

**BUSINESS MODELS FOR OPEN INNOVATION:
MATCHING HETEROGENOUS OPEN INNOVATION STRATEGIES
WITH BUSINESS MODEL DIMENSIONS**

Tina Saebi*

Center for Service Innovation--Department of Strategy and Management
Norwegian School of Economics
Helleveien 30, N-5045
Bergen; Norway
+4755959462

Nicolai J Foss

Department of Strategic Management and Globalization
Copenhagen Business School;
Kilen: Kilevej 14, 2nd floor
2000 Frederiksberg; Denmark
njf.smg@cbs.dk

and

Center for Service Innovation--Department of Strategy and Management
Norwegian School of Economics
Helleveien 30, N-5045
Bergen; Norway

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Abstract

Research on open innovation suggests that companies benefit differentially from adopting open innovation strategies; however, it is unclear why this is so. One possible explanation is that companies' business models are not attuned to open strategies. Accordingly, we propose a contingency model of open business models by systematically linking open innovation strategies to core business model dimensions, notably the content, structure, governance of transactions. We further illustrate a continuum of open innovativeness, differentiating between four types of open business models. We contribute to the open innovation literature by specifying the conditions under which business models are conducive to the success of open innovation strategies.

INTRODUCTION

Open innovation has been widely debated in the management of innovation literature over the past decade (e.g., Chesbrough, 2003; Gassmann & Enkel, 2004; Prahalad & Ramaswary, 2004; von Hippel, 2005; West & Gallagher, 2006; Dahlander & Gann, 2010). On the one hand, research has identified a number of advantages of the open innovation model, such as leveraging external knowledge inputs to accelerate internal innovations and expand the markets for external use of innovation. On the other hand, empirical evidence indicates that the returns from open innovation decrease at the margin as the costs of openness exceed the benefits (Laursen & Salter, 2006). Studies highlight considerable heterogeneity in open innovation performance among companies, indicating that companies vary considerably in their ability to master the challenges associated with openness (cf., Salge, Bohne, Farchi & Piening, 2012). Perhaps due to a lack of systematic evidence on inter-company heterogeneity in open innovation performance, little is known about the factors that help distinguish organizations capable of reaping the benefits of open innovation from those that are less capable (Huizingh, 2011). *A priori* many factors may account for such heterogeneity, such as product complexity (Almirall & Casadesus-Masanell, 2010), research capability (Laursen & Salter, 2006), and industry membership (Grimpe & Sofka, 2009).

However, recent studies reveal that companies that have successfully capitalized on integrating external sources of knowledge into their innovation processes primarily stand out in *organizational* terms: They are characterized by organizational flexibility and a willingness to restructure their existing business models to accommodate open innovation strategies (Hienerth, Keinz & Lettl, 2011; Keinz Hienerth & Lettl, 2012; Chesbrough & Schwartz, 2007; van der Meer, 2007). We define business models as the content, structure, and governance of transactions inside the company and between the company and its external partners in support of the company's creation, delivery and capture of value (Santos, Spector

& van der Heyden, 2009; Zott & Amit, 2008, 2010). As business models reflect the strategic choices of the company (Margretta, 2002; Zott & Amit 2008), the choice of open innovation requires that the company defines those ways to create, deliver and capture value in conjunction with external partners that are consistent with open innovation (Hienerth et al., 2011; Vanhaverbeke, 2006). As support of this overall proposition, empirical evidence strongly suggests that organizational design, practices and capabilities need to be aligned with open innovation strategies, so as to positively influence the sourcing of knowledge from external parties and its subsequent exploitation for innovation (Foss, Laursen & Pedersen, 2011; Salge et al., 2012; Keinz et al., 2012; Jansen, van den Bosch & Volberda, 2005). These findings indicate that companies wishing to engage in open innovation must (at least partly) re-organize their business models as to accommodate their open innovation strategies and to subsequently enhance innovative performance.

However, there is little research that explicitly links business models to open innovation strategies. That is, while such strategies differ significantly with regard to, for example the number and types of actors involved (Laursen & Salter, 2006; Elmquist, Fredberg & Ollila, 2009) and the phases of the innovation process that are kept open in terms of interacting with outside knowledge sources (Lazzarotti, Manzini & Pellegrini, 2011; Foss, Lyngsie & Zahra, 2013), little is known about how companies need to design their business models to match different open innovation strategies. For this reason, companies may mistakenly think of open innovation as yet another “off the shelf” management practice that can be implemented almost as an add-on to existing practices and organizational arrangements in the company.

It is against this backdrop that this theoretical article examines the question of how companies need to align business models with different open innovation strategies. To answer this question, we review relevant literatures on open innovation and business models and

subsequently propose a contingency model of open business models that systematically links inbound open innovation strategies to business model dimensions.¹ Figure 1 depicts our basic research model.

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Drawing on this conceptual framework, we take the focal company's open innovation strategy (at the business-unit level) as the unit of analysis and examine how adopting different types of open innovation strategies affect a company's business model with respect to (1) the content (the set of elemental activities) (2) the structure (the organizational units performing those activities and the ways in which these units are linked), and (3) the governance of the transactions (the mechanisms for controlling the organizational units and the linkages between the units).² Overall, we extend the emerging literature on the organizational antecedents of successful open innovation (Salge et al., 2012; Foss et al. 2011; Hienerth et al., 2011) by explaining open innovation performance in terms of the alignment of companies' open innovation strategies with their business model. By adopting a business model perspective we integrate recent findings from the organizational literature on the alignment of structure, practices and capabilities for open innovation, which so far have been dealt with separately, into a single framework. Using this framework allows us to differentiate business model designs for different open innovation strategies. Thus, while the contributions of this article are purely theoretical, we add to the open innovation literature by specifying the conditions under which business models are conducive to open innovation success.

¹ While research on outbound open innovation is no less essential, in this article we focus on the implications of inbound open innovation for the design of business models. Inbound open innovation or external knowledge sourcing refers to the practice of establishing relationships with external organizations or individuals with the purpose of accessing their technical or scientific competencies for improving internal innovation performance (Chiaroni, Chiesa & Frattini, 2010).

² We chose to focus on the business-unit level of the company (as opposed to corporate-level), as large companies can adopt different open innovation strategies for their different business units. We recommend Santos, Spector and van der Heyden (forthcoming) and Casadesus-Masanell, Ricart & Tarzuján (forthcoming) for further readings on the role of corporate-level strategy on the choice and flexibility of business model design at the business-unit level.

BUSINESS MODELS AND OPEN INNOVATION: BACKGROUND

Companies realize different outcomes from open innovation. Three possible reasons emerge from extant open innovation literature. One research stream ascribes the inter-company performance heterogeneity to differences in open innovation *strategies*. Here, studies assume a main effect relationship between the degree of openness (commonly measured by the breadth and depth of knowledge search) and innovative performance (e.g., Laursen & Salter, 2006, Fey & Birkinshaw, 2005; Oerlemans & Knobens, 2010; Leiponen & Helfat, 2010). Such effects may correspond to actual practice; for example, the more a company's R&D personnel directly interact with external knowledge sources, the more innovation may happen as a result. However, as in actuality this is usually somehow mediated or moderated by, for example, organizational practices, a second research stream investigates the moderating or mediating variables between open innovation and performance. Here, studies (implicitly) assume that open innovation strategies are fairly similar, but that companies adopt different organizational designs, some of which are mismatched with the open innovation strategy, leading to performance differentials (e.g., Foss, Laursen & Pedersen, 2011; Salge et al., 2012; Hienerth et al., 2011). Integrating these two perspectives, a third possible reason for performance differentials may stem from the fact that open innovation strategies are in fact different and thus are aligned with different business models. As companies are not equally good at matching open innovation strategies to business models, this can result in performance differentials.

Reviewing both the literatures on business models and open innovation clearly indicates that companies can choose from an array of different business models and different open innovation strategies. Thus, the match between open innovation strategy and business model is likely to be an important antecedent to open innovation performance. As little has been written on this issue, we first briefly examine the notions of business models and open

innovation, and subsequently propose a contingency framework of business models for open innovation.

What is a Business Model?

The business model construct, though widely used in management research as well as by practitioners, suffers from lack of clarity. The construct was introduced in the late 1950s but hardly used in publications until the 1990s, and it was only with the hype of the Internet and the emergence of e-businesses that it caught on about a decade ago or so (Osterwalder, Pigneur & Tucci, 2005; Zott, Amit & Massa, 2011). Since then the business model construct has been used to denote different things, “such as parts of a business model (e.g. auction model), types of business models (e.g. direct-to-customer model), concrete real world instances of business models (e.g. the Dell model) or concepts (elements and relationships of a model)” (Osterwalder et al., 2005, p.8). This conceptual ambiguity is reflected in the variety of business model definitions to be found in extant literature. Table 1 provides a non-exhaustive overview of studies that have explicitly offered a definition of business models (as to differentiate from studies that do not address the definition of business model directly).

--- Insert table 1 here ---

The table shows that extant definitions indeed vary. Some definitions specify the interplay between business actors, value creation and revenue sources (cf. Timmers, 1998; Casadesus-Masanell & Ricart, 2010), others relate to innovations and how to generate revenues from them (cf. Chesbrough & Rosenbloom 2002), while others again start from the theoretical essence of business models, that is, the minimum set of core components that must be common to all business models and which set the business model construct apart from other constructs (cf. Amit & Zott, 2001, Morris, Schindehutte & Allen 2005, Osterwalder et al., 2005).

Notwithstanding these differences, the majority of studies seem to converge on the basic understanding that business models denote the company's core logic for creating and capturing value by specifying the company's fundamental value proposition(s), the market segments it addresses, the structure of the value chain which is required for realizing the relevant value proposition, and the mechanisms of value capture that the company deploys, including its competitive strategy. Teece (2010: 172) summarizes this by stating that the "... essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit."

More recently, adopting an organizational perspective, researchers depict business models as devices for structuring and designing organizations (cf. Foss & Saebi, *forthcoming*). Business models are understood as manifestation of how organizational variables are configured (Winter & Szulanski, 2001), how the company structures its transactions with external stakeholders (Santos, Spector & van der Heyden, *forthcoming*), and the consequences of those configurations on company performance (Casadesus-Masanell, Ricart & Tarjizan, *forthcoming*). Thus, in line with recent literature, we define business models as the content, structure, and governance of transactions within the company and between the company and its external partners that support the company in the creation, delivery and capture of value.

Adopting this organizational perspective to defining business models is advantageous for the purpose of this article. As the various definitions in Table 1 indicate, the notion of business model is a highly complex one, as it involves heterogeneous elements with relatively little in common, except that they somehow collectively integrate the purpose of the company and its strategy. This heterogeneity of the business model construct does not allow generating a unified theory of business models (cf. Suddaby, 2010). However, adopting an organizational perspective, the various components of a business model can be "homogenized" into the

dimensions of content, structure and governance of transactions. Thus, our definition directly links the organizational aspects of transactions and relationships to the creation and capturing of value. Following this definition, a business model needs to specify (1) the content of the transactions (the set of elemental activities the company conducts, e.g. its value proposition), (2) the structure of the transactions (the organizational units performing those activities and the ways in which these units are linked), and (3) governance of the transactions (the mechanisms for controlling the organizational units and the linkages between the units) (cf. Zott & Amit, 2010; Santos et al., 2009).

Based on the different possible configurations of these business models elements, companies can design different business models to reflect their overall strategic choices. Examples of well-known business model “themes” include the “no-frills” model often found in the aviation industry (e.g. Ryanair) or the “customer-lock in” business model of Apple or Nespresso. With the increased adoption of open innovation practices, “open business models” have emerged as a new design theme (cf. Chesbrough, 2006). While there is a general understanding among business model scholars that business models need to be aligned with the company’s overall (innovation) strategy (Casadesus-Masanell & Ricart, 2010; Zott & Amit, 2008), little business model research has investigated how companies can realign their existing business models to accommodate open innovation practices. To this end, we briefly review the notions of open innovation and open business models in the next section and subsequently propose a contingency framework of open business models.

What is Open Innovation?

An influential and expanding stream of literature in innovation research argues that in the face of increasing global competition, rising R&D costs and shortening product life cycles, companies can no longer rely on the traditional model of closed innovation. Thus, increasingly they depend on accessing external sources of knowledge and collaborating with

individuals, companies and other organizations that possess relevant knowledge that may be deployed in the context of the company's innovation process (Rosenberg, 1982; Cohen & Levinthal, 1990; von Hippel, 1988, 2005; Chesbrough, 2003).

Collaborating with external knowledge partners has, to a large extent, been enabled by recent trends in information and network technologies that have led to decreased costs of knowledge dissemination, communication and coordination costs which make it easier for companies to find and access distributed knowledge from all over the world (Lakhani, Assaf & Tushman, 2012). Recognizing the fact that the appropriate knowledge required to solve innovation problems is both widely distributed and sticky leads many companies to adopt an open innovation model (Afuah & Tucci, 2012). Since Chesbrough (2003), many studies have contributed to a further clarification of the concept. Table 2 provides an overview of definitions of open innovation.

--- Insert Table 2 ---

These definitions illustrate three important points that are essential to our understanding of open innovation. First, open innovation studies are congruent with regard to their understanding of open innovation as a set of practices that facilitate both purposive inflows and outflows of knowledge; thus open innovation generally encompasses both inbound and outbound dimensions of innovation processes. While outbound open innovation refers to innovation activities to leverage existing technological capabilities outside the boundaries of the company, inbound open innovation relates to the internal use of external knowledge. Second, studies seem to agree that pursuing open innovation requires a certain degree of permeability of organizational and innovation process boundaries to guarantee successful innovation. Third, extant definitions of open innovation are kept broad, arguably to reflect what Huizingh (2011) calls the "appeal" of open innovation, namely that it provides the "umbrella that encompasses, connects and integrates a range of already existing activities"

(Huizingh, 2011, p.3). Thus, extant definitions are inclusive for different kinds of initiatives to fall under the category of open innovation. For example, various practices such as scanning the external environment for ideas, acquiring a technology on market basis, engaging in crowd sourcing, innovation contest, forming a joint venture, engaging in R&D alliances, licensing technology from a university and participating in broad networks to coordinate innovative activity fall, by definition, under the category of inbound open innovation (cf. van de Vrande, Lemmens & Vanhaverbeke, 2006; Petroni, Venturini & Verbano, 2011). We emphasise this point to clarify that inbound open innovation (the focus of this article) refers to a multitude of open innovation strategies, where different strategies might require different underlying business models.

Business Models for Open Innovation

Specifying the characteristics of business models for open innovation is an emerging theme in the open innovation literature. While the role of business models has been recognized in the context of appropriability regimes (cf. West, 2006) and as a tool to generate value from IP (cf. Chesbrough, 2003; Chesbrough & Schwartz, 2007), it is only recently that studies have begun to empirically address how companies need to redesign their business models so as to accommodate open innovation (cf. Hienerth et al., 2011; Storbacka, Frow, Nenonen & Payne, 2012). For example, in a study on user-innovation, Hienerth et al. (2011) find that engaging in co-creation requires a shift away from traditional business models and towards user-centric business models where users need to be managed as key resources—which requires redesigning key internal processes (such as R&D or marketing) to facilitate the participation of externals. Along similar lines, Storbacka et al. (2012), find that business models for co-creation need to be designed in such a way as to allow external parties to participate in the company's specific activities and to modify delivery processes in order to deal with the increased need for adaptation.

Another group of studies originating from organizational literature examines how companies need to realign their organizations so as to benefit from the integration of external knowledge sources. Albeit not explicitly studied under the business model framework, these studies provide valuable insight into how companies need to adapt the “structure” and “governance” dimensions of their business models as to accommodate open innovation. For example, the strong dependency on external sources of knowledge in the context of open innovation requires the development of complementary internal networks that facilitate accessing and integrating the acquired knowledge into the company’s innovation processes (Hansen & Nohria, 2004). Studies on innovation and organizational design illustrate that this internal reorganization might concern realigning the organizational structure as well as developing knowledge capabilities and new organizational practices as to positively influence the sourcing of knowledge from external parties and its subsequent exploitation for innovation. There is evidence that the organizational structure (e.g. specialization, hierarchical layers, etc.) needs to be designed in such a way as to accommodate the search behavior of companies as well as their ability to integrate and utilize external knowledge (Dahlander & Gann, 2010; Piller & Ihl, 2009). The establishment of open innovation business units (Kirschbaum, 2005), task forces and dedicated cross-functional teams (Huston & Sakkab, 2006) are found crucial to support open innovation practices of companies. Internal reorganization for open innovation also implies the assignment of new organizational roles, such as champions who lead the process of transition from closed to open innovation, or gatekeepers who manage the interface between the company and its external environment (Chiaroni, Chiesa & Frattini, 2010).

Moreover, open innovation requires the development of capabilities to manage the various knowledge processes such as knowledge exploitation, exploration and retention processes that take place between the companies and its environment (Zahra & George, 2002;

Jansen et al., 2005; Lane, Koka & Pathak, 2006; Foss et al., 2013). Notably, absorptive capacity is placed in a key mediating role between external knowledge and innovation. It supports the company in first, identifying and acquiring external know-how, and, second, transforming and incorporating the newly obtained knowledge into the company's existing knowledge base (Zahra & George, 2002; DeSanctis, Glass & Ensing, 2002; Tsai, 2001; Zahra & Nielsen, 2002).

Finally, to effectively harness the potential benefits of open innovation, companies need to employ various organizational and managerial practices such as extensive delegation, intensive lateral and vertical communication and rewards for knowledge sharing (Foss et al., 2011) and dedicated incentive systems for innovation, in-house research capacity and cross-functional collaboration between departments in the innovation processes (Salge et al., 2012) as to facilitate accessing and integrating knowledge residing outside the company's boundaries.

In sum, the literature on business model literature clearly indicates that companies can choose from a variety of business models (Zott & Amit, 2008; Santos et al., 2009)—that have to match the company's overall (innovation) strategy (Margretta, 2002; Casadesus-Masanell & Ricart, 2010). Relatedly, originating from organization and innovation management literature, an emerging research stream strongly suggest that companies that adopt open innovation practices need to carefully design the internal organizational aspects of their business models to positively influence the sourcing of knowledge from external parties and its subsequent exploitation for innovation (e.g., Foss et al., 2011, Salge et al., 2012; Hienerth et al., 2011; Keinz et al., 2012). However, while open innovation research illustrates the heterogeneity of open innovation practices (van de Vrande et al., 2006; Petroni et al., 2011), extant studies linking business models to open innovation do not discriminate between different open innovation strategies and thus do not theorize how different open innovation

strategies call for different supporting business models. This means that there is currently no contingency framework that helps us to precisely understand how open innovation strategies and business models need to be aligned.

A CONTINGENCY FRAMEWORK FOR OPEN BUSINESS MODELS

A Typology of Inbound Open Innovation Strategies

Inbound open innovation or external knowledge sourcing refers to the practice of establishing relationships with external organizations or individuals with the purpose of accessing their technical or scientific competencies for improving internal innovation performance (Chiaroni et al., 2010). By definition, inbound open innovation can range from inward-licensing of IP to crowd-sourcing to establishing R&D alliances. Thus, in the context of inbound open innovation, companies can access external knowledge sources by various means of collaborative and contractual agreements involving individuals, companies and other organizations that possess relevant knowledge to complement the company's internal R&D efforts (Arora & Gambardella, 1990; von Hippel, 2005). Thus, companies can choose to engage in a variety of open innovation practices that can differ with regard to the extent and the intensity to which companies rely on external sources of knowledge.

Given this heterogeneity in open innovation practices, the open innovation literature commonly differentiates inbound innovation strategies with regard to the “breadth” and “depth” of knowledge search.³ “Search openness” (Salge et al., 2012; Leiponen & Helfat, 2010; Laursen & Salter, 2006) or “breadth of knowledge search” (Amara & Landry, 2005) captures the diversity of a company's external sources of knowledge, often defined as the number of different types of external parties involved in the innovation processes of the

³ Other less common classifications include the division into “openness” of innovation process versus outcomes. For example, the innovation outcome can be closed (a proprietary innovation) while the process is opened up to allow for external knowledge input. Or, as in the case of open source settings, both the innovation process and outcomes are open (Hui zingh, 2011). Another classification differentiates between inbound innovations that are “pecuniary” versus “non-pecuniary” (Dahlander & Gann, 2010). While pecuniary inbound innovation refers to acquisitions of input to the innovation process through the market place, non-pecuniary inbound innovation refers to scanning of the external environment for novel ideas.

company. Crowd-sourcing is an example of an open innovation practice that relies on a diversity of external sources to provide knowledge input to its innovation activities. Here, the diversity of external sources, in terms of diverse backgrounds and skills, ensures a rich breadth of new ideas. “Depth” of knowledge search refers to the intensity with which companies draw knowledge from external sources and is often measured as the number of external partners that are deeply integrated into a company’s innovation activities (Leiponen & Helfat, 2010; Oerlemans & Knobens, 2010; Bahemia & Squire, 2010; Laursen & Salter, 2006). Deeply integrating external sources into the company’s innovation activities is required when innovations need to be jointly developed as in the case of R&D alliances. Consistent with recent literature, we differentiate inbound open innovation strategies with regard to the breadth and depth of external knowledge search. Figure 2 illustrates the resulting 2x2 matrix of inbound open innovation strategies.

--- Insert Figure 2 here ---

Market-based innovation strategy (low depth / low breadth). Companies in this category follow what we call a “market-based innovation strategy”, where knowledge input to the innovation process is acquired through the market. This open innovation strategy is characterized by low diversity in and low integration of external sources. Exemplary for this type of knowledge acquisition strategy are inward-licensing of IP, R&D outsourcing or the acquisitions of innovative small start-ups (Chesbrough, 2003; Ebersberger, Bloch, Herstadt & van de Velde, 2012; Dahlander & Gann, 2010). Companies are likely to pursue such a strategy in order to benefit from market-ready innovations, complementary resources or technological capabilities of external parties and thus to reduce development time and time to market. For example, R&D outsourcing is an emerging trend in the pharmaceutical industry and is expected to transform the traditional model of drug discovery (Chesbrough & Crowther, 2006). Further, when competitive pressures require a quick response, companies

acquire a market-ready idea in the form of a small company. Examples include Procter & Gamble's acquisition of the small company that invented the SpinBrush electric tooth brush, which became a critical and successful component of P&G's oral-care business, or the acquisition of Skype by Microsoft to accelerate Microsoft's innovation in communications.

Crowd-based innovation strategy (low depth/ high breadth). Companies in this category follow a "crowd-based innovation strategy" where knowledge input is sourced from a larger number of actors. Enabled by "digitization" (Baldwin & Clark, 2000), and low communication costs, companies can access the distributed knowledge of external individuals or communities without resorting to traditional means of backwards or forwards integration (Lakhani, Assaf & Tushman, 2012, p.6). Crowd-sourcing is the act of outsourcing a task to a "crowd" rather than to a designated agent as in the case of the market-based innovation strategy. Crowd-sourcing practices can range from innovation contests to engaging with user communities (Howe, 2008). The underlying assumption is that the collective intelligence of a larger group of people exceeds that of a few, both in terms of ideas and knowledge (Surowiecki, 2005).

Collaborative innovation strategy (high depth / low breadth). Companies in this category rely on a "collaborative innovation strategy" by entering into collaborative agreements with a few knowledge-intensive partners, such as lead- users (von Hippel, 2005; Simard & West, 2006), universities and research institutes (Perkmann & Walsh, 2007) or other companies (EmdenGrand, Calatone & Droge 2006; van de Vrande et al., 2006). Deeply integrating external partners into the company's innovation processes ensures the close and frequent interactions between partners and the development of mutual trust that eases the transfer of tacit knowledge across organizational boundaries (Dyer & Nobeoka, 2000; Hansen, 1999; Lane, Salk & Lyles, 2001).

Network-based innovation strategy (high depth / high breadth). Similar to the “collaborative innovation strategy,” companies in this category deeply integrate external partners to ensure the effective joint development of knowledge. However, as the required knowledge is widely distributed outside the company’s organizational boundaries, the company can engage in what we call a “network-based innovation strategy” by engaging and maintaining a network of relationships with various external partners. The company becomes part of a larger innovation ecosystem consisting of individuals, communities and other organizations (Keinz et al., 2012).

In sum, in market-based innovation and crowd-based innovation strategies, the company sources ready available knowledge from external parties. The difference between these two strategies is the breadth of knowledge search. While in market-based innovation the company chooses one designated knowledge supplier, crowd-sourcing relies on the input of a large and heterogeneous pool of knowledge holders (individuals, experts, suppliers). In contrast to the market-based and crowd-based innovation strategies, in collaborative and network-based innovation strategies the innovation is developed closely with external partners, where the collaborative strategy relies either on individuals (e.g. lead-users) or another organization (company, university) and the network strategy integrates a variety of external sources (individuals, communities, organizations) into its innovation processes for the purpose of joint innovation development.

Matching Business Model Design to Open Innovation Strategies

Based on the conceptualization of the business model discussed earlier in this article, we argue that pursuing open innovation is likely to affect a company’s business model with respect to (1) the content (the set of elemental activities of the company) (2) the structure (the organizational units involved and the ways in which these units are linked); and (3) governance (the mechanisms for controlling the organizational units and the linkages between

the units). For example, open innovation can affect the “content” dimension of the business model as co-creating innovation with external partners may lead to a new value proposition and thus alter the set of elemental activities which the company performs. Open innovation can further affect the “structure” dimension of companies’ business model as integrating external knowledge sources into the company’s innovation processes may change the linkages between organizational units and the role they play in the company's (innovation) activities. Moreover, some forms of open innovation may require alterations to the “governance” dimension of the business model, as collaborating with external knowledge partners changes the way linkages are governed within the company and between the company and its stakeholders. In the following, we analyse the effects of different open innovation strategies on business models along these three dimensions.

Designing business model for market-based innovation strategy. Adopting a market-based innovation strategy, the company acquires the “solution” to its innovation problem from a selected knowledge supplier on market basis (e.g., by means of licensing IP, R&D outsourcing or acquisition). This strategy affects the company's business model content, structure and governance in the following ways.

Change in business model content. Adopting a market-based innovation strategy, the company can achieve significant reductions in transaction costs. In comparison to collaboration or network-based innovation strategies, the acquisition of knowledge through the market or by means of internalization can lead to a reduction in complexity, uncertainty and information asymmetry as well as to a reduction in coordination costs (cf. Williamson, 1975; Milgrom & Roberts, 1992). This allows the company to attain greater efficiency, innovate faster and hereby reduce time to market, which in turn creates additional value for customers. Furthermore, as compared to in-house or joint development of a new technology, sourcing readily-available technologies can significantly reduce development costs, hence

providing a greater potential for value capture. Hence, adopting a market-based innovation strategy can result in a more efficiency-oriented business model, where the company can enjoy greater potential for value creation and value capture.

Change in business model structure. Sourcing readily-available knowledge as part of a market-based innovation strategy can complement the company's internal R&D efforts or replace them (to a large extent) entirely. Moving (parts of the) R&D activities outside of the organizational boundaries, this strategy affects the structure of the business model by redefining the way the internal R&D organization works and how it is linked to other intra- and extra-organizational units. For example, as Petroni et al. (2011) show, companies relying on acquiring external sources of knowledge and technology need to centralize the main technological innovation programs and increase the coordination responsibilities of the corporate R&D laboratories. As adopting external technologies often requires adapting and developing them, several different business units may need to be involved, and thus central technology intelligence and monitoring structures need to be set up. Hence, by adopting a market-based innovation strategy, the company's business model structure becomes increasingly dependent on the supply and integration of market-available knowledge and technology, which in turn reduces the role of internal R&D systems as knowledge producers while expanding that of scouting and integrating knowledge that originates outside the company.

Change in business model governance. Essential to accommodate this strategy effectively, is the design of new organizational roles that support the company in assessing which innovation activities need to be outsourced, evaluating externally developed ideas and technologies, and selecting the right knowledge supplier for its innovation-related tasks (Teirlinck, Dumont & Spithoven, 2010; Dahlander & Gann, 2010; Spithoven, Clarysse & Knockaert, 2010). Hence, to allow for the effective scouting and integration of external

knowledge and technologies, traditional roles of R&D personnel need to be redefined or new roles created. In particular, R&D personnel need to gain expertise that enables them to communicate and interact with researchers and managers from other industrial sectors. To this end, new professional figures are emerging. For example, in a case study on Procter & Gamble, Dodgson, Gann and Salter (2006) highlight the new role of so-called "T-Men" which act as integration experts who are responsible to select and integrate external knowledge. These individuals are capable of integrating scientific and technological knowledge with managerial competence. With a scientific-technical background, they are able to assess the value of and potential of new external technologies against the innovation needs of the focal company.

In sum, we propose that the company needs to design a business model that is attuned with its market-based innovation strategy. This business model is then characterized by an efficiency-oriented value proposition, an increased reliance on external knowledge acquisition and a reduced role of internal R&D systems (i.e., "efficiency-centric open business model").

Designing business model for crowd-based innovation strategy. Adopting a crowd-based innovation strategy, the company draws on a diversity of knowledge sources to solve its innovation-related tasks. This affects the company's business model in the following ways.

Change in business model content. Common crowd-sourcing practices involve launching innovation contests to groups of potential problem-solvers to work on a specific problem and to submit adequate solutions. These often consists of users or experts (e.g. scientists), which have highly heterogeneous backgrounds and skills to ensure a rich breadth of new ideas. The company then chooses the best solution for the purpose of commercializing it and awards the submitter of the winning solution a price (Terwiesch & Ulrich, 2009). Other crowd-sourcing methods involve engaging in supplier and academic innovation networks or communities to scan for and absorb novel ideas to improve the company's innovation

leadership.⁴ If successful, a crowd-sourcing strategy can result in a new offer to the market, which builds on and caters directly to the needs of its customers. For example, at Made.com, a UK-based furniture retailer, a visitor to the website can submit their furniture designs, and members of the community vote for the winning design which is then made available for order.⁵ Thus, by adopting a crowd-sourcing strategy, the company can create additional value by offering a user-oriented value proposition that is customised for and co-created by the community of users that helped shape the innovation.

Change in business model structure. Crowd-sourcing practices are generally aimed at the ideation phase of the innovation process in order gain inspiration for new product ideas, to solve a particular technical problem or to uncover new market trends, and thus the core innovation processes such as innovation prototyping, development and commercialisation are likely to remain in-house and thus unchanged. However, adopting a crowd-based innovation strategy, user communities and their interactions with the company become an integral part of the company's business model structure, which requires new governance modes as described below.

Change in business model governance. New governance forms need to be introduced into the company's business model to support the company's crowd-based innovation strategy. On the one hand, the company needs to provide monetary or non-monetary rewards for external participants to entice potential contributions.⁶ On the other hand, the company needs

⁴ For example, the global skin care company Beiersdorf launched the “Pearlfinder innovation network”, where the company set up and manages a proprietary, web-based hub-and-spoke innovation network for its existing innovation partners. As compared to innovation contests, this network presents a confidential and protected environment where innovation partners can access Beiersdorf’s confidential scientific challenges and propose solutions that may lead to joint collaborations. In this manner, Beiersdorf can scan its existing network of innovation partners for novel insight.

⁵ <http://www.ideaconnection.com/open-innovation-success/Crowdsourcing-is-Shaking-Up-the-Business-Model-00237.html>

⁶ For example, the global health care company Eli Lilly launched its PD2 initiative, where Eli Lilly funds and tests submitted proposals by external innovators, while the latter hold all intellectual property rights. However, Eli Lilly maintains the right to be the first to discuss commercialization opportunities for promises approaches. If no agreement is attained, the external innovator receives the complete documentation without any legal bindings and is free to search for another commercialization opportunity (Mattes, 2011).

to provide incentives for its own employees to involve them in the open innovation initiative. Often employees resist such initiatives out of the fear of losing competencies and responsibilities. To entice employee's and management interest in the innovation contest as well as to overcome the not-invented-here attitude, Keinz et al. (2012, p.17) stress the importance of incentive systems that build on the outcome of the crowd-sourcing activity.

Further, an important challenge in crowd-sourcing is the vast amount of information that needs to be assessed and organized, requiring new organizational capabilities and practices. For instance, the company needs to ensure that the contest is broadcasted in the right way as to increase the share of useful contributions as well as to ensure that the initiative is accepted by its employees. As some companies lack the competencies in how to formulate and broadcast the challenge effectively (Jeppesen & Lakhani, 2010) companies can rely on "innovation brokers", which provide and manage a platform for the innovation contests (Marjanovic, Fry & Chataway, 2012).

In sum, to support a crowd-based innovation strategy, the company needs to design its business model accordingly. The main value driver of this type of business model is the offering of a value proposition tailored for and co-created by the community of users that helped shape the innovation. Hence, user communities and the management thereof become an important part of the company's business model, leading to the design of "user-centric open business model".

Designing business model for collaborative innovation strategy. Adopting a collaborative innovation strategy, the company chooses a designated knowledge partner for mutual development of the innovation, requiring close interaction and collaboration to facilitate the transfer and sharing of tacit knowledge between the parties. Examples include establishing R&D alliances with a knowledge-intensive partner or involving lead-users in co-creation processes (von Hippel, 2005).

Change in business model content. Commonly, these types of collaborative innovation are established for the reason of generating novel and disruptive innovations, which can result in new value offerings, often targeted at creating new markets. For example, Nestlé is an example of a company which systematically engages in collaborative innovation that results in new value offerings. Nestlé was able to substantially extend the scope of its innovation portfolio by establishing an orchestrated series of R&D alliances with companies such as BASF, DSM, DuPont and Tetra Pak. As Mattes (2011) reports, “in less than 3 years, these joint developments have contributed to more than USD 200 million worth of new business” (p.19). Another widely-adopted collaborative open innovation practice is the use of the lead-user method for the purpose of co-developing innovative products and services. The lead-user method is a systematic approach to identify and involve a special group of highly advanced and progressive users into corporate innovation processes for the purpose of generating radically new innovations (von Hippel. 2005). As lead-user generated innovations tend to be more radical than innovations developed in-house (Lilien, Morrison, Searls, Sonnack & Hippel. 2002; Lüthje & Herstatt, 2004), they result in a high market potential but low technology feasibility (Keinz et al., 2012). This affects the content dimension of the company’ business model, as it changes the way the customer is satisfied by offering a new value proposition (Hienerth et al., 2011) or even targeting a new customer segment.

Change in business model structure. Further, adopting a collaborative innovation strategy is likely to affect the structure dimensions of companies’ business models as it requires establishing formal linkages with external partners for the purpose of co-creating innovation. Research and development functions that were formerly conducted within the organization become shared activities between the focal company and its collaborators, as in the case of R&D alliances with knowledge-intensive partners or involving lead-users in co-creation processes. For example, Apple enters into a R&D alliance with its LDC manufacturer

to secure its leadership in advanced low-temperature polysilicon display technology, which enables high resolution in small displays. To this end, Apple closely integrated "its supplier into in the design and development phases and invested in the supplier's production capacities in order to secure future supplies" (Mattes, 2011, p.20). Hence, external partners become key assets in companies' innovative activities and business model structure and need be managed accordingly.

Change in business model governance. An important condition in this respect is that collaborative innovation strategies involve the mutual exchange of knowledge between the parties. This implies that the company needs to develop new skills and processes that govern the interactions between its internal employees with external parties. For collaborations with other organizations (companies, universities, etc.), the development of "alliance capability" or "alliance competence" is highly recommended, allowing the company to manage its relationships with external partners in an institutionalized and knowledgeable way (Lambe, Spekman & Hunt, 2002; Harbison & Pekar, 1997; Kale, Dyer & Singh, 2002). For collaborations with lead-users, Keinz et al. (2012) emphasize the importance of developing competencies with regard to identifying lead-users and moderating lead-user workshops. As lead-users themselves are the most crucial success factor in lead-user projects, it becomes essential to select the right lead-user for the company's innovation projects, engage with lead users in special workshops and to provide the appropriate incentives for lead-users to participate in the project (von Hippel, Franke & Prügl. 2009; Keinz et al., 2012). Further, psychological barriers, such as the not-invented-here syndrome as well as the fear of having to fulfill new tasks in addition to the daily work, can cause employees to resist engaging with lead-users. Appropriate incentive systems are crucial in this regard (Keinz et al., 2012).

In sum, adopting a collaborative innovation strategy, the company's business model is centered on the development and delivery of often disruptive innovations and/or the creation

of new target markets. The mutual, long-term development of knowledge and technologies are key to this type of “collaborative open business model”.

Designing business model for network-based innovation strategy. Companies that adopt this network-based innovation strategy rely on a large number of heterogeneous, external partners that are all deeply integrated into the company’s innovation activities. The high diversity of knowledge sources combined with a deep integration of these sources into the company’s innovation activities allows the company to benefit from a rich breadth of ideas as well as to establish close linkages with its external partners.

Change in business model content. Adopting a network-based innovation strategy, the company’s business model acts as an open innovation platform, which connects the focal company with individuals, communities and other organizations for the purpose of joint co-development of innovations. One example is Apple’s iPhone application store that provides third-party developers with a virtual marketplace for end-users. Given the complexity in managing this platform and the diverse set of external parties involved, this innovation strategy gives rise to the most fundamental changes in company’s business models as compared to the three aforementioned open innovation strategies.

Change in business model structure. Adopting this type of open innovation strategy combines the challenges of all previous mentioned strategies, namely the need to search and identify external knowledge sources, adopting and integrating external ideas and technologies in the company’s innovation processes as well as the challenges associated with managing and interacting with external parties. Thus, the structure and governance dimensions of companies’ business models need to be aligned accordingly. Given the diversity and large number of external knowledge parties, there are strong needs to develop complementary internal networks to smoothly integrate externally acquired knowledge (Hansen & Nohria,

2004), and to ensure a strong championship for the open innovation process (Chesbrough & Crowther, 2006).

Change in business model governance. Moreover, there is a need to introduce a reward system which is geared to promoting the efforts of employees toward the achievement of open, collaborative outcomes (Chesbrough, 2003). Traditional reward systems are not geared to rewarding these kinds of efforts, and companies will have to experiment with setting up and running such systems. In sum, this type of open business model needs to encompass the establishment of dedicated units or sub-units devoted to the implementation of open innovation (Kirschbaum, 2005), organizational procedures used to screen, select and integrate new business opportunities and ideas coming from both internal and external sources as well as rewarding and incentive mechanisms for assessing of the effort devoted to open innovation (Salge et al., 2012; Foss et al., 2011, 2013). Procter & Gamble is an interesting case of a company that has become a champion of open innovation practices. As Dodgson et al., (2006) and Huston and Sakkab (2006) illustrate, Procter & Gamble has set up new organizational roles and practices to facilitate the screening, identification and evaluation of external sources of knowledge. For example, Procter & Gamble has created new professional figures, such as integration experts that are able to effectively acquire scientific and technological knowledge from the sources external to the company and successfully use it in new products and processes. Integration experts are able to communicate and interact with researchers and managers from other industrial sectors, as well as facilitate the integration of external knowledge within the organizational across different units (Dodgson et al. 2006).

In sum, adopting a network-based innovation strategy, the company designs a business model that acts as an open innovation platform for a multitude of knowledge partners (i.e. “open platform business model”).

A Continuum of Open Business Models

As illustrated, there are considerable differences in the effects of different open innovation strategies on companies' business models. These effects are different with respect to:

1. the main drivers of value creation of the company's business model (i.e. the content dimension); for example, while by adopting a market-based innovation strategy the company creates value by reducing transaction and coordination costs, crowd-based innovation allows the company to create value by offering user-oriented value propositions.
2. the extent to which the business model needs to undergo repartitioning or relinking of activities and linkages to allow for the joint development of knowledge (i.e. the structure dimension); for example, higher degree of integration calls for managing external sources as key assets in the business models (lead users, alliance partners); and
3. the extent and design of governance mechanisms to facilitate the accessing and integration of external knowledge, for example, the deeper external sources are integrated into the company's innovation activities, the higher the need for providing incentives for employees to interact and share knowledge with external parties.

These differences can be further understood and illustrated along a continuum of open business models, that is, different open innovation strategies require different levels of “openness” in companies' business models. Figure 3 displays a continuum of “openness” along the dimensions of business model content, structure and governance.

--- Insert Figure 3 here ---

Firstly, different open innovation strategies require different levels of co-creation in business model content. Hence, we conceptualize the openness of business model *content* as a function of the level of co-creation needed for the company's innovative activities and value creation. For example, in an efficiency-centric open business model, the company sources

readily-available knowledge with little potential for co-creation of knowledge between the focal company and the external knowledge provider. In the case of a user-centric open business model, the potential for co-creation increases, as the company is able to integrate the ideas of user communities into its value proposition, and hereby create additional value. In the case of collaborative open business model, the potential for co-creation rises higher, as knowledge and technologies are jointly developed. Finally, an open platform business model creates the highest potential for co-creation, resulting in a business model that acts as an open innovation platform for a multitude of different stakeholders.

Secondly, different open innovation strategies require different levels of permeability in the company's business model structure. Hence, we understand openness of business model *structure* as a function of the type of knowledge flow between the focal company and its external knowledge provider(s) (which in turn determines the degree of permeability of the business model structure). In efficiency- and user-centric open business models, knowledge flows are largely unilateral. Hence, the business model structure needs to allow only for the inflow and integration of external knowledge into the company's internal R&D system. In contrast, in collaborative open business model, knowledge flows are dyadic and knowledge needs to be developed jointly, hence requiring a higher degree of permeability. The level of permeability of the company's business model structure needs to be the greatest in case of open platform business models, as knowledge flows are multilateral between varieties of knowledge partners.

Finally, different open innovation strategies require different levels of collaborative capability as integral part of the company's business model governance. Hence, we capture the openness of the *governance* dimension as a function of the degree to which the company needs to develop collaborative capability to govern its interactions with external knowledge providers. For example, while in efficiency- and user-centric open business models, the

company has to offer appropriate incentive systems to overcome the “not-invented-here syndrome” as well as to develop capabilities in identifying and integrating external knowledge, collaborative and open platform business models require the development of collaborative capabilities that are geared towards mutual knowledge exchange and development as well as managing long-term partnerships.

Notwithstanding these differences, there are a number of similarities common to all open business models that companies need to take into account when designing open business models. As all open innovation strategies are aimed at complementing internal R&D efforts with external knowledge input, open business models are similar in the respect that they must facilitate the inflow and integration of external knowledge into the company’s innovation activities. Further, open innovation strategies have some shared organizational effects that call for similar responses. For example, the adoption of open innovation strategies is likely to evoke fear among the companies’ employees of losing competences, responsibility or even job loss as well as the often-cited “not-invented-here” syndrome. Thus, all open business models must include appropriate incentives and control mechanisms to reduce fear and increase the involvement and commitment of employees for the open innovation practices of the company. As such, all open business models must encompass (1) the search processes to identify external knowledge sources, (2) provide incentives for external sources to contribute knowledge input, (3) provide incentives for own employees to interact with external parties, and (4) provide sufficient absorptive capacity to integrate external knowledge input. Table 3 summarizes our arguments.

--- Insert Table 3 here ---

CONCLUDING DISCUSSION

In line with organizational literature (Galbraith, 1974; Burton & Obel, 2003), our contingency model underscores the importance of aligning the internal organizational aspects of companies with their business models to accommodate open innovation. Consistent with previous studies, we argue that open business models must allow for a certain degree of organizational permeability to facilitate the in- and outflow of knowledge across organizational boundaries (e.g., Chesbrough, 2006). And consistent with literature, we emphasize the importance of governance mechanisms and organizational practices that positively influence the integration of external knowledge. However, reaching beyond extant literature, our contingency framework offers three important insights:

First, different open innovation strategies do in fact require different business models. While the importance of aligning business models to open innovation has been previously established (cf. Hienerth et al., 2011; Chesbrough, 2006), this article is the first to systematically examine the effect of different open innovation strategies on the design of business models.

Second, the extent of business model reconfiguration varies with different open innovation strategies. Certain open innovation strategies require more fundamental restructuring of business models as compared to other open innovation strategies and result in different degrees of openness of the business model.

Third, we find that strategies characterized by high diversity in knowledge sources require business models which are geared towards handling a vast amount of information. Governance mechanisms need to be in place that can help to organize and manage the vast amount of information. In contrast, strategies that involve the deep integration of external sources into the company's innovation activities require business models which are designed to allow for the close collaboration with external partners and facilitate the mutual exchange of knowledge between partners.

These three insights have an important theoretical implication, namely that business models are important moderating variables that influence the relationship between open innovation strategies and innovation outcomes. This implies a shift away from earlier work that considered open innovation characteristics as main determinant of performance. This is crucial because it allow companies to actively influence the outcome of their open innovation initiate. For example, earlier work found a curvilinear relationship between openness and performance (Laursen & Salter, 2006; Leiponen & Helfat, 2010), as the initial benefits of openness diminish due to resource allocation problems and information overload. For example, maintaining deep relations with external partners require high investments in terms of time consuming and frequent face-to face interactions as well as higher coordination efforts. However, by adopting business models that provide appropriate structure and governance mechanisms (e.g. incentives, absorptive capacity), the company can counteract these effects and positively influence the integration of external knowledge. Further, the contingency framework integrates the various elements of business models (content, structure, governance) which have previously been treated separately in organization and open innovation literature. This has allowed us to systematically examine the effects of different open innovation strategies on business models, a topic that so far had received little attention in open innovation literature.

It is clear that the framework outlined in this article requires additional work, both conceptual/theory and empirical. First, tests of our contingency framework need to take into account a dynamic element. The level of maturity, in terms of age and experience, may play an important role in the adoption and design of open business models. For example, while younger firms may have more flexibility and therefore be better capable of matching internal organization and open innovation strategy, more mature companies with more experience in open innovation, may better understand the organizational requirements of open innovation

strategies. Hence, further research into the antecedents and dynamics of open business model is required.

Second, it is certainly possible to offer more fine-grained insight into, for example, how governance mechanisms differ across business models in response to the adoption of different open innovation strategies. Third, our contingency model asserts, like all contingency models, that organizational elements appear in discrete configurations. Thus, we have argued that the elements of content, structure and governance that constitute business models are tightly linked in their support of different innovation strategies. However, while such reasoning is supported by extant organizational theory, there is an obvious need to confront it with empirical reality. It is conceivable that the organizational elements are not that tightly coupled, so that a given business model may support different open innovation strategies. Our main purpose in this article, however, has been to develop *apriori* theory on business model-open innovation strategy fit.

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Figure 1: Research model

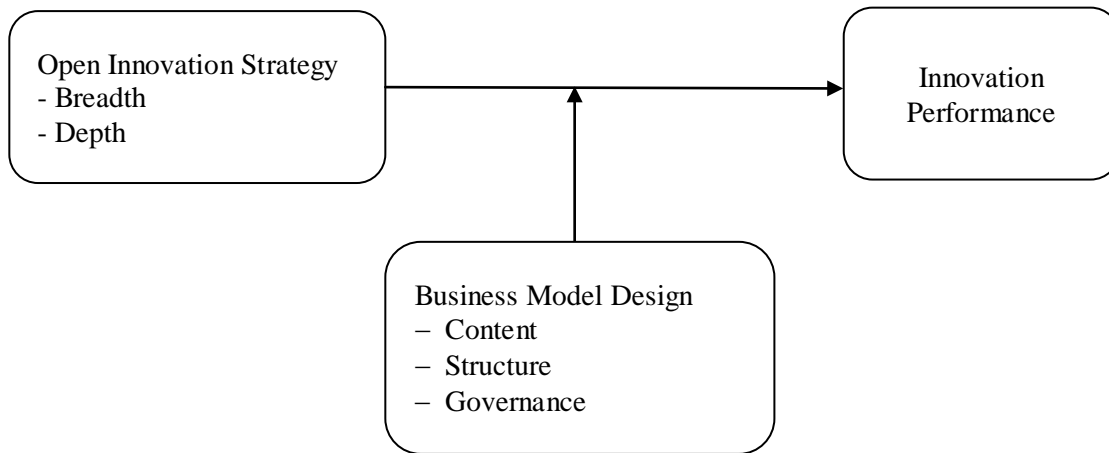


Figure 2: Typology of inbound open innovation strategies

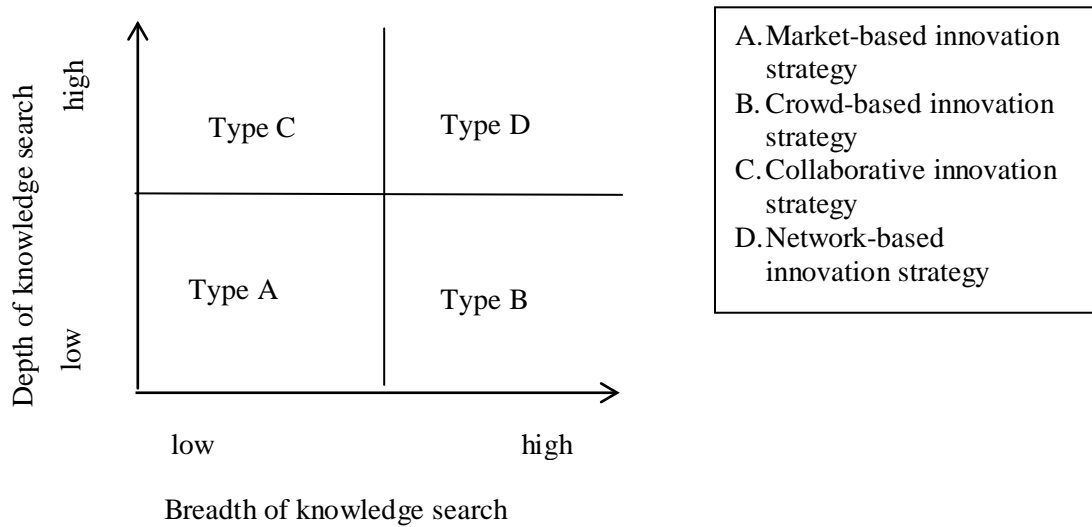


Figure 3: Continuum of open business models

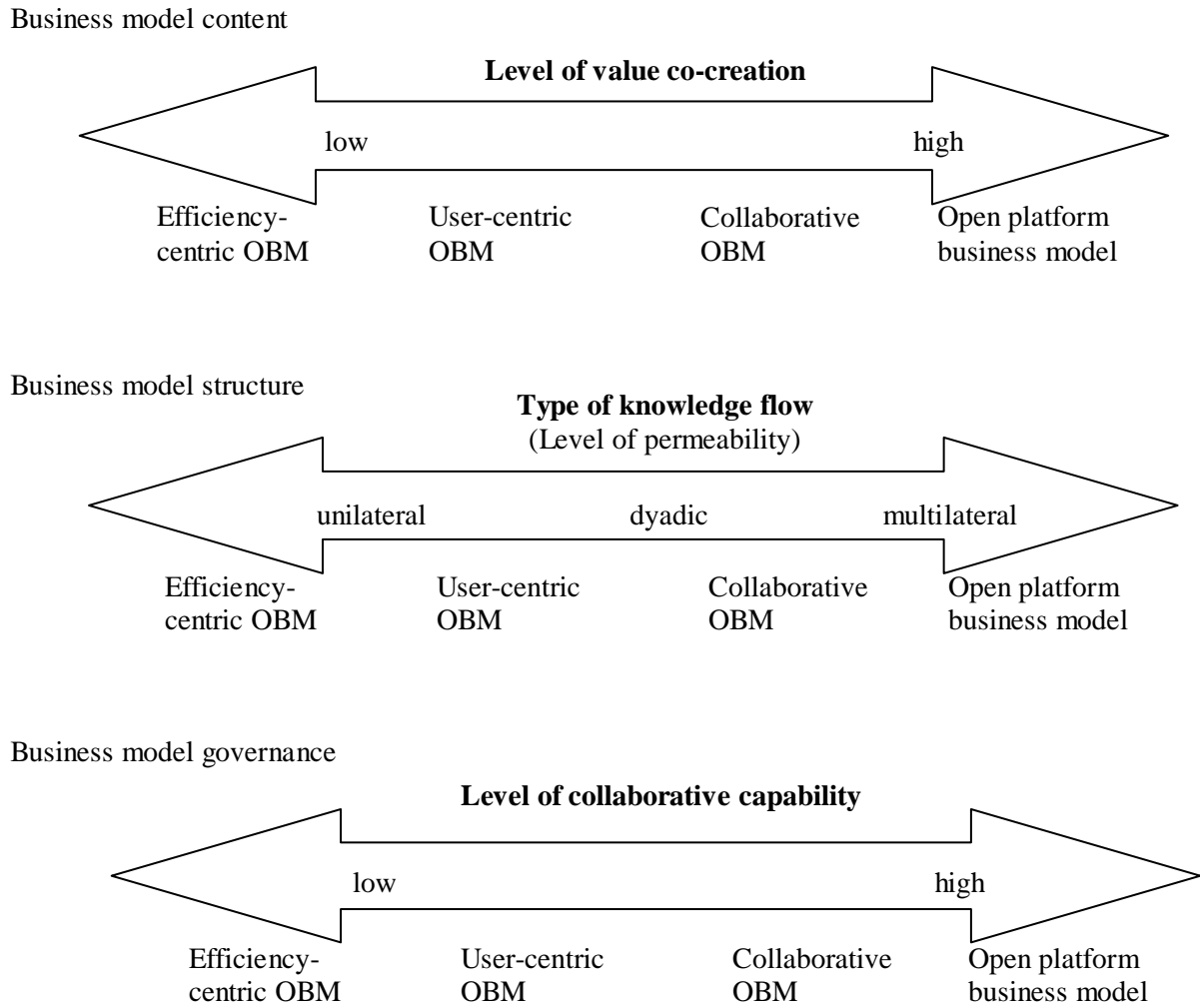


Table 1: A selection of business model definitions (chronologically)

Authors (Year)	Definition of business model	Business model elements
Timmers (1998, p.4)	“an architecture for the product, service and information flows, including the various business actors and a description of the sources of revenues”	<i>n.a.</i>
Mahadevan (2000, p.59)	“a unique blend of three streams that are critical to the business. These include the value stream for the business partners and the buyers, the revenue stream, and the logistical stream”	<i>n.a.</i>
Linder & Cantrell (2000, p.1)	“the organization’s core logic for creating value. The business model for a profit-oriented enterprise explains how it makes money.”	<i>n.a.</i>
Amit & Zott (2001, p.4)	“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.	<ul style="list-style-type: none"> • Content of transactions • Structure of transactions • Governance of transactions • Value creation design
Bienstock, Gillenson & Sanders (2002, p.174)	“the way we make money”	<i>n.a.</i>
Chesbrough & Rosenbloom (2002, p.532)	“The business model provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and markets into economic inputs. The business model is thus conceived as a focusing device that mediates between technology development and economic value creation.”	<ul style="list-style-type: none"> • Value proposition • Market segment • Structure of value chain • Cost structure and profit potential • Position within value network • Competitive strategy
Magretta (2002, p.4)	“The business model tells a logical story explaining who your customers are, what they value, and how you will make money in providing them that value.”	<ul style="list-style-type: none"> • Customer definition • Value to customer • Revenue logic • Economic logic
Osterwalder <i>et al.</i> (2005, p.17)	“A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating,	<ul style="list-style-type: none"> • Value proposition • Target customer • Distribution channel

	marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.”	<ul style="list-style-type: none"> • Relationship • Value configuration • Core competency • Partner network • Cost structure • Revenue model
Shafer <i>et al.</i> (2005, p.202)	“Business is fundamentally concerned with creating value and capturing returns from that value, and a model is simply a representation of reality. We define a business model as a representation of a firm’s underlying core logic and strategic choices for creating and capturing value within a value network.”	<ul style="list-style-type: none"> • Strategic choices (e.g. customer, value proposition, capabilities, pricing, competitors, offering, strategy) • Create value (incl. resources/assets, processes/activities) • Capture value (incl. cost, financial aspects, profit) • Value network
Tikkanen <i>et al.</i> (2005, p. 792)	“We define the business model of a firm as a system manifested in the components and related material and cognitive aspects. Key components of the business model include the company’s network of relationships, operations embodied in the company’s business processes and resource base, and the finance and accounting concepts of the company.”	<ul style="list-style-type: none"> • Material aspects: strategy & structure, network, operations, finance & accounting • Belief system: reputational rankings, industry recipe, boundary beliefs, products
Voelpel <i>et al.</i> (2005, pp.261-262)	“The particular business concept (or way of doing business) as reflected by the business’s <i>core value proposition(s) for customers</i> ; its <i>configured value network(s)</i> to provide that value, consisting of <i>own</i> strategic capabilities as well as <i>other</i> (e.g.outsourced/allianced) value networks and capabilities; and its <i>leadership and governance enabling capabilities</i> to continually sustain and reinvent reinvent itself and satisfy the multiple objectives of its various stakeholders (including shareholders).”	<ul style="list-style-type: none"> • Customer value propositions • Value network configuration • Sustainable returns for stakeholders
Chesbrough (2007, p.12)	“The business model performs two important functions: value creation and value capture. First, it defines a series of activities, from procuring raw materials to satisfying the final consumer, which will yield a new product or service in such a way that there is net value created throughout the various activities. Second, a business model captures value from a portion of those activities for the firm developing and operating it.”	<ul style="list-style-type: none"> • Value proposition • Target market • Value chain • Revenue mechanism • Value network or ecosystem • Competitive strategy

<p>Johnson, Christensen & Kagermann (2008, p.52)</p>	<p>A business model consists of four interlocking elements (customer value proposition, profit formula, key resources, key processes) that taken together create and deliver value.</p>	<ul style="list-style-type: none"> • Customer value proposition (incl. target customer, job to be done, offering) • Profit formula (incl. revenue model, cost structure, margin model, resource velocity) • Key resources • Key processes (incl. metrics, rules & norms)
<p>Zott & Amit (2010, p.219)</p>	<p>“We have defined the business model as depicting the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities”</p>	<ul style="list-style-type: none"> • Structure of transactions • Content of transactions • Governance of transactions
<p>Santos, Spector & van der Heyden (2009, p.11)</p>	<p>“A business model is a configuration of activities and of the organizational units that perform those activities both within and outside the firm designed to create value in the production (and delivery) of a specific product/market set.”</p>	<ul style="list-style-type: none"> • A set of elemental activities • A set of organizational units performing the activities • A set of linkages between the activities • A set of governance mechanisms for controlling the organizational units and the linkages between the units





Source: Adapted from Zott, Amit and Massa (2011) and Nenonen and Storbacka (2010)

Table 2: Selected definitions of open innovation

Study (Year)	Definition of open innovation
Chesbrough (2006, p.1)	"Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology."
Gassmann & Enkel (2004, p. 2)	"Open innovation means that the company needs to open up its solid boundaries to let valuable knowledge flow in from the outside in order to create opportunities for cooperative innovation processes with partners, customers and/or suppliers. It also includes the exploitation of ideas and IP in order to bring them to market faster than competitors can."
Dittrich & Duysters (2007, p. 512)	"The system is referred to as open because the boundaries of the product development funnel are permeable. Some ideas from innovation projects are initiated by other parties before entering the internal funnel; other projects leave the funnel and are further developed by other parties."
Perkmann & Walsh (2007, p. 259)	"This means that innovation can be regarded as resulting from distributed inter-organizational networks, rather than from single firms."
West & Gallagher (2006, p. 320)	"We define open innovation as systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels."
Terwiesch & Xu (2008, p. 1529)	"There exist a rapidly growing number of innovation processes that rely on the outside world to create opportunities and then select the best from among these alternatives for further development. This approach is often referred to as open innovation."

Source: Adapted from Gianiodis, Ellis and Secchi (2010)

Table 3: A contingency framework for open business models

	Four Open Innovation Strategies			
	Market-based innovation strategy 	Crowd-based innovation strategy 	Collaborative innovation strategy 	Network-based innovation strategy 
Business model dimensions	Efficiency-centric open business model	User-centric open business model	Collaborative open business model	Open platform business model
Content	<ul style="list-style-type: none"> ▪ Efficiency-centered value proposition, enabled by reduction in transaction and coordination costs 	<ul style="list-style-type: none"> ▪ User-centered value proposition, input from communities of users 	<ul style="list-style-type: none"> ▪ Radical innovations and opening up of new target segment 	<ul style="list-style-type: none"> ▪ Business model acts as open-innovation platform for multiple stakeholders
Structure	<ul style="list-style-type: none"> ▪ Redefinition of role of internal R&D system ▪ Efficiency-centered structure 	<ul style="list-style-type: none"> ▪ Ideation phase of innovation process "outsourced" to the crowd 	<ul style="list-style-type: none"> ▪ Users / suppliers / customers / competitors become key partner in innovation process 	<ul style="list-style-type: none"> ▪ Re-organization of the production & distributional system ▪ Need for complementary internal network
Governance	<ul style="list-style-type: none"> ▪ Monetary remuneration for external knowledge provider ▪ Use of "integration experts" to absorb market-available knowledge 	<ul style="list-style-type: none"> ▪ Monetary prizes or recognition for external knowledge providers ▪ Incentives to engage and manage communities of users for own employees 	<ul style="list-style-type: none"> ▪ Contract based, sharing of rewards on organizational level with external knowledge provider ▪ Incentives for own employees to engage with lead users and alliance partners 	<ul style="list-style-type: none"> ▪ Provide incentives for own employees to engage with multitude of knowledge partners (individuals, companies, communities) ▪ Re-distribution of risks & rewards

Source: the authors