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Network configuration, customer centricity, and performance of open business models: A solution provider perspective

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ABSTRACT

While research has shown a positive impact of open business models on value creation, it has remained silent on the configuration of the corresponding partner networks and their effect on performance. Studying three cases of solution providers which involve external service partners for solution delivery, we find that solution customer centricity – the degree to which the focal firm focuses on solution customers in the joint delivery of solutions – moderates the relationship between partner networks and open business model performance. For open business models with low solution customer centricity, a network configuration characterized by many weak ties to service partners leads to superior performance. Conversely, for open business models with high solution customer centricity, few but strong ties to partners lead to superior performance. Based on these findings, three ideal configurations of networks for open business models are derived: the controlled, the joint, and the supported model.

The findings of this paper are especially relevant for managers of product-focused firms who seek guidance in evolving their business models into solution providers. The paper also contributes to business model research by linking extant insights from network research to open business model performance.

1. Introduction

Increasing specialization and division of labor in today's economy have led to the emergence of open business models in many industries. One instance of these business models are firms which rely on external service providers in delivering integrated solutions. While the business model, in general, illustrates the logic of how firms create and capture value (Chesbrough & Rosenbloom, 2002; Mason & Spring, 2011; Teece, 2010; Zott & Amit, 2009), the open business model specifically describes value creation and capturing by *"systematically collaborating with outside partners"* (Osterwalder & Pigneur, 2010: 109). Scholars in this field explain how the integration of external resources and exchange with partners can create additional value (Chesbrough, 2006, 2007; Sandulli & Chesbrough, 2009). Business model scholars also highlight the importance of customer orientation as a key characteristic of business models (Amit & Zott, 2001) and especially of open business models, whereby multiple actors co-create value for the same customer (Storbacka, Frow, Nenonen, & Payne, 2012). Solution customer centricity – the degree to which the focal firm focuses on solution customers in the joint delivery of solutions – is hence an important aspect in studying open business models involving partner networks.

Although open business models are by definition closely linked to the establishment and management of external networks, research falls short in explaining the configuration of these networks and their impact on the performance of open business models. Understanding these relationships is of particular relevance for manufacturing companies facing the organizational challenge to become solution providers. A solution provider manufactures stand-alone products as well as bundling them with related services into solutions that solve customers' problems (Davies, Brady, & Hobday, 2006; Galbraith, 2002). For these firms, utilizing services provided by partners in the network is an attractive means of achieving successful integrated solutions (Gebauer, Paiola, & Saccani, 2013; Helander & Möller, 2008; Jaakkola & Hakanen, 2013; Martinez, Bastl, Kingston, & Evans, 2010; Windahl & Lakemond, 2006) and, in turn, successful open business models. Scholars have studied partner networks in the context of the development of new integrated solutions (Liu & Hart, 2011; Windahl & Lakemond, 2006), but not the required network setup and logic for successful delivery of solutions.

This raises two research questions we aim to answer in this article: Firstly, how do various network configurations in relation to service partners influence the performance of open business models? Secondly, what is the role of varying degrees of customer centricity of open business models in this setting? We study these questions in the context of solution providers as a good backdrop.

To come to an answer we build on network theory, which argues that a network of relations of firms produces positive but also negative results (e.g., Lechner, Frankenberger, & Floyd, 2010). Positive effects include information benefits (Burt, 1992; Granovetter, 1985; Hansen, 1999; Rindfleisch & Moorman, 2001), efficient knowledge

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transfer (Reagans & McEvily, 2003; Uzzi, 1996, 1997), and access to resources (Gnyawali & Madhavan, 2001). Conversely, negative effects stem from reduced information benefits (e.g., Uzzi, 1997) and costs of maintaining additional ties (Burt, 1992). Such networks are characterized on the basis of three dimensions: the relational, the structural, and the cognitive (Lechner et al., 2010; Nahapiet & Ghoshal, 1998; Simsek, Lubatkin, & Floyd, 2003).

Our results suggest patterns new to existing theory. We find the influence of networks on performance of open business models contingent on the level of customer centricity. That is, to ensure superior performance, different levels of solution customer centricity in the business model require different network configurations to service partners. The realization of these relationships contributes to the open business model, solution provider, and network fields.

2. Theoretical background

This section analyses in depth the theoretical background necessary for our line of reasoning, namely literature on open business models, social network theory, customer centricity, and solution providers.

2.1. Open business models

In general, the business model is depicted as an overarching concept assimilating the constituent components of a business and assembling them as a whole. Components proposed often include the value proposition (e.g., Chesbrough, 2010; Morris, Schindehutte, & Allen, 2005), the customer (e.g., Morris et al., 2005; Teece, 2010), and the performed activities and transactions (e.g., Afuah, 2004; Amit & Zott, 2001; Zott & Amit, 2008). The most common role of the business model is to illustrate how the focal firm creates and captures value for its stakeholders and itself (e.g., Afuah & Tucci, 2001; Amit & Zott, 2001; Chesbrough, 2007; Chesbrough & Rosenbloom, 2002; Teece, 2010). A central feature of the business model is the provision of a holistic view of the business by combining the firm's internal and external factors (Teece, 2010; Zott, Amit, & Massa, 2011). In other words, the business model suggests an interplay between the internal dimension of a business, such as the firm's resources and activities, and the external dimension, such as the firm's customers and partners (Chesbrough & Rosenbloom, 2002; Johnson, Christensen, & Kagermann, 2008; Morris et al., 2005). In this regard, it is often referred to as a boundary-spanning concept explaining how the focal firm embeds in and transacts with its surrounding ecosystem (e.g., Shafer, Smith, & Linder, 2005; Teece, 2010; Zott & Amit, 2008, 2009).

Although the business model describes boundary-spanning value creation, not every firm must do so. Chesbrough (2006, 2007) differentiates between closed and open business models. Firms implementing closed business models focus primarily on internal value creation and rarely collaborate with partners; they only maintain simple buyer-seller relationships with the outside world. In contrast, open business models focus on external resources as key contributors to a firm's value creation process; value for the customer is co-created between actors in a network (Storbacka et al., 2012). Through close partner collaboration, firms implementing open business models gain improved access to markets and knowledge, as well as to external resources and capabilities (Sandulli & Chesbrough, 2009). In this study, we focus on open business models which we define as follows: An open business model explains value creation and value capture of a focal firm, whereby externally sourced activities contribute significantly to value creation.

2.2. Networks

Although open business models are by definition related to the establishment and management of social ties to external partners, the field currently lacks a systematic approach to identify patterns and rules for the composition of partner networks underlying open business models (Zott & Amit, 2009).

Research in network theory in multiple studies shows that a network of relationships produces a number of positive outcomes, including increased access to novel and diverse information (Burt, 1992; Granovetter, 1985; Hansen, 1999), increased access to resources (Gnyawali & Madhavan, 2001), more efficient knowledge transfer (Reagans & McEvily, 2003; Uzzi, 1996, 1997), heightened power and control (Brass, 1984; Brass & Burkhardt, 1992), increased legitimacy and understanding for the products (Tsai & Ghoshal, 1998), increased innovation (Capaldo, 2007; Phelps, Wadhwa, Yoo, & Simon, 2010; Rodan & Galunic, 2004; Schilling & Phelps, 2007), and increased performance (Lechner et al., 2010; Powell, Koput, Smith-Doerr, & Owen-Smith, 1999; Zaheer & Bell, 2005). But scholars also argue that networks have negative effects, such as costs of maintaining additional ties (Burt, 1992), reduced information benefits (Uzzi, 1997), or information overload (Iselin, 1989).

Scholars characterize such networks on the basis of three dimensions: the relational, the structural, and the cognitive (Lechner et al., 2010; Nahapiet & Ghoshal, 1998; Simsek et al., 2003). As these dimensions are too broad to develop hypotheses (Lechner et al., 2010; Miller, 1996; Powell et al., 1999), we use more specific constructs for each dimension: tie strength for the relational, centrality for the structural, and shared vision for the cognitive.

2.2.1. Relational dimension: tie strength

Granovetter (1973: 1361), who introduced the concept of tie strength, defined it as a *"combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie."* With strong ties at one extreme and weak ties at the other, it is viewed as a continuous measure (Granovetter, 1973; Hansen, 1999; Lechner et al., 2010; Levin & Cross, 2004; Marsden & Campbell, 1984).

Researchers argue that both strong and weak ties produce a number of positive outcomes. Granovetter (1973) argues that weak ties lead to novel information by otherwise unconnected groups within an organization. He argues that weak ties are more likely to transfer non-redundant information, since the contacts are less likely to be connected. Similarly, Levin and Cross (2004) show in their empirical study that weak ties, rather than strong ties, provide access to novel and non-redundant information. Conversely, researchers show the positive effects of strong ties, as they facilitate the transfer of fine-grained information and tacit knowledge (Brass, Butterfield, & Skaggs, 1998; Gulati, 1998; Hansen, 1999; Rangan, 2000; Uzzi, 1996), increase the level of trust (Burt & Knez, 1995; Granovetter, 1973; Gulati, Nohria, & Zaheer, 2000; Krackhardt, 1992; Larson, 1992; Podolny, 1994; Uzzi, 1997), and lead to support (Fukuyama, 1995; Gambetta, 1988; Kostova, 1999; McAllister, 1995) between the two actors within the social relationship. Some efforts are made to reconcile the differences between weak and strong ties by introducing a contingency argument to moderate the effects (Burt, 1997; Hansen, 1999; Lechner et al., 2010; Levin & Cross, 2004; Rowley, Behrens, & Krackhardt, 2000).

2.2.2. Structural dimension: centrality

Network research mostly defines centrality as the position of an actor within the network, meaning *"the extent to which the focal actor occupies a strategic position in the network by virtue of being involved in many significant ties"* (Wasserman & Faust, 1994: 172).

Several researchers emphasize that centrality in a network is connected to power and control (Brass & Burkhardt, 1992; Burt, 1992; Ibarra, 1993; Salk & Brannen, 2000), to superior information and resource flows (Gnyawali & Madhavan, 2001; Gulati et al., 2000; Lechner et al., 2010; Powell et al., 1999), and to broad access to many resources, partners, or knowledge (Rowley et al., 2000). Some researchers emphasize the value of low centrality, arguing that it allows time for the focal actor, since fewer ties require less time to maintain the relationships

and support others in the big network (Hansen, Podolny, & Pfeffer, 2001). Furthermore, they outline that fewer connected partners decrease the risk of exposure to potential hindrance groups (Lechner et al., 2010; Sparrowe, Liden, Wayne, & Kraimer, 2001) or leakage points whereby valuable information is conveyed to others (Gnyawali & Madhavan, 2001). Low centrality improves the ability of the focal actor to conceal activities from those opposing them. Lechner et al. (2010) introduce the notion that effects of low or high centrality are moderated by the type of initiative.

2.2.3. Cognitive dimension: shared vision

The cognitive dimension is increasingly recognized as an important element of networks (Gilsing, Nooteboom, Vanhaverbeke, Duysters, & Vandenoord, 2008; Lechner et al., 2010; Nahapiet & Ghoshal, 1998; Nooteboom, 1999; Nooteboom, Van Haverbeke, Duysters, Gilsing, & Van Den Oord, 2007; Rost, 2011; Simsek et al., 2003; Tsai & Ghoshal, 1998; Wuyts, Colombo, Dutta, & Nooteboom, 2005). It refers to the similarity in representation, interpretation, mental models, and world views (Nahapiet & Ghoshal, 1998) and to common backgrounds amongst different social actors within a network (Rost, 2011). The concept is based on the logic that shared understandings and structured regularities of mental processes influence economic action or limit economic reasoning, as described by Zukin and DiMaggio (1990: 15-16): *"By cognitive embeddedness we refer to the ways in which the structured regularities of mental processes limit the exercise of economic reasoning. Such limitations have for the most part been revealed by research in cognitive psychology and decision theory*."

There is broad evidence in literature that shared beliefs and common visions strongly influence strategic choices and actions taken (e.g., D'Aveni & MacMillan, 1990). Furthermore, research states that shared vision leads to groupthink, as focal actors recognize the same risks and chances and perceive the same strategies and capabilities as valuable (Gavetti & Levinthal, 2000; Hambrick & Mason, 1984; Walsh, 1995). Additionally, it improves communication and facilitates resource and information transfer between the focal actors (Orton & Weick, 1990; Tsai & Ghoshal, 1998). Scholars find positive or curvilinear performance implications of cognitive embeddedness (Nooteboom et al., 2007; Rost, 2011; Wuyts et al., 2005), and others see its effect subject to moderating influences (Lechner et al., 2010).

In this study we consider the three dimensions to characterize networks and analyze their effect on the performance of open business models. Thereby, we focus on social ties between the focal firm and its service partners involved in the value creation and capture processes of the open business model.

2.3. Customer centricity and solution providers

Business model scholars frequently stress that the customer should be at the center of the business model and its primary goal is to create value for the customer (e.g., Johnson et al., 2008; Teece, 2010). Amit and Zott (2001: 513) observe that business models *"are often customer centric in their design"* and customers in some cases even engage in value co-creation. Teece (2010: 172) emphasizes customer centricity, stating that a business model *"reflects management's hypothesis about what customers want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit."* In the context of open business models, these questions are more important to answer, as several players need to agree a joint value proposition towards the customer and align their co-creation activities accordingly (Storbacka et al., 2012).

Given its prominence in business model literature, we include customer centricity as a defining characteristic of open business models and as a potential construct influencing their performance, in addition to the network characteristics mentioned. In line with previous research (Shah, Rust, Parasuraman, Staelin, & Day, 2006), we conceptualize customer centricity on the basis of three dimensions: (1) customer-oriented values and beliefs guide actions of the organization from the top (Selden & MacMillan, 2006; Webster, 1988), (2) the structure of the organization uses dedicated customer-facing units (Day, 2006), and (3) the focus of the organization is on customer needs discovery and satisfaction (Gummesson, 2008; Sheth, Sisodia, & Sharma, 2000).

We embed our study in the context of solution providers as this is a promising field to study open business models and the effects of networks and customer centricity. During the past two decades, solution selling became a popular concept, particularly in mature industrial settings (Sharma & Iyer, 2011). By a solution, scholars refer to the combination of products and services required to solve specific customer problems (Töllner, Blut, & Holzmüller, 2011). For a former product manufacturer, the transformation into a solution provider requires massive changes to its business model. In the real world many companies fail to innovate their business models coherently (Evanschitzky, Wangenheim, & Woisetschläger, 2011). Literature on the subject hence often deals with questions as to how manufacturers can become solution providers (Davies, Brady, & Hobday, 2007; Helander & Möller, 2008; Matthyssens & Vandenbempt, 2008). A promising possibility identified in this context is the close collaboration with partners in the development and delivery of solutions (Gebauer et al., 2013; Jaakkola & Hakanen, 2013; Kakabadse, Kakabadse, Ahmed, & Kouzmin, 2004; Windahl & Lakemond, 2006). By sourcing certain parts of the value creation externally, solution providers do not develop the corresponding skills and capabilities, and thereby reduce uncertainty (Liu & Hart, 2011). From a business model perspective, this strategy of incorporating partners deeply into value creation can be described as adopting an open business model.

The importance of customer centricity is also highlighted in the context of solution providers, in particular with regard to centricity of the solution customer. Authors from the solution provider field identify customer closeness and customer focus as important factors for solution success (e.g., Cova & Salle, 2008; Davies et al., 2007; Galbraith, 2002). A study by Day (2006) shows that "implementing a solutions strategy" is the most frequently cited rationale for a customer-centric realignment of organizations. Finally, authors highlight that solutions need to be tailored to specific needs of individual customers, explaining why the process of solution selling is characterized by a high level of interaction with the solution customer during requirements definition, customization and integration of goods and services, their deployment, and subsequent support (Tuli, Kohli, & Bharadwaj, 2007). Solution customer centricity hence is seen as a key element in value creation of solution providers.

Based on the theoretical foundations above, we identify two gaps in current literature we aim to close in our study. Firstly, open business models are not analyzed with regards to the influence of partner network characteristics on their performance. Secondly, the role of customer centricity in the context of these business models is unclear and not understood. The solution provider setting allows us to study these questions, as both partner networks and solution customer centricity are important elements of solution provider business models. Fig. 1 illustrates the theoretical framework into which our study is embedded.

3. Methodology and overview of cases

3.1. Case study approach

Given limited theory on different network dimensions' impact on performance of open business models, and about the role of customer centricity in this context, an inductive multiple case study approach is employed (Eisenhardt, 1989; Yin, 1994). To comply with the theoretical background and aim of our study, the case firms' open business models in the solution provider context must meet two conditions. Firstly, to differentiate from a closed business model, a significant amount

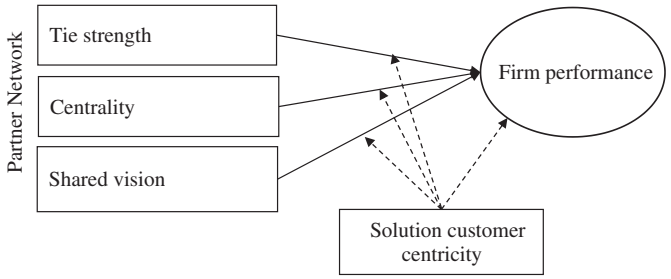

Fig. 1. Theoretical framework of the study.

of externally sourced activities is included in the value creation process. Secondly, to differentiate from a product manufacturer, the solution providers care for value co-creation for the solution customer. That is, the activities performed by the focal firm are not limited to selling a product to a partner, but include activities which ensure solution delivery for the solution customer.

Three companies meeting these criteria are identified: 3M Services, SAP, and Geberit. While they all rely on a network of partners to deliver the service part of the solution, which thereby contribute significantly to value creation, their open business models differ. 3M Services defines and sells the solutions, such as applying films to cars and buildings, itself. It owns the customer relationship and covers administrative processes such as order handling and billing. Only the service part of solution delivery is subcontracted to external partners operating under the umbrella of the 3M solution. SAP, our second case firm, sells its enterprise software directly to the solution customer, while its partners sell and accomplish the implementation part separately. SAP, however, recommends partners to its customers, invests in their training, and provides support to ensure overall quality of the solution. Finally, Geberit, a Switzerland-based manufacturer of sanitary and piping systems, manufactures the product but leaves the application and the entire process of solution selling to its partners. In contrast to a simple buyer-seller relationship with partners, Geberit ensures value creation for the solution customer by educating and enabling its service partners through a wealth of free partner support offerings. Fig. 2 illustrates the differences of the three open business models along a simplified solution provider value chain.

The unit of analysis in our study is the open business model of the solution provider, including links to the partners co-creating the solution. With respect to the level of analysis, we focus on the inter-firm level as we analyze the relationships between the focal firm and its service partners.

3.2. Data source

We use two data sources: (1) semi-structured interviews with executives of the case firms as the main data source, and (2) archives of publications on the three firms and their solutions. Two semi-structured interviews of 1-1.5 h per case were conducted with senior company representatives from general management, business development, and partner management (cp. Appendix A). The interviewees received our main questions in advance so that they could prepare. The interviews were transcribed, allowing for subsequent analysis, and specific questions clarified in follow-up e-mails.

Following Lincoln and Guba's (1985) criteria of methodological trustworthiness, we address potential biases in several ways. Credibility, the findings' fit with reality, is achieved through triangulation of interview data with that from other sources (Jick, 1979). For this, we use documents provided to us by our contacts or those publicly available. Dependability, the findings' consistency, we achieve through focused interviews of contacts with a deep understanding of the respective company's open business model. This allows us to limit the data to a manageable amount (cp. Pettigrew, 1990). Finally, transferability of the results is ensured in

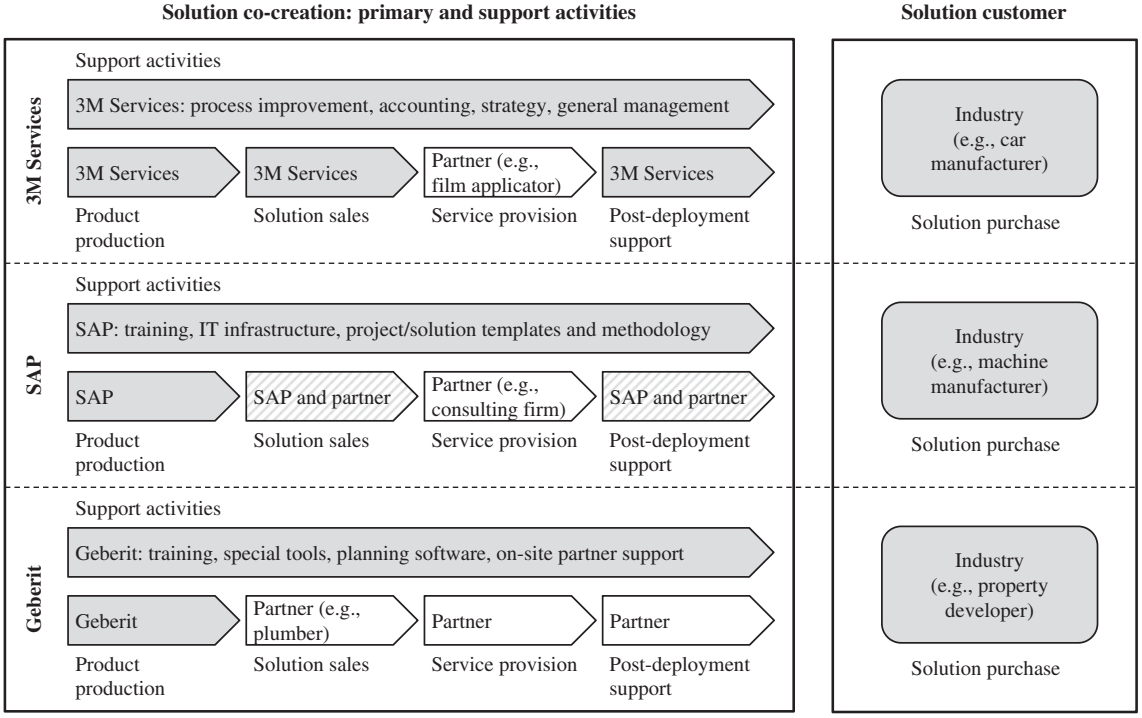

Fig. 2. The cases illustrated along a solution provider value chain. Grey activities in solution co-creation indicate activities performed by the focal firm; white activities are performed by its partners.

two ways. Firstly, we select our cases from different industries to prevent being misled by industry specifics and achieve a higher diversity. Secondly, as part of the analysis, we compare our results with a broad set of previous findings in literature (Eisenhardt, 1989) to achieve a higher confidence in their transferability.

3.3. Data analysis

Based on interview transcripts and additional information obtained, we first wrote a case story for each company in the sample. We allowed the participants to review their cases, enabling us to complete the write-up and eliminate some of the biases associated with retrospective interviews (Silverman, 2000). Following familiarization with individual cases, we commenced with the cross-case analysis (Eisenhardt, 1989; Ozcan & Eisenhardt, 2009). Tables and other visualization methods such as network graphs identified important similarities across the cases and formed initial relationships between our constructs. We then iteratively oscillated between the initial findings and original data to clarify specific details and reach a consistent picture. As a last step, we conducted multiple iterative loops between data, literature, and initial findings until we achieved a strong match between the data and the identified theoretical framework.

3.4. Rating framework

Despite following a qualitative study approach, we find it worthwhile to employ measures to answer our research question. The three dimensions of network embeddedness are determined along the following relational measures (see Section 2.2): For *tie strength*, we use a combination of frequency and closeness (Hansen, 1999; Hansen, Mors, & Løvås, 2005; Lechner et al., 2010; McFadyen & Cannella, 2004; Smith, Collins, & Clark, 2005) of the contact with service partners. For *centrality*, we use degree centrality within the ego network, referring to the number of ties the focal firm maintains with service partners (Wasserman & Faust, 1994). We display the number of service partners in relation to the number of potential partners. For *shared vision*, we measure two items: shared ambition and vision with the partner (Tsai & Ghoshal, 1998), and common background with the partner (adapted from Rost, 2011).

For *solution customer centricity*, we refer to the three items derived from theory, namely (1) customer oriented values of the organization, as measured by firms' readiness to take responsibility for solution delivery and importance attributed to the solution customer; (2) a customer facing structure, as measured by the existence and size of dedicated units interacting with the solution customer; and (3) a focus on customer needs discovery and satisfaction, as measured by the focus of the firm in development (product vs. solution) and the commonness of contact with the solution customer.

Apart from centrality, which we directly asked the interviewees to estimate as a percentage, all measures were rated in line with the rating framework provided in Table 1 by the first two authors independently. Differences in rating on the 5-point Likert type scale initially occur for three of 12 items and were jointly discussed and resolved by re-examining the case data (cp. Bullock, 1986).

Furthermore, we are interested in the *performance of the open business models* under study. As other scholars in this field, we assume that business model performance reflects in the performance of firms implementing the model (Malone et al., 2006; Weill, Malone, & Apel, 2011; Zott & Amit, 2007, 2008). We operationalize firm performance as return on assets (ROA) and net profit margin (NPM) (cp. Agle, Nagarajan, Sonnenfeld, & Srinivasan, 2006) and compare these to respective industry values in the 5-year average. This approach allows us to roughly term a firm's business model "successful" if ROA and NPM are above industry average.

Table 1 shows a summary of the variables, measures, and their operationalization.

3.5. Case description

3M Services is a subsidiary of 3M Germany incorporated in 2010 to tap the market of solutions within 3M's wide range of products. A strong product company, 3M adopted an open business model for solutions to rely on a network of partners for service delivery. Thus, the new organization is lean and utilizes the existing knowledge of specialized service providers. In 3M Services solutions, partners with special skills take over the application of the 3M product. One simple example is the application of films to cars, offered by 3M Services to car manufacturers. For special car editions, such as the 400 exemplars of the matt-finished "Nissan Juke Pure Black", 3M Services sells a solution comprising both its product (the film) and necessary modifications to the car, such as applying the film and attaching add-on parts. In other settings, cars are individually designed on the car dealer's site. For service delivery in these car solutions, 3M Services coordinates a nationwide partner network comprising 30 certified film applicators. The applicators are subcontracted, hence 3M Services acts as the single point of contact to the car manufacturer or dealer and takes full responsibility for solution delivery. Although not all 3M solutions are as standardized, and partner-provided services can go far beyond product application (e.g., into consulting), the same general business logic applies to all of the company's solutions.

Founded in 1972, *SAP* is a Germany-based manufacturer of enterprise application software and today ranks amongst the world's largest five software companies. At the historic center of SAP's product portfolio is SAP ERP, a system to help corporate customers run, manage, and track all processes. Customers buy a software license from SAP and sign a maintenance contract to ensure regular updates and fixes. The complex configuration of the software at the customer site, however, is typically performed by independent service partners. Customers' expenses for these services can exceed product costs considerably for large-scale projects. Despite the attractiveness of this service market, SAP's share in delivering turn-key solutions is not outstanding. Huge shares are held by global partners such as Accenture, Capgemini, or IBM Global Services. SAP, however, is not just a software manufacturer ignoring customers' needs for solutions — it possesses a huge "Ecosystem & Channels" department that, amongst other tasks, manages relations to the company's 1700 service partners. Partners can become certified or preferred partners in different areas, book training at SAP, and are equipped with resources to help deliver better solutions. The split of duties between SAP and its partners is not always clearly defined and a certain degree of "coopetition" (Bengtsson & Kock, 2000) occurs in some areas.

Founded in 1874, *Geberit* is a Swiss-based manufacturer of sanitary and piping systems. Today, the company employs 6000 people and sells in more than 100 countries. A major player globally, with a very strong market position in its core European markets, Geberit's products are mainly applied behind the walls of buildings to ensure water is available when and where it is needed. Solution customers – corporations, property developers, construction companies, and house owners – do not plan and install these piping systems; they turn to architects, plumbers or sanitary planners for a customized solution. Thus, Geberit's business model in developed markets aims to make solution delivery as easy as possible. 500 Geberit technical advisors in Europe alone support the service partners within the firm's network. Partners have access to a wide choice of free-of-charge Geberit offerings, including training classes for their employees, partner events, planning software, plus remote and on-site support. This focus on value co-creation allows architects, plumbers and planners to deliver solutions faster and better with Geberit products. Compared to the other two cases, Geberit is special — its value chain includes wholesalers distributing products to service partners. Since wholesalers, for Geberit simply assume the role of a distribution network, we do not further consider them in our analysis of the business model.

Table 1
Overview of measures in the rating framework used for case analysis.

Theoretical Construct		Variable	Measure	Scale
Customer centricity		Solution customer centricity	• Solution responsibility • Importance of solution customer • Solution customer facing units • Development focus (product vs. solution) • Commonness of solution customer interaction	5-point Likert type (average of the five dimensions)
Partner network	Relational embeddedness	Tie strength	• Contact frequency: 'several times per week' to 'few times a year' • Closeness: 'very close' to 'very distant'	5-point Likert type (average of the two dimensions)
	Structural embeddedness	Centrality	Degree centrality	Number of service partners in relation to number of potential service partners (relative value)
	Cognitive embeddedness	Shared vision	• Shared ambition and vision: 'conflicting goals' to 'full alignment' • Common background: 'no commonalities' to 'extensive prior knowledge and joint investments'	5-point Likert type (average of the two dimensions)
Performance of open business model		Firm performance	Firm ROA and NPM (five-year averages) as compared to corresponding industry average	Delta in percentage values

4. Results and discussion: the effect of network embeddedness and customer centricity on performance of open business models

In the three cases analyzed, the firms complete their core product offering to a solution through externally provisioned services. Despite these commonalities, we identify significant differences across the employed business models with respect to level of customer centricity and configuration of the network with service partners (see Table 2).

4.1. Solution customer centricity

Since it is ranked high on the five dimensions of our measure, the highest level of solution customer centricity (5/5) is found in the 3M Services business model. The unit was deliberately incorporated as a subsidiary, acting as the single point of contact for solution customers and, as such, is the only one in our set to have this feature. 3M Services develops the solutions, takes legal responsibility for their quality, and has close relationships and frequent contact with all solution customers as it organizes delivery. In contrast, SAP does not own customer relationships exclusively. It maintains direct relationships to all of its solution customers through its sales force and support centers, but interaction is reduced to sale of product licenses and provision of product support. Legal responsibility is shared with partners. Customer-specific adjustments to the product, even down to source code level, are performed by partners since SAP considers itself a standard software manufacturer. Comparing these characteristics to those of 3M Services, the lower level of customer centricity in SAP's business model is obvious. It is hence rated 3/5 on our scale. In Geberit's model, the entire solution customer relationship is handed over to partners — in the "behind the wall" business under study, Geberit itself rarely meets solution customers. Solution responsibility, unless a clear product issue occurs, remains with the partner. In developing and manufacturing the product, Geberit focusses on making partners' jobs easier and providing additional value to the joint solution in the form of extensive support activities, enabling partners to deliver solutions efficiently. Despite these contributions, the business model's solution customer centricity by our measure is low (1/5).

Based on the identified inter-case differences in solution customer centricity, the three network configurations are analyzed and discussed in the following.

Table 2
Overview of cross-case analysis results.

		3M Services	SAP	Geberit
Solution customer centricity		5/5	3/5	1/5
Partner network	Tie strength	5/5	3/5	2/5
	Centrality	~5%	30-50%	50-95%
	Shared vision	5/5	4/5	5/5
Firm performance[1] (delta ROA/NPM above industry)		+11.9%/+12.1% above Industrial Conglomerates	+1.8%/+1.0% above Software	+16.2%/+16.5% above Construction Supplies / Fixtures

[a] Financial data (5-year average of return on assets and net profit margin of case companies and industries) retrieved from reuters.com on 2012-07-17. Financial data provided for 3M Services is for 3M Co. - specific data for 3M Services subsidiary was not made available to us. We conclude from the company's expansion plans that 3M Services is at least as profitable as the parent company.

4.2. Tie strength and solution customer centricity

Our results indicate the positive and negative effects of strong ties; they depend on the level of solution customer centricity of the open business model. In the case of 3M Services, the level of customer centricity is the highest in the set and its ties with service partners are strong (rated 5/5), as 3M Services communicates with them for every solution delivered. Interactions can occur frequently within a single week and also during the development of new solutions. For solutions incorporating more complex services, both parties work closely together to design the offering. The end result, however, is always a 3M Services-branded solution for which the company takes full responsibility — which is why partners are managed closely.

In the case of SAP, which has a lower degree of customer centricity, interactions with partners occur less frequently. Intensity of partner interaction varies: high in the context of new product implementations, for which SAP meets partners in regular status meetings, test sessions, and ramp-up trainings, and also high when SAP and a preferred partner join forces to convince a prospective customer. In the fundamental business of established products, however, intensity is low: SAP and its partners communicate only in the event of a major issue. Considering this very common set-up, tie strength is rated 3/5 for SAP's partner network.

Finally, Geberit with the lowest level of customer centricity in the sample, also rates low at 2/5 in tie strength with its partners. Despite the high number of support activities offered by Geberit, contact with its partners is not regular. Unless issues occur during implementation at the solution customer, Geberit meets partners a few times per year during training (approximately 50,000 people per year trained free of charge) and partner events.

Despite the three business models' obvious differences in terms of customer centricity and tie strength with partners, the three companies in our sample achieve superior firm performance, as all of them clearly outperform their respective industries (see Table 2). In order to better understand these findings, we discuss them in the light of existing theory.

We start the discussion with the open business model featuring high solution customer centricity and strong ties to partners, represented by 3M Services. 3M Services provides one offer before the customer, which includes the externally sourced service. A convincing solution in this setting requires detailed coordination and exchange of sensitive knowledge and information between service partners and product manufacturer. Tacit knowledge (Szulanski, 1996) and fine-grained information is transferred, and only possible through strong and close ties (Uzzi, 1996). Also, Hansen (1999) outlines non-codified and dependent knowledge transferred only through strong ties.

Furthermore, to offer superior solutions co-developed or co-produced between external service provider and product manufacturer, efficient communication between the two parties is a key precondition. With strong ties between product and service partners, the process of

knowledge transfer is more efficient, since the focal firm knows what the partners know and how they work and interact (Gulati et al., 2000; Lechner et al., 2010). Finally, these strong ties lead to increased trust between the firms (Krackhardt, 1992; Uzzi, 1996), which is crucial for solution providers fully responsible for the entire solution, but sourcing a significant part of the solution externally. While financial payments help ensure performance of external partners, trust is a more powerful lever to ensure a high quality solution and collaboration.

In our second case, SAP, characterized by a medium level of customer centricity, ties to partners are of medium strength. SAP and its partners share solution responsibility for the customer and tasks in solution delivery are split. SAP is concerned with delivering and maintaining the product, whereas the partner delivers the service part of the solution independently. Both parties work loosely together in delivering the solution, yet ties are weaker than the case of 3M Services, as information and knowledge exchanged are more codified and product related.

Geberit, our third case, has a low level of solution customer centricity. It is further characterized by weak and infrequent interactions with service partners during solution delivery. Business models with a low level of customer centricity need direct relationships to numerous partners to overcome lack of direct customer contact. Maintaining a broad partner network, however, requires time and effort (Stevenson & Greenberg, 2000), making it difficult or even impossible to build up strong ties to each of those partners, assuming that time is limited and taking into account that strong ties require a significant amount of time (Hansen, 1999).

Although time constraints make it difficult for solution providers with low customer centricity to build up strong ties to their partners, they actually do not need strong ties for the performance of their business model. As solution customer relationships are managed by the service partners, and the individual solution designed by them, extensive coordination efforts and transfer of fine-grained information between the product manufacturer and its partners is not required. The knowledge transferred is primarily open, codified, and generic — the solution provider seeks to enable its partners to deliver solutions. Examples include general product descriptions, process instructions, checklists, handbooks, or – as in the case of Geberit – planning software and special tools. Hansen (1999) underlines this argument in his study that weak ties are better than strong for the transfer of codified and independent knowledge.

Finally, solution providers with low customer centricity need to gain diverse and non-redundant information about needs and requirements of customers. Then they are able to develop products to fulfill the needs of different customer groups, leading to superior performance. Weak ties to service partners enable the product manufacturer to indirectly gain diverse information about solution customers, as the partners are not all connected and thus channel back non-redundant and diverse information (Burt, 1992; Granovetter, 1973; Hansen, 1999). Hence, for solution providers with low customer centricity, weak and distant ties to service partners are more beneficial to ensure transfer of non-redundant information, and are key for customer and solution-oriented product development and competitive advantage.

In summary, we argue that solution customer centricity moderates the relationship between tie strength and firm performance:

Proposition 1: *For open business models with high solution customer centricity, strong ties (in contrast to weak ties) to partners lead to superior firm performance. For open business models with low solution customer centricity, weak ties (in contrast to strong ties) to partners lead to superior firm performance.*

4.3. Centrality and solution customer centricity

Our cases reveal different levels of centrality in respective partner networks (see Table 2). 3M Services only collaborates with carefully selected partners, and varying by solution, the number of these ranges between one and thirty. The interviewees estimate that only 5% of potential service providers are part of 3M Services' partner network. At SAP, in contrast, there are virtually no barriers to becoming a partner. Almost every systems integrator or consultant delivering SAP solutions joins the company's official network. As investment in product knowledge is high on the service partners' side, however, smaller partners determine either SAP's or a competitor's product as the basis for their services. In line with this reasoning, SAP's centrality in the partner network is estimated to lie within a 30–50% bandwidth. Compared to SAP's network, investment in Geberit-specific knowledge is not as high for their partners. This is especially true since Geberit training is provided free and starts at apprentice level. Thus Geberit, in its European core markets, achieves a centrality of 50–95% in the respective country-wide partner networks.

For centrality, again, we find differences between three profitable open business models. How is this explained? We start our discussion with 3M Services, the case with high solution customer centricity. Firstly, as 3M Services owns the customer contacts, the firm is not dependent on the ability to access customers or gain information about them via partners. Hence, the benefits for high centrality, such as access to information and indirect access to customers, are not as relevant for solution providers with high solution customer centricity. On the other hand, each additional tie costs time and resources to maintain the contact (Stevenson & Greenberg, 2000). Therefore, we argue that a solution provider with high customer centricity is better off maintaining fewer ties than being more central in the partner network.

A second argument explaining the advantage of low centrality for open business models with high customer centricity is predicated on increased centrality entailing risk of exposure to hindrance groups (Lechner et al., 2010; Sparrowe et al., 2001). 3M Services works very closely with service providers, from joint development of the solution to delivery, including transfer and exchange of sensitive information. In this setting it is important for the success of the business model that information and knowledge exchanged stay with partners and are not provided to competitors or other parties. A smaller network to partners allows the focal solution provider to better control partners and fully understand their interests behind the cooperation. Thus, partners whose intentions do not meet 3M Services' expectations can be excluded upfront.

In the second case in our sample, SAP, customer centricity is of medium level. The company interacts with solution customers as part of product sales and maintenance, leaving final solution design and fine-tuning to partners. As reasoned before, the company's level of centrality in the partner network is medium.

Finally, the business model of Geberit is characterized by a low level of solution customer centricity. Since the company only has limited direct contacts to solution customers, it needs to ensure market reach via relations to service partners that define and sell solutions to the end customers. A central position in the partner network overcomes or even outplays the missing direct contact to customers. Connections to many partners, in turn connected to many customers, enables the focal solution provider to indirectly connect to a large number of solution customers, many more than the solution provider manages in isolation. Therefore, being highly central in the network to service partners is crucial for success of the open business model with low customer centricity, as it provides the focal company with access to resources and customers (Rowley et al., 2000).

Furthermore, no direct connection to solution customers requires the solution provider to use other sources to gain insights about customer needs and preferences. A central position in the partner network enables the focal firm to gain detailed and diverse information about the needs and preferences of their customers. This is crucial for continuous development of products and a competitive position. Literature supports this argument, as previous scholars have outlined a high degree of centrality leading to an increase in information flow and diversity (Gnyawali & Madhavan, 2001; Gulati et al., 2000; Lechner et al., 2010; Powell et al., 1999).

Finally, solution providers with low solution customer centricity require power within the network of partners to ensure that partners use their – and not competitors' – products in the customer solution. Current literature argues a central position within a network significantly helps achieve this powerful position (Brass & Burkhardt, 1992; Burt, 1992; Ibarra, 1993; Salk & Brannen, 2000). Geberit shows clearly the power of a central position. They achieve between 50 and 95% centrality within the partner network in their core markets, directly translating into a leading market penetration with their products. Competitors, having a much lower centrality within the partner network, have difficulty penetrating the market.

As a result, we argue that solution customer centricity moderates the relationship between the level of centrality of the business model and firm performance:

Proposition 2: *For open business models with high solution customer centricity, low centrality within the partner network leads to superior firm performance. For open business models with low solution customer centricity, high centrality within the partner network leads to superior firm performance*

4.4. Shared vision and solution customer centricity

Analyzing case data, we assign high levels of shared vision to all cases during the rating process (see Table 2). At 3M Services, shared vision and common background with service partners are given: many solutions are jointly developed with partners, goals are aligned, and relationships often existed informally before the formal definition of a solution. Hence, a 5/5 rating for 3M Services seems appropriate. For SAP, a 4/5 rating is assigned. Much indicates a high level of shared vision, such as common growth history that many SAP partners share with SAP. Also, partners' considerable investment in SAP skills and customer base lock them into the partnership and align vision and goals. One conflicting goal, however, exists: while a partner is focused on a more customized and service-intensive solution, SAP is interested in proving a low total TCO to the customer and hence prefers a low share of services in the overall solution. Finally, at Geberit, goals are aligned with partners as both sides profit from the relationship. The wealth of support activities Geberit provides to ease its partners' work in solution sales and delivery is well received by them. For these convinced "Geberit shops", as one of the interviewees addresses them, there is little reason to leave the network and cease a relationship often originating at vocational school. Hence, a 5/5 rating is considered appropriate.

We argue that shared vision has a positive effect on firm performance without any moderating effect of solution customer centricity. For the three case examples, a shared vision with partners is crucial for performance of the open business model. For a business model with high customer centricity, such as 3M Services, a high level of shared vision is important. As partners in this case exchange sensitive information and tacit knowledge, a high level of shared vision facilitates efficient communication and tacit knowledge transfer (Tsai & Ghoshal, 1998). Also, as the two parties work closely together, a common worldview is necessary for superior results.

In the SAP case, partners build up knowledge and experience in delivering SAP-based solutions. The more knowledge gained, the more successful they are in the market as they can sell their services more convincingly. Specialization culminates by being nominated a "special expertise partner" by SAP for a specific application or industry. Being successful with SAP-based solutions increases service partners' belief in SAP products and increase switching costs to a competitor's products.

In Geberit's case, whereby service partners sell the solution to customers, a shared vision and common values are key for a functioning business model. Only if partners have the same understanding of the products, the environment, and specific challenges as the product manufacturer, can the solutions be sold independently and successfully. Geberit develops and retains a high level of shared vision amongst its partners through frequent events and training with all partner employees. While partners are trained in Geberit products, tools, and their application, shared values and beliefs are communicated to them.

Furthermore, sharing a vision with external service partners is likely to lead to a cognitive lock-in (Abrahamson & Fombrun, 1994) of the partners. This, in turn, limits the search for alternatives (Barr, Stimpert, & Huff, 1992). Hence, partners cognitively locked-in are more likely to stick to their solution provider, as switching costs are quite high. This has a positive effect on its performance. Summing up, we argue that shared vision is crucial for firm performance and equally important for business models with high and low customer centricity. Formally:

Proposition 3: *The higher the level of shared vision between a solution provider and its service partners, the greater the firm performance.*

Fig. 3 summarizes identified relationships between constructs of our study based on insights of the three case studies and existing theoretical contributions. As articulated in propositions 1 to 3, all partner network dimensions influence firm performance. While the influence of centrality and tie strength is contingent on the degree of solution customer centricity, shared vision has a direct positive impact on firm performance.

5. Conclusion and implications

5.1. Conclusion

The level of customer centricity is a useful way to explain how the three dimensions of networks with partners of open business models – tie strength, centrality, and shared vision – influence performance of firms. Based on these insights, we derive three ideal configurations of networks for open business models leading to superior firm performance contingent on the level of customer centricity, namely the controlled, the joint, and the supported model. They are summarized in Fig. 4.

5.1.1. The controlled model

We term the first configuration, whereby the product manufacturer keeps control of most aspects of the solution and customer relationship, the controlled model. Due to its focus on the solution customer, customer centricity in this business model configuration is very high. We argue in our propositions that an open business model with this property establishes relationships to a few key service partners with whom it builds up strong and reliable relationships. In addition, the level of shared vision between the solution provider and the service providers is strong. This case allows the solution provider to achieve superior performance with its open business model, since its level of customer centricity and partner network configuration is aligned. In our case analysis, 3M Services represents this type of open business model.

5.1.2. The joint model

We term the second configuration, whereby the product manufacturer weakens its customer relationship and allows solution business for independent partners, the joint model. Relinquishing control enables the solution provider to weaken ties with service partners to a medium

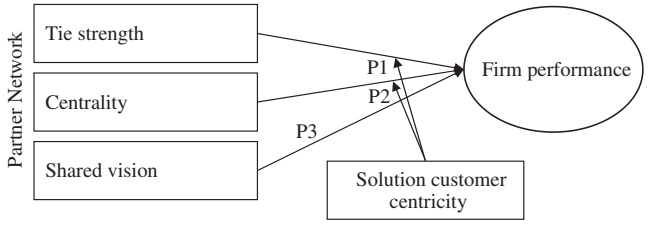

Fig. 3. Results summary and the three propositions.

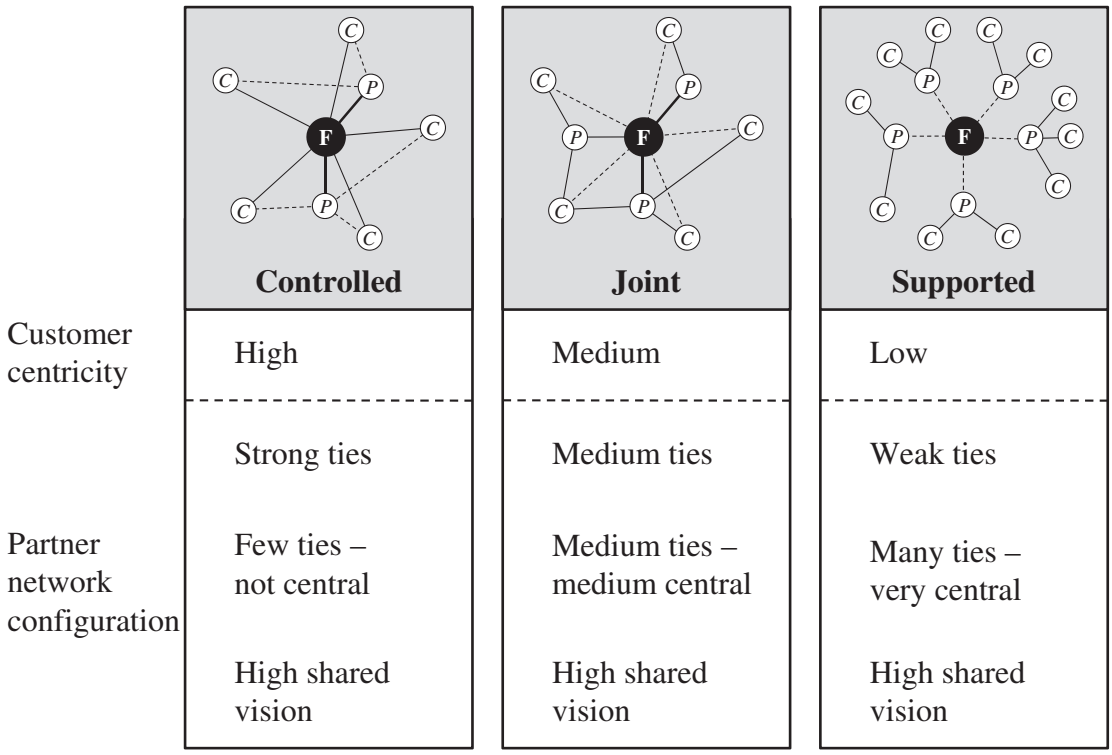

Fig. 4. Three ideal configurations of networks with partners (P) for open business models leading to superior firm performance contingent on the level of customer (C) centricity.

level but reach out to more to increase market reach, as is represented by a medium level of centrality. Shared vision between the solution provider and service partners is strong in this configuration. It leads to superior firm performance based on an open business model, represented by SAP in our cases.

5.1.3. The supported model

The third configuration, whereby the product manufacturer relinquishes direct solution customer contact entirely, actively enabling partners to design and deliver solutions, is termed the supported model. Since no direct solution customer relationships exist, only a very low level of customer centricity is attributed to this model. As our propositions state, this is a viable option for a solution provider if the partner network is set up accordingly i.e. if it features a high level of centrality and weak partner ties. The level of shared vision is high. In our case analysis, Geberit represents this type of open business model.

The models represent three ideal partner network configurations for open business models with varying degrees of customer centricity. They illustrate our propositions and demonstrate how customer centricity and partner network characteristics are aligned to achieve superior performance of open business models. While the controlled and supported models mark extreme positions in terms of customer centricity in open business models, the joint model shows there is also middle ground between them.

5.2. Implications for theory and practice

With this article we seek to contribute to the growing body of knowledge on design of open business models. By focusing our analysis on solution providers incorporating externally sourced services into solution delivery, we apply the business model concept to a concrete environment of high practical relevance (Liu & Hart, 2011; Windahl & Lakemond, 2006). This allows us to deliver knowledge relevant to both worlds: the underlying theoretical bodies of knowledge, and managerial practice of firms transitioning from manufacturer to solution provider.

We show that high solution customer centricity, often seen as the key ingredient for open business models and for a solution provider strategy, is not the only option for firm success. Through the rise of business services and open business models incorporating partner networks, customer centricity changes its role. It acts as a moderator, shaping the partner network and determining interactions with partners.

6. Theoretical implications

By applying insights from network theory to business model literature, this paper contributes to research on open business models and business models in general as follows. Firstly, although previous research acknowledges the critical role of networks for business models (e.g., Morris et al., 2005; Osterwalder, Pigneur, & Tucci, 2005; Shafer et al., 2005; Zott et al., 2011), it has not described the causal relationships leading to superior firm performance. This paper advances literature on business models by explaining how networks of open business models influence firm performance. Secondly, our results show that the effect of these networks on firm performance is contingent on the level of customer centricity. Rather than being a key requirement for successful open business models, as seen in previous research (Amit & Zott, 2001; Johnson et al., 2008; Teece, 2010), our findings suggest that customer centricity can be a precondition, but is not mandatory. Thirdly, our analysis suggests broadening the perspective of the term "open business model". Currently, research under this umbrella frequently addresses concepts of opening R&D and intellectual property management to the outside network of a firm (Chesbrough, 2006, 2007). With the rise of business services, however, business models can open up for partners in manifold ways and gestalts (Ehret & Wirtz, 2010; Holm, Günzel, & Ulhøi, 2013; Sandulli & Chesbrough, 2009).

The paper contributes to network theory as it provides new insights into resolving the ongoing debate in network research between strong

and weak tie effects and high and low centrality. Our results suggest that the most beneficial configuration depends on the related level of customer centricity. Similar contingency arguments for networks in other contexts are outlined by Burt (1997), Rowley et al. (2000), Hansen (1999), Levin and Cross (2004), and Lechner et al. (2010). Furthermore, by combining business models with network theory, we add a unit of analysis to network research useful for future research.

Finally, we contribute to solution provider theory by suggesting an alternative to the common assumption that a solution provider is responsible for delivery of the actual solution (Davies et al., 2006; Galbraith, 2002). From the solution customer's perspective, the question of who offers and delivers the solution is secondary so long as the need for a solution can be satisfied on the market.

7. Managerial implications

Given the concrete background to the analysis, our results directly impact managerial decisions at strategy level. Our findings suggest a more deliberate use of the "customer first" paradigm in solution provider contexts as we show that low centricity of the solution customer in the focal firm's business model can be as successful as high centricity, provided the right network configuration is chosen. Furthermore, it is important for managers to understand that there is more than one way of setting up an open business model incorporating service partners for solution delivery. We identify three possible network configurations with external service partners spanning the bandwidth between a highly customer-centric controlled model and a highly partner-centric supported model. Managers can take these models as a reference for their own implementation or draw inspiration from the archetypes in designing their unique open business model variant.

Our propositions provide additional guidance for managers to be increasingly open and network aware. Through awareness of customer centricity acting as a key contingency for partner network design, managers can determine the required levels of centrality in the partner network and tie strength with partners. Finally, our results create awareness that more network ties are not always beneficial. The conventional wisdom amongst managers is solely on the positive side, following the "the more the better" paradigm. Managers can actively shape their network to partners based on this knowledge.

8. Limitations and future research

It is a noteworthy limitation that the propositions condensing the results of our study are derived from a comparative study of three cases. This qualitative approach allows us to deeply analyze and compare data in an explorative way and provide meaningful results for practical problems. Yet, our subject of study and the concepts of network theory also allow for a quantitative approach to the research question. In the sense of triangulation, this is a desirable completion of our findings and hence marks a promising route for future research. For the quantitative study, we suggest a combination of network analytic technology and moderated multivariate regression analysis. Researchers need to analyze the partner networks of solution providers that pursue open business models, using those network measures as independent variables in the regression model. Data should be gathered through questionnaires. Such a quantitative study could not only verify the propositions made, but also shed light on the finiteness of business model options within the solution provider space.

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Appendix A

Overview of primary data sources by case
Interviews conducted between June 2011 and January 2012

3M Services:
- Presentation by general manager and group discussion (1.5 h)
- Interview with general manager (1.5 h)
- Interview with founding business development manager (1.5 h)
- Multi-year relationship as a coach in innovation management of one author

SAP:
- Interview with senior manager in strategic partner management (1.5 h)
- Interview with director cloud services (1 h)
- Direct observation during project work in strategic service partner initiative, June–November 2011
- 5 year professional work experience in SAP's solution marketing and consulting units of one author

Geberit:
- Interview with head of strategic planning (1 h)
- Interview with country head of field service (1 h)

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