innovation is primarily developed by an external party, while the focal company provides support or complementary assets.	Innovation sourcing, licencing, contracting (Carson, 2007; Teece, 1986).

Locus of innovation

The other significant strategic dimension is the division of development responsibilities. Traditionally, innovation management research and practice have focused on models with a high proportion of internal R&D. More recently, models characterised by co-creation and innovation sourcing, where parts of the innovation process take place outside the boundaries of the company, have also received attention.

Different loci of innovation may be roughly divided into three categories: internal, external, and shared (Lifshitz-Assaf, 2018). If the locus of innovation is internal, most of the development effort is done in-house, typically in an R&D unit, and the transformation of knowledge from internal and external sources into an innovation occurs within the focal company. It, therefore, allows companies to integrate not only mature solutions but also raw ideas, concepts, knowledge, and emerging technologies that may be further developed internally. The distinctive characteristic of this locus is that it enables knowledge integration in the early phases of the innovation process.

In contrast, an external locus emphasises integrating more mature solutions that do not require extensive development efforts before implementation. Ready-to-market technologies or prototypes and proofs-of-concept that are close to market introduction and can be accessed, for example, by procuring or licencing them or partnering with the owner. Many pharmaceutical companies, for example, licence compounds developed by other companies to bring new products to the market quickly.

Finally, a middle position – a shared locus – may be identified, where the innovation is a collaborative effort with both parties having a similar share of the responsibilities. A shared locus implies a strategy based on the co-creation of innovations. In co-creation, external contributors are deeply embedded in a company's innovation projects (Tekic & Willoughby, 2019). This strategy is suitable when the company does not have the knowledge needed to develop a solution by itself, and no mature options are available on the markets (Le Dain et al., 2010).

Strategies' dynamic capability requirements

Due to the costs associated with openness, there is a genuine need for focused advice for managers beyond the one-size-fits-all suggestions for developing dynamic capabilities. Next, I apply the contingency view of inbound open innovation strategies to evaluate how the dynamic capability requirements vary according to strategic choices. The main insights are collected in [Table 2](#).

Sensing capability

Depending on the managerial attention, the capability needed for finding innovative technologies and partners differs. Sensing capability is a type of dynamic capability that allows companies to 'identify and shape opportunities' by constantly scanning, searching, and exploring across technologies and markets (Teece, 2007, p. 1322). It helps companies *proactively* acquire valuable knowledge from external sources by providing means to find and evaluate new technologies and opportunities generated externally. Companies that pay proactive attention to open innovation should develop a sensing capability to assist

Table 2. Dynamic capability requirements for inbound open innovation strategies.

Strategic dimensions		Required levels of dynamic capabilities			
Managerial attention	Locus of innovation	Sensing capability	Impression management capability	Absorptive capacity	Collaboration capability
Reactive	External	Low	High	Low	Moderate
Reactive	Shared	Low	High	Moderate	High
Reactive	Internal	Low	High	High	Low
Proactive	External	High	Moderate	Low	Moderate
Proactive	Shared	High	Moderate	Moderate	High
Proactive	Internal	High	Moderate	High	Low

them in ‘identifying and evaluating valuable external knowledge, and establishing cross-boundary collaboration outside the business’ (Bogers et al., 2019, p. 84).

Many open innovation endeavours are bound to fail or advance very slowly because of the inability to detect valuable knowledge. First, there is the challenge of choosing the right knowledge sources. On a general level, partnering with suppliers, customers, universities, and competitors has been identified as an efficient way to gain access to external knowledge (Un et al., 2010). However, choosing the best partners is difficult since there is high uncertainty about their competencies – especially if no previous collaboration has taken place (Badir & O’Connor, 2015; Enkel et al., 2009). There is likely to be considerable information asymmetry about the potential partners’ capabilities, making it challenging to predict collaboration outcomes (Saebi & Foss, 2015). Also, within existing partnerships, there may be difficulties locating relevant knowledge as it is not always clear ‘who knows what and where critical expertise resides within each firm’ (Dyer & Singh, 1998, p. 665).

Companies that proactively pay attention to external sources of innovation need to have a set of skills, routines, programmes, projects, and procedures to search for innovation opportunities and select the best partners (Ocasio, 1997). In other words, they require methods for introducing innovations in the organisation as comprehensively as possible (Veugelers et al., 2010). Companies may set up planning processes for information gathering activities, gather and analyse data, establish team problem-solving arrangements, connect to more and better information sources, and establish relationships with external experts (Hilliard & Goldstein, 2019). Setting up systematic ways of gathering information about new opportunities and transforming it into actionable intelligence facilitates open innovation and strategic decision-making (Veugelers et al., 2010). It can be concluded that a high level of sensing capability is needed for proactive strategies as it enables companies to identify new business opportunities by scanning and monitoring new technologies and assessing changes in customer needs (Grimaldi et al., 2013; Teece, 2007).

Impression management capability

An alternative way to identify external knowledge is to develop an impression management capability that enables companies to shape their legitimacy and reputation. Organisations who adopt the *reactive* attention approach need to ensure that their attractiveness is sufficient to encourage relevant co-innovators to work with them. To

achieve high attractiveness, they can leverage an impression management capability that helps attract ideas and innovations without proactive sensing efforts.

Without a sensing capability, the best external sources of innovation are challenging to locate. However, some renowned companies may avoid this problem by inducing innovators to approach them (Schiele, 2012). Companies may choose to invest in increasing their attractiveness so that others contact them with collaboration opportunities. The notion of attractiveness is based on the idea that innovative technologies are scarce, and companies need to compete for them. An attractive company has certain positive characteristics that technology developers are drawn to, creating positive expectations about the value of collaboration (Hüttinger et al., 2012; Tanskanen & Aminoff, 2015). It, therefore, 'stimulates' companies to offer their ideas and technologies to that partner (Pihlajamaa et al., 2019).

A company's existing assets, such as its size, market share, and production capacity, form the basis of its attractiveness (Pulles et al., 2014; Tanskanen & Aminoff, 2015). On top of these, creating and conveying narratives and stories about the company is an effective way of drawing attention to it and providing reasons to believe that it would make a good partner (Lounsbury & Glynn, 2001). As a result, the company may appear more credible and successful and attract more external contributions (Zott & Huy, 2007). There is evidence that potential partners do not seek only utility when deciding to engage in an open innovation partnership. If they perceive a company as unfair, they may decide against collaboration (Franke et al., 2013). In contrast, a good reputation may induce an emotional attachment or 'favourability' towards the company (Christopher & Gaudenzi, 2009). Therefore, a company that wishes to attract more and better innovation partners should not consider branding and storytelling efforts only as a means for increasing sales. Instead, they should be seen as crucial processes to facilitate organisational innovation (Lounsbury & Glynn, 2019).

Impression management capability can be considered as a substitute for sensing capability for identifying external knowledge. With a sufficiently high ability to manage its attractiveness, a company does not have to search for external partners independently, and a low sensing capability is enough. This principle is at the core of reactive strategies. For proactive strategies, impression management capability may also be useful as the identified external partners are more likely to be willing to collaborate with an attractive company. Proactive strategies may benefit from a moderate level where external partners are open for collaboration but do not necessarily make contact unprompted.

To develop impression management into a dynamic capability, companies need to systematically assess reputational risks and needs and design appropriate responses to them (Christopher & Gaudenzi, 2009). Here, managers may learn from best practices in corporate communications (Pfeffermann, 2011) and corporate social responsibility and stakeholder management (Cantrell et al., 2015).

Absorptive capacity

Absorptive capacity is an organisation's ability to recognise the value of new, external information, assimilate it, and apply it to commercial ends (Cohen & Levinthal, 1990). In addition to locating external knowledge, the knowledge needs to be processed and put

into use. Cohen and Levinthal (1990) argue that investments in internal R&D have two functions: in addition to enabling the generation of innovations internally, they increase the organisation's absorptive capacity. Collecting knowledge from external sources and bringing them in-house for further development creates much work for the R&D department and calls for highly competent staff, sufficient resources, and well-functioning routines and structures for internalising external knowledge. Depending on the locus of innovation, the required level of absorptive capacity varies.

Internal locus of innovation

With an internal locus of innovation, the purpose is to integrate external ideas and knowledge, and considerable R&D investments are needed both for understanding external inputs and developing them further. Since the goal is to use external inputs to promote internal innovation projects, the acquired knowledge and ideas need to be fully understood and integrated. Companies with high absorptive capacity can assimilate new knowledge better and faster, thus enhancing their ability to innovate (Fabrizio, 2009; Rothaermel & Alexandre, 2009).

A classic example is IBM, which famously led the IT market for over 50 years by developing core technologies in its R&D labs. When it finally moved towards an open innovation model, it was well-equipped to leverage external technologies because of the absorptive capacity generated by internal R&D investments (Chesbrough, 2003). In addition to ensuring a sufficient level of internal R&D, companies with an internal locus of innovation need to invest in the development of routines, practices and structures that promote knowledge sharing inside the company to augment its absorptive capacity and alleviate the not-invented-here syndrome that prevents them from exploiting external contributions (Antons & Piller, 2015; Pihlajamaa, 2018). If external knowledge does not reach suitable recipients within the company, it cannot be integrated and exploited.

External locus of innovation

This situation stands in contrast to that of an external locus of innovation, where the focal firm does not necessarily have to gain an in-depth understanding of the external knowledge. Strategies with an external locus are based on the innovation partners having complementary strengths that can be combined without them operating extensively in each other's domains. If a company may use innovative external technologies without needing to understand them thoroughly, there is less need to develop absorptive capacity. Ready-to-market technologies are of particular interest as many uncertainties and problems related to the use of mature technologies have already been resolved by others. They are, hence, easier to apply without extensive domain knowledge (Calvi et al., 2020).

Strategies with an external locus of innovation are becoming commonplace (Stanko & Calantone, 2011), and there are ways to implement them without significant investments in absorptive capacity. First, in many industries, companies are increasingly giving more development responsibility to their partners. They source whole components and even new 'turnkey' products to stay ahead in innovation (Carson, 2007; Quinn, 2000). Internal R&D efforts may, in fact, be almost entirely replaced by external sources (Saebi & Foss, 2015). Companies with an external locus of innovation may, for example, acquire a ready-to-market product or service whose developer is unable to bring it to the market

by itself, then finalise it, embedding it in a business model that can deliver, scale, and sustain it (Chesbrough, 2020; Nambisan & Sawhney, 2007). Suppose a company's other competencies (e.g. commercialisation) may be combined with an external partner's technologies. In that case, it may be a beneficial innovation partner, even without contributing extensively to technology development (Pihlajamaa et al., 2017). The requirements for high absorptive capacity can, therefore, be overcome by partnering with a technology developer.

A second way of avoiding investments in absorptive capacity is using modular product and service architectures. If the product architecture is highly modular, specific modules can easily be connected to the overall product design, and there is no need to maintain in-depth knowledge of all of them (Zirpoli & Becker, 2011). External partners may take over primary development responsibilities, and the resulting components may easily be integrated into a more extensive product or service system, as is common in the automotive industry (Le Dain et al., 2010; Lakhani et al., 2013).

Shared locus of innovation

Finally, there is the shared locus of innovation, where defining and solving the problem is done in collaboration between innovation partners (Prahalad & Ramaswamy, 2004). In this case, a company engages in co-creation of knowledge, products, or value with external parties (Tekic & Willoughby, 2019). For a shared locus, absorptive capacity requirements may be approached from the perspective of optimal overlap in knowledge bases. The purpose of co-creation is to create novel recombinations from two or more knowledge bases, and R&D investments generate the ability to absorb knowledge from an external partner.

Some overlap in the knowledge bases is needed to ensure mutual understanding and the ability to work together, justifying investments in absorptive capacity. The partners need to understand each other sufficiently to know which problems the other can solve (Postrel, 2002) and how to combine both sides' contributions into a distinct new solution (Malhotra et al., 2001). However, too similar knowledge bases may limit the emergence of novelty as the partners think too much alike (Nooteboom et al., 2007).

Consequently, a middle ground where companies 'target other firms with moderately related knowledge bases' is desirable (Vanhaverbeke et al., 2008, p. 12). When engaging in co-creation, companies should try to keep an 'optimal cognitive distance' to the other party that enables them to develop novel solutions but does not lead to misunderstandings (Nooteboom et al., 2007). The optimal distance is likely to be shorter in a shared than an internal locus of innovation: it is unnecessary to absorb all the new knowledge as some development tasks may be divided among the parties (Fliess & Becker, 2006). However, compared to an external locus, the focal company actively participates in the development process, and relevant expertise is thus required.

These observations have implications for the need to develop absorptive capacity. Suppose only a low level of absorptive capacity has been developed. In that case, it is challenging to implement strategies that focus on a shared locus of innovation because the company does not possess the capability to understand external contributions and develop them collaboratively. Substantial investments in absorptive capacity, on the other hand, may be unnecessary since co-creation may not be needed if the company

can do most of the development work by itself. An optimum is likely to be found between these extremes.

Collaboration capability

Collaboration capability enables companies to coordinate their external relationships, manage open innovation projects, negotiate contracts and manage conflicts in joint activities (Allred et al., 2011; Blomqvist & Levy, 2006; Saebi & Foss, 2015). Companies with high collaboration capability can anticipate and resolve conflicts in collaborative relationships, promote trust creation and timely and sufficient knowledge sharing, and ensure that the contractual set-up is satisfactory for all parties.

There are several reasons why a collaboration capability is needed in inbound open innovation. First, collaborative innovation projects may require intensive coordination of interactions and knowledge exchange (O'Sullivan, 2006). External knowledge needs to be accessed at the right time and in an understandable and usable format (Cavusgil et al., 2003; Malhotra et al., 2001). Second, collaboration can be complicated when the culture, goals, and practices of the participants differ. Even when mutual benefits are in sight, joint efforts may fail if there is a lack of mutual trust and divergent interests are not kept under control (De Jong & Woolthuis, 2008). When the partners come from different backgrounds, a clash may occur if they try to force their values and ways of working on the other (O'Mahony & Bechky, 2008). Third, the collaborators need to agree on contractual questions, such as intellectual property (IP) rights, division of development risks and responsibilities, and potential joint business models. How demanding it is to manage collaborative relationships varies according to the locus of innovation.

Internal locus of innovation

In the case of an internal locus, the need for coordination is modest. Most of the development work is carried out internally and is thus easier to coordinate as there is little need for complicated knowledge sharing procedures or sophisticated contractual arrangements (Sobrero & Roberts, 2001). Nevertheless, some collaboration capability is needed to motivate collaborators to share their insights and, thus, secure access to external knowledge (Abrell et al., 2017). This is, however, simplified by the fact that the external inputs are often ideas, concepts, and knowledge whose IP rights are not well defined. Most of the IP is created by the focal company, and issues related to its use are relatively easy to resolve.

External locus of innovation

When the external partners' responsibilities increase, so do their incentives to protect the resulting IP (Kloyer & Scholderer, 2012; Nambisan & Sawhney, 2008). As much effort, risk-taking, and capital have been put into developing new technologies, providing others access to them is typically dependent on reasonable compensation (Bogers et al., 2019). Companies that aim to source ready-to-market innovations will need competencies to work out win-win situations for all parties and resolve potential conflicts.

If the external contributions are easily integrated into a product design, such as in the case of sourcing modular components, collaboration capability is needed to ensure

continuous access to and potential future improvement of the component (Le Dain et al., 2010). In cases where the developer of a technology will be actively involved in its commercialisation, even more extensive negotiations are needed to agree on matters such as a shared business model, IPR ownership, exclusive rights of use and the sharing of risks (Pihlajamaa et al., 2017). Sensitivity to differences in cultures, priorities, and working practices is needed to avoid conflicts. For example, big corporations often need to adjust the way they engage in a partnership when working with startups. A common mistake is to chase entrepreneurs away by presenting them with overly complicated contracts or asking them to commit to one partner exclusively (Pihlajamaa et al., 2017; Zaremba et al., 2017).

Shared locus of innovation

Compared to the internal and external loci, strategies with a shared locus of innovation include engaging in collaboration at a much deeper level (Saebi & Foss, 2015). This position is characterised by joint problem-solving activities, which require intensive interactions and knowledge exchange, and which may give rise to goal conflicts and coordination challenges (O'Sullivan, 2006). A shared locus generates opportunities for rich information flows that favour innovation, but managing those flows requires extensive interactions (Sobrero & Roberts, 2001). Especially in large projects with multiple organisations and functions involved, facilitating interactions and knowledge sharing becomes an arduous task (Malhotra et al., 2001; O'Sullivan, 2006).

In co-creation, there is also a significant possibility of a clash of cultures, goals, and practices. For example, when working with the open-source community, established companies have found it difficult to align their own strategic goals and schedules with the community's priorities on informality, autonomy, and transparency (O'Mahony & Bechky, 2008). To resolve these challenges, they have had to adapt their organising practices to find a compromise that all could live with during the collaborative project. If a compromise is not possible, the pursuit of multiple goals may be incorporated into the collaboration (Perkmann & Schildt, 2015). Companies with high collaboration capability can establish a shared purpose for working together and enhance mutual trust and commitment (Allred et al., 2011; Blomqvist & Levy, 2006). They know how to socialise with their partners outside formal work settings to get to know each other better and increase trust (Lawson et al., 2009), and have culture, skills, and processes for the systematic handling of conflicts (Lam & Chin, 2005).

Much of the challenges related to negotiating business models and IPR ownership that are present in an external locus of innovation also apply to co-creation. Furthermore, in intensive collaboration, a company may have the interest to avoid the leakage of strategic knowledge. When engaging in knowledge sharing, companies risk revealing trade secrets, and collaboration capability is needed to manage this 'paradox of openness' (Bogers et al., 2019; Laursen & Salter, 2014). Some of the risks may be addressed by patenting, but specific project structures and coordination may also be required (Rouyre & Fernandez, 2019). Furthermore, it is often difficult to distinguish each party's contribution to the innovation that is being developed, and companies need to evaluate how and when the new IP will be shared among the collaborators (Kloyer & Scholderer, 2012).

Based on the above discussion, it may be concluded that investing in the development of dynamic collaboration capability is most advantageous when it supports an open

innovation strategy with a shared locus of innovation, moderately so for an external locus, and least for an internal locus.

A typology of strategy archetypes

As discussed above, combinations of the dimensions of managerial attention and locus of innovation each have distinct dynamic capability requirements. This allows me to formulate six inbound open innovation strategy *archetypes* that leverage distinct sets of capabilities (Figure 1). Archetypes here refer to ‘ideal’ positions along a wider continuum whereby distinctly identifiable elements enable companies to locate their position on a broad strategy map. Depending on the nature of managerial attention, the strategies may be labelled as proactive or reactive. Depending on the locus of innovation, companies may source ready-to-market innovations, ideas and knowledge, or engage in co-creation.

Reactive sourcer of ready-to-market innovations

A reactive sourcer of ready-to-market innovations leverages its impression management capability to find mature externally-generated technologies, which relieves it from investing in sensing capability and absorptive capacity. A case of a high-tech OEM illustrates

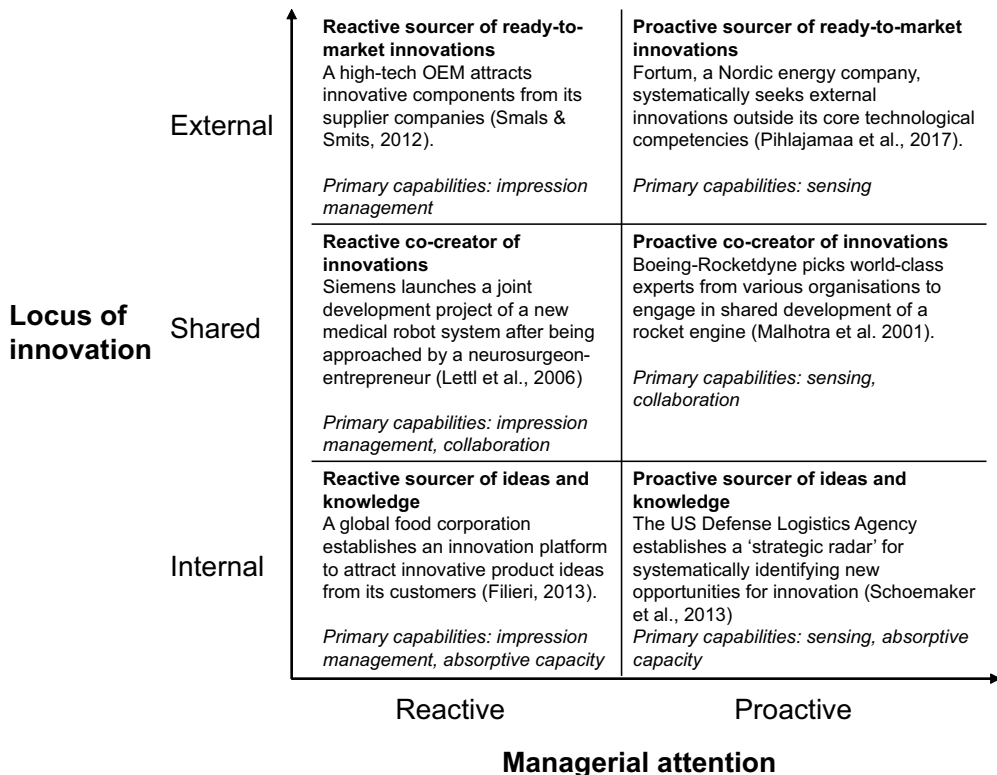


Figure 1. Six inbound open innovation strategy archetypes with illustrative examples.

how a company can translate its good reputation into access to innovative technological components (Smals & Smits, 2012). The OEM in question is known for being a demanding customer for its supplier companies. Consequently, those companies whose technologies it uses can present themselves as highly capable and innovative to other customers as well. Due to these reputation benefits, the OEM has suppliers who take the initiative of proactively offering it new technologies and asking it to describe its future needs in terms of high-level functional requirements. This relieves the company from a proactive search for new technologies. Benefiting from a modular product architecture, it may easily integrate the components developed by others in its products.

Proactive sourcer of ready-to-market innovations

Proactive sourcers of ready-to-market innovations primarily rely on their sensing capability in locating promising technologies. An excellent example of such a strategy is found from Fortum. This Nordic energy company operates power plants and generates and sells solutions and services for electricity, heat, and cooling. Fortum works intensively with technology developers ranging from small startups to large corporations and research institutes to find mature externally developed technologies that can be commercialised under its brand (Pihlajamaa et al., 2017). It has invested a lot in developing a sensing capability to identify promising new technologies, and it proactively scans technology companies globally to be the first to recognise new opportunities. When the topics become too complex, it brings in external consultants to help. Collaboration capability is needed for agreeing on a business model and IPR ownership with the technology developers.

Reactive co-creator of innovations

For a reactive co-creator of innovations, critical capabilities include impression management capability for attracting co-creators and collaboration capability for ensuring successful development outcomes. Such a strategy was successfully applied in Siemens – the largest industrial manufacturing company in Europe well-known for its operations in multiple fields, including medical technologies. When a German neurosurgeon Volker Urban envisaged a new medical robot system to help in neurosurgery, the first company he contacted was Siemens (Lettl et al., 2006). All Siemens had to do to attract him was to announce that it was looking for novel ideas in medical technology that could be presented at its 150th-anniversary celebration event. Siemens' good reputation and public visibility made it a well-known and attractive partner for the innovative entrepreneur. Siemens became interested and agreed to finance the development of the prototype. At that time, Siemens lacked internal technological capabilities to develop medical robots, and the project provided an excellent opportunity to experiment with a new field. Fraunhofer Institute – a research centre – was invited along, and the group collaborated intensively for one and half years for building the prototype.

Proactive co-creator of innovations

A proactive co-creator of innovations faces the challenge of locating the best available collaborators. Boeing-Rocketdyne, a major rocket engine manufacturer, launched a project to reduce its engines' costs and time-to-market and increase their life span (Malhotra et al., 2001). Due to the ambitious goals, the company sought and hand-picked the best experts from three organisations, including their own. The team included people from different disciplines and backgrounds who had never worked together, half without any experience of rocket engine design. However, all organisations were sufficiently research-intensive, enabling them to understand the project's goals and bring their complementary skills to the collaboration process. Managing collaboration became a critical challenge in the project. Rocketdyne had to develop practices for coordinating information flows and interactions, consolidating ideas into design proposals, and rapidly co-creating design sketches.

Reactive sourcer of ideas and knowledge

Sometimes companies have such a good reputation that they do not have to seek new ideas proactively. A major global food corporation originating in Italy reportedly received thousands of emails from its customers, who showed their affection for the brand and suggested ideas related to new products, promotion, packaging and corporate social responsibility issues (Filieri, 2013). To collect the ideas systematically, the company launched an online platform where external contributors may submit their ideas and vote for others' suggestions. By outsourcing idea generation and screening to customers, the company became able to develop innovative solutions that were more likely to be accepted by the market. The integration and implementation of the ideas were entirely at the company's responsibility, creating a need for absorptive capacity. However, collaboration with the customers was very lightweight and consisted of moderating the online platform and providing feedback to the contributors.

Proactive sourcer of ideas and knowledge

Proactive sourcers of ideas and knowledge rely on their sensing capability to identify relevant knowledge that can be absorbed and put into use. The US Defence Logistics Agency (DLA) is a good example of such a strategy. Supplying the armed forces with critical supplies, it resembles a large private sector company in the supply and logistics field (Schoemaker et al., 2013). DLA set up a 'strategic radar', where external experts, databases, and documents are systematically monitored and used to plan future scenarios and identify innovation opportunities. Besides pre-identified trends and topics, DLA scans for weak signals that may significantly change its operating environment, such as the emergence of alternative sensor technologies. In addition to the investments in gathering information, interpreting the radar's signals requires in-depth domain knowledge of the industry and relevant technologies. On the other hand, collaboration is straightforward and includes collecting the inputs of external experts on various signals, such as potential changes in markets.

Discussion and conclusions

Inbound open innovation has received a great deal of attention in the past years, which has sometimes led to over-optimistic views of its benefits. At the time of writing, the hype starts to fade, and attention is shifting towards getting actual results (Chesbrough, 2020). Developing dynamic organisational capabilities has been proposed as a way for companies to promote open innovation by becoming proficient at integrating external knowledge (Bogers et al., 2019; Teece, 2020). However, not all companies that have such capabilities can translate them into a competitive advantage. Developing and maintaining capabilities generates costs, and if they are not fully used, they may be detrimental to the company's overall performance. In the current study, I contribute by adopting a contingency approach to inbound open innovation and focusing on distinct open innovation strategies that companies may choose to pursue. I develop a typology of six inbound open innovation strategies, and report their requirements concerning four dynamic capabilities: sensing capability, impression management capability, absorptive capacity, and collaboration capability.

The findings provide practical support for managers in implementing a successful open innovation strategy. First, the typology of archetypal strategies presented in [Figure 1](#) can be used to determine an inbound open innovation strategy that supports the company's overall objectives. Guiding questions such as 'what kind of external inputs do we need?' and 'what kind of engagement with external partners is natural for us?' can help managers identify a suitable strategy. [Table 2](#) can be used as a tool for reflecting on a specific strategy's requirements and deciding on investments in dynamic capabilities. If a company is good at managing its reputation and attractiveness among the desired partners, could investments in sensing capabilities be decreased without too much loss? If most open innovation projects involve intensive co-creation, should there be more investments in collaboration capabilities?

Finding the balance between underinvestment and overinvestment in dynamic capabilities is a key task for managers responsible for open innovation. Locating the sweet spot between these two will ensure that the company is good enough to exploit external knowledge while avoiding a scenario where the innovation department eats into the business's profitability. While earlier research has addressed the costs of open innovation (Greco et al., 2019; Laursen & Salter, 2006; Salge et al., 2013), in this study, I contribute by viewing costs from the perspective of investments in dynamic capabilities and by presenting a contingency argument concerning the connection between capabilities and inbound open innovation strategies.

The strategy typology presented in this study complements earlier categorisations of open innovation strategies, responding to the calls for increased attention to open strategy formulation and implementation (Randhawa et al., 2016). For example, Dahlander and Gann (2010) distinguish between inbound and outbound as well as pecuniary versus non-pecuniary open innovation. Chesbrough and Appleyard (2007) focus on value creation (in-house vs community-driven) and value capture (ecosystem vs company) to classify open innovation initiatives. Bogers et al. (2019) consider the technology development business model and IP strategy as key factors.

The typology presented in this paper adds to these in two main respects. First, it proposes reactive strategies as valid alternatives to proactive ones. This takes the earlier

idea of proactive vs reactive attention and extends it from online crowdsourcing (Dahlander & Piezunka, 2014) to the broader context of open innovation strategy. The issue of reputation management has been previously emphasised in the literature on collaboration with open source software communities (Henkel, 2006; Henkel et al., 2014), but developing an impression management capability for attracting open innovation partners has rarely been addressed as a valid strategic choice in place of proactively sensing new opportunities. This study contributes by proposing impression management as a critical dynamic capability in reactive strategies for inbound open innovation. This view also adds to earlier conceptualisations of managerial attention in open innovation that have focused on the breadth and depth of attention (Laursen & Salter, 2006) by suggesting that an increase in a company's attractiveness may free managers' attention for other activities.

Further, the idea of a locus of innovation provides nuance to extant views of inbound open innovation. By acknowledging where innovation takes place in different phases of the innovation process, clarity can be achieved on whether inbound open innovation refers to companies that aim to create their new technologies or companies that develop existing technologies into new products (Laursen, 2012). As a methodological implication, I emphasise the risks of using broad survey questions such as 'Did your enterprise co-operate on any of your innovation activities with other enterprises or organisations?', found in the Eurostat Community Innovation Survey, which is widely used in the innovation management field (for example, Grimpe & Sofka, 2009; Laursen & Salter, 2006; Leiponen & Helfat, 2010; Lhuillery & Pfister, 2009; Love et al., 2011). Lack of means to distinguish between different open innovation strategies may lead to confusion (e.g. superficially conflicting results) and prevent the accumulation of knowledge.

Limitations and future research

In this article, I focused on two key dimensions and capabilities to provide an easily applicable frame of reference for positioning inbound open innovation strategies. Due to this focus, other potentially relevant capabilities, such as reconfiguring capabilities (Teece, 2007), are left out, generating opportunities for extending the framework. Given the emphasis on inbound strategies, it also becomes of interest to investigate appropriate sets of dynamic capabilities for different outbound open innovation strategies. I did not extensively address the relative benefits of different strategies and their applicability in different contexts. However, the typology provides a starting point for future studies investigating the performance outcomes of different combinations of strategies and capabilities.

Another interesting avenue for future research is to explore how companies settle on a specific strategy, given that contextual factors and relevant capabilities may vary even within a single organisation. Optimal strategies may differ from one business unit, target market, or product line to another, making decisions on capability development more complicated. Further, the emergence of novel value systems, such as ecosystems, increases the diversity of the ways companies organise innovation and production, making them likely to adopt multiple approaches to open innovation simultaneously.

Consideration of locus of innovation, in particular, could help investigate the various roles companies adopt and activities that they engage in such settings.

Note

1. In this article, I zoom into *inbound* open innovation, it being more prevalent both in research and practice (Chesbrough & Brunswicker, 2014; Huizingh, 2011). *Outbound* open innovation, which refers to the external exploitation of internal knowledge and technologies, remains out of the scope of this study.

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