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INNOVATION CAPABILITIES: AFFIRMING AN OXYMORON?

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Contents

From the Editors

The relationship between resources and capabilities and performance has been discussed since Edith Penrose addressed the mechanisms behind the growth of the firm (Penrose, 1959). Early contributions to this area of research suggest that valuable and inimitable resources and capabilities are the primary sources of superior performance and sustained competitive advantage (Barney, 1991; Wernerfelt, 1984), while more recent contributions suggest that the ability to change and re-configure resources and capabilities (dynamic capabilities) are the most important for performance, especially when the market is unstable (Teece, 2014; Teece, Pisano & Shuen, 1997).

It has also been argued that firms may utilize their resources and capabilities through the development of innovations in the form of new products, services or processes (Hill, Brandeau, Truelove & Lineback, 2015), and empirical research has confirmed that there is a positive relationship between the implementation of innovation activities and the future performance of firms (Bowen, Rostami & Steel, 2010; Rubera & Kirca, 2012). However, innovation as a phenomenon entails change, as opposed to resources and capabilities that represents a firm's ability to reproduce a certain performance – and as such involves stability. Viewed in this way the very term innovation capability can constitute an oxymoron.

The study of innovation capabilities is therefore a complex field of study that is emerging. The topic has already attracted interest from a number of scholars (e.g. Forsman, 2011; Guan & Ma, 2003; Hertog, van der Aa & de Jong, 2010; Wang, Lu & Chen, 2008; Yam, Lo, Tang & Lau, 2011), but despite these important advances there is still a lack of consensus in the literature and a pressing need to clarify what type of resources and capabilities drive innovation in different contexts (Lidija & Robert, 2014), and how these capabilities are developed and utilized (Helfat & Peteraf, 2003).

In the assessment of theory informing innovation capabilities, we identify how capability dynamics are contingent upon the degree of market change – static as opposed to fast moving markets. In our assessment of innovation management theory, we identify how organizational innovation processes are contingent upon the degree of novelty – incremental as opposed to radical innovations. Therefore, we suggest analysing what type of innovation

capabilities are required in the four different contexts that emerge by utilizing these two contingency variables to construct a two-by-two matrix.

The first paper, by Aas and Breunig, introduces the four contexts of innovation capability discussed above and also provide a framework to introduce and position the different contributions in this special issue on Innovation Capability.

In the second paper, Lis and Sudolska address the synergy between inter– and intra-firm learning processes in relation to firms' absorptive capacity, in a context where stable markets are observed, but where innovations can be both incremental and radical.

The third paper authored by Martinkenaite, Breunig and Fjuk, addresses service design as an emerging organizational capability. The paper illustrates conditions requiring radical innovations in both static and fast moving markets.

In the fourth paper of this issue, Strønen, Hoholm, Kværner and Støme address innovation capabilities in a healthcare context resembling the traditional dynamic capability perspective, where markets can be fast moving and both incremental innovations and radical innovations occur.

The fifth paper of this issue, by Svare and Gausdal, explores empirically whether variations in firms' dynamic capabilities can explain variations in the benefits they harvest from participation in regional innovation networks. Like in the fourth paper, this is studied in fast moving markets where both incremental innovations and radical innovations take place.

The sixth and final paper, by Narcizo, Canen and Tammela, contributes by providing a bibliometrical study identifying 19 different definitions of the concept of innovation capability, and subsequently suggesting a conceptual framework based on maturity models distinguishing between three levels of the domain of innovation capability. This framework is applicable to all the four contexts identified here for innovation capability.

How the papers in this issue are positioned in relation to the four contexts is illustrated in Figure 1.

This issue of JEMI combines contributions from Brazil, Poland, and Norway. We would like to express our gratitude to the authors who enabled us to publish this insightful selection of papers for this special issue. We are also very grateful to the anonymous reviewers who have shared their knowledge and experience in a positive and constructive tone – enabling the authors to improve their research. Lastly, we would like to thank Dr Anna Ujwary-Gil, Editor-in-Chief of JEMI, for the chance to cooperate with JEMI and for her support during each phase of the work on this special issue.

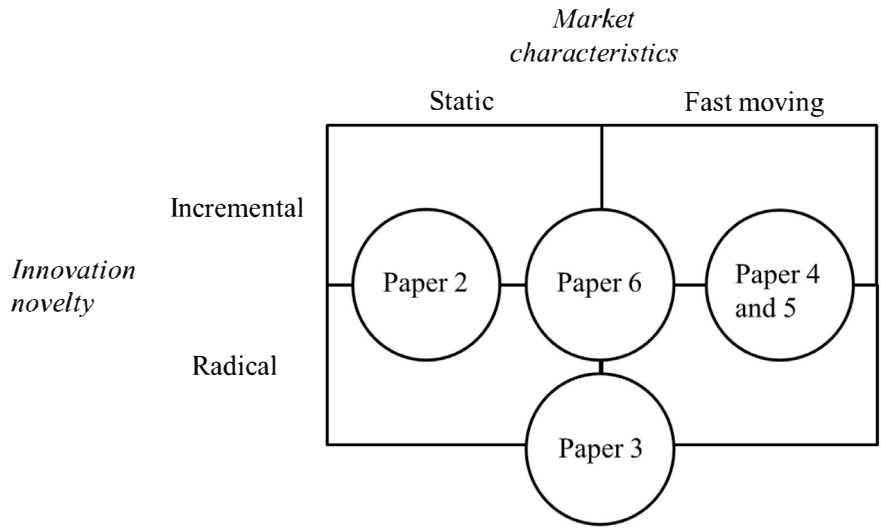

Figure 1. Positioning according to the contingency framework introduced in Aas and Breunig (2017).

We hope that this issue will prove to be interesting reading for global scholars and inspire them on to further research. Owing to the collaboration between authors, reviewers and editors, the present issue of JEMI offers high-quality contributions to extend our understanding of the concept of innovation capability.

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Conceptualizing Innovation Capabilities: A Contingency Perspective

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Abstract

Empirical research has confirmed that a positive relationship exists between the implementation of innovation activities and the future performance of organizations. Firms utilize resources and capabilities to develop innovations in the form of new products, services or processes. Some firms prove to be better at reproducing innovation success than others, and the capacity to do so is referred to as innovation capability. However, the term innovation capability is ambiguously treated in extant literature. There are several different definitions of the concept and the distinction between innovation capabilities and other types of capabilities, such as dynamic capabilities, is neither explicitly stated, nor is the relationship between the concept and other resource- and capability-based concepts within strategy theory established. Although innovation is increasingly identified as crucial for a firm's sustainable competitiveness in contemporary volatile and complex markets, the strategy-innovation link is underdeveloped in extant research. To overcome this challenge this paper raises the following research question: What type of innovation capabilities are required to innovate successfully? Due to the status of the extant research, we chose a conceptual research design to answer our research question and the paper contributes with a conceptual framework to discuss what innovation capabilities firms need to reproduce innovation success. Based on careful examination of current literature on innovation capability specifically, and the strategy-innovation link in general, we suggest that innovation capability must be viewed along two dimensions – innovation novelty and market characteristics. This framework enables the identification of four different contexts for innovation capabilities in a two-by-two matrix. We discuss the types of innovation capabilities necessary within the four different contexts. This novel framework contributes to the understanding of the strategy-innovation link as well as clarifies the conceptual understanding of capabilities within the strategy literature and establishes the relationship between these structures and innovation management theory.

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Keywords: *conceptual framework; capabilities; innovation novelty; market characteristics; strategy-innovation link.*

INTRODUCTION

Firms utilize their resources and capabilities for the development of innovations, such as new products, services or processes (Hill, Brandeau, Truelove & Lineback, 2015). Empirical studies indicate that there is a positive relationship between the implementation of innovation activities and future performance (Bowen, Rostami & Steel, 2010; Rubera & Kirca, 2012). The resources and capabilities needed to succeed in innovation activities vary widely between firms. Some firms prove to be better at reproducing innovation success than others, and the capacity to do so can be framed as an innovation capability. Innovation capability is defined as a firm's ability to identify new ideas and transform them into new/improved products, services or processes that benefit the firm.

Current descriptions of innovation capabilities overlap with the notion of dynamic capabilities (Teece, 1997), making these concepts difficult to distinguish. Dynamic capabilities refer to a pervasive concept within the field of strategic management. The term 'dynamic capability' was coined by Teece et al. (1997) and is defined as "*the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments* (p. 516)". However, a thorough review by Barreto (2010) identified several other definitions of the concept that are frequently cited, and thus concluded that the conceptual underpinnings of dynamic capabilities are underdeveloped. Despite the identified conceptual ambiguities, dynamic capabilities are central to innovation strategy (Tidd, 2012). Moreover, current research also calls for an improved understanding of the link between strategy and innovation (Lightfoot & Gebauer, 2011).

Conceptualizing innovation capabilities is a recently emerging complex field of study and the topic has attracted interest from a number of scholars (e.g. Forsman, 2011; Guan & Ma, 2003; Hertog, van der Aa & de Jong, 2010). However, there remains a lack of consensus in the literature and a pressing need to clarify what type of capabilities drive innovation (Lidija & Robert, 2014), and how these capabilities are developed and utilized (Helfat & Peteraf, 2003). This conceptual paper therefore, aims to synthesize the current understanding of innovation capability and provide a framework to discuss the type of innovation capabilities necessary for innovation success over time. The following research question is raised: *What type of innovation capabilities are required to innovate successfully?*

The paper is divided into three sections. First, we map out the theoretical underpinnings of the resource- and capability-perspective of strategic management, and link these to innovation capability as addressed within the innovation management literature. Second, we present a conceptual research approach and suggest that the type of innovation capabilities required for success is related to two important contingency variables. Capability dynamics are contingent upon the degree of market changes – static as opposed to fast-moving. In our assessment of innovation management theory, we identify that organizational innovation processes are contingent upon the degree of novelty – incremental as opposed to radical. Therefore, we suggest a framework including four different contexts that emerge by utilizing these two contingency variables to construct a two-by-two matrix. Lastly, we utilize this framework to present a concluding discussion with key implications and limitations.

THEORETICAL BACKGROUND

Organizations must be able to manage change in an increasingly volatile and complex service eco-systems (Yoo & Kim, 2015) to succeed in the contemporary globalized and hyper-velocity business environment (Crossan & Apaydin, 2010; Francis & Bessant, 2005). Dynamic capabilities, therefore, are central to innovation (Tidd, 2012), as they are linked to sustained competitiveness under these conditions (Eisenhardt, 2004). However, the link between a firm's strategic management of resources and capabilities that are heterogeneously distributed among firms and the ability to replicate innovation success over time has not yet been firmly established. It is therefore necessary to assess the theoretical underpinnings of the resource- and capability perspectives within strategic management, to better understand the concept of innovation capability.

The theoretical underpinnings of resource and capability perspectives

The resource-based view of the firm (RBV) is a popular strategic management perspective suggesting that very specific resources, competencies and capabilities are necessary to sustain a firm's competitive position (Barney, 1991; Penrose, 1959; Petraf, 1993; Spender, 1996; Wernerfelt, 1984). According to the RBV, it is the creation, ownership, management and deployment of intangibles, specifically knowledge and relationships, which explain variations in performance. In particular, intangibles that are valuable, rare, inimitable and non-substitutable, and therefore heterogeneously distributed, explain variation between firms. A firm must exploit and

successfully deploy resources that competitors are not able to copy in order for resources to be of value. This perspective suggests that a key determinant of competitive advantage includes the internal organization of firms, and acts in conjunction with the external industry structure and positioning view of strategy as a key determinant of competitive advantage (Porter, 1980; 1985).

In order to extend the theory to incorporate external market variations Teece et al. (1997) coined the term dynamic capabilities. Teece et al. (1997, p. 517) state that "*winners have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences*". Hence, the dynamic capabilities perspective is not only inward-looking in relation to the organization and its strategies but also incorporates the notion of innovation.

The core idea of the dynamic capabilities perspective is that sustained performance is achieved by aligning the organization with shifting external environmental demands by achieving *evolutionary fitness*, defined as "*how well a dynamic capability enables an organization to make a living by creating, extending, or modifying its resource base*" (Helfat et al., 2007, p. 120). By definition, therefore, dynamic capabilities involve adaptation and change because they build, integrate and reconfigure other resources and ordinary capabilities.

However, the dynamic capabilities perspective cannot fully explain how a firm uses resources and capabilities to create competitive advantage (Helfat & Peteraf, 2003). Helfat (2003) distinguishes the terms resources and capabilities. *Resource* is an asset or input to production (tangible or intangible), while *capability* is the utilization of resources in a coordinated manner to achieve a goal. This distinction emphasizes that value does not arise from the possession of resources alone but includes the wise use of resources, and is linked to how resources are deployed, i.e. how they are combined within the firm. A firm must, therefore, continually develop expertise and innovations, and managers must possess entrepreneurial, in addition to managerial skills (Penrose, 1959). Thus, a capability, does not represent a single resource in the concert of other resources (e.g. financial assets, technology, manpower), but is a distinctive and superior method for the allocation of resources.

Related to the discussion about dynamic capabilities is the capabilities-lifecycle (CLC) perspective introduced by Helfat and Peteraf (2003) in order to formulate a dynamic resource-based view of the firm. The concept of CLC follows Wernerfelt's (1984) observation that products and resources are two sides of the same coin. Accordingly, Helfat and Peteraf (2003) suggest that capabilities, much like products, go through cycles of development,

maturation and decline. The author suggests that both ordinary and dynamic capabilities are subject to these lifecycles.

The dynamic capabilities approach has extended the applicability of the resource-based view of strategic management to a dynamic market environment (Eisenhardt & Martin, 2000). Faced with a dynamic market environment and uncertain market opportunities, a firm must build new skills and create new knowledge to enhance innovativeness and competitiveness (Cohen & Levinthal, 1990; Kogut & Zander, 1993). Capability adaptation is essential for long-term competitive advantage (Tallman, 2003). Dynamic capabilities give firms a sustained competitive advantage by avoiding the core rigidities which inhibit development, generate inertia and stifle innovation (Leonard-Barton, 1992). Accordingly, the main motivation behind the dynamic capabilities perspective is to explain how firms sustain their performance over time. Consequently, in order for firms to sustain their performance over time they must have the capacity to flexibly adapt – and the adaptation required is often related to the creation of new products, services or process (Hill et al., 2002). This is where the resource and capability perspective of strategic management overlap with ideas in innovation management, and when firms demonstrate that they have a capacity to replicate previous innovation success they are said to possess a certain innovation capability –also an ambiguous term in existing research.

Innovation capability

A firm's 'innovation capability' can be understood as the potential to innovate (Saunila & Ukko, 2012), or more specifically the "ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders" (Lerro, Linzalone & Schiuma, 2009, p. 11). It has been suggested that innovation capabilities are so-called higher-order capabilities or "the ability to mould and manage multiple capabilities" (Lawson & Samson, 2001, p. 380). Firms that possess these capabilities have "the ability to integrate key capabilities and resources of their firm to successfully stimulate innovation" (Lawson & Samson, 2001, p. 380). Accordingly, attempts to define innovation capability have overlapped with the theory of dynamic capabilities. In addition, within the conceptualization of innovation capability is the idea that capability is linked to renewal and performance of a firm over time, especially with changing markets and the idea that it is necessary for a firm to be flexible and adapt services and products offered. Moreover, innovation capability includes a combination and orchestration of resources to maintain fitness along with external changes. Again, the above definition appears to overlap with dynamic innovations;

however, innovation capability focuses more directly on the firm's ability to change its offerings, while dynamic capability emphasizes environmental fitness as an indication of performance (Helfat, et al., 2007).

A recent bibliometric study presented by Narcizo et al., (2017) revealed a total of 19 different definitions for 'innovation capability', and concluded that the variability in descriptions of the term make a unified definition difficult.

Innovation capabilities have been divided into different categories by different researchers. For example, Lawson and Samson (2001) suggested that innovation capabilities consist of seven elements (vision, competence base, organizational intelligence, creativity, idea management, organizational structures, culture and climate, and management of technology). Terziovski (2007) on the other hand, suggested just two categories: collaboration and knowledge transfer. Den Hertog et al. (2010) identified six dynamic service innovation capabilities (signalling used needs and technological options, conceptualizing, (un)bundling, (co)producing and orchestrating, scaling and stretching, and learning and adapting), arguing for innovation capability as contingent upon the context (i.e. whether the innovation is aiming at product or service improvements).

Consequently, the different approaches described above, and the different contexts from which innovation capabilities can be viewed may account for the ambiguity of definitions in the literature.

A contingency perspective on innovation capability

Several authors have suggested that innovation capabilities are dependent upon context. For example, Francis (2000) suggested that innovation capabilities "may not be unitary and may vary between organizational levels, configurations, national or firm-specific cultures, distinctive strategies, different threat levels, technological complexity or other factors" (p. 106). In other words, there are a number of contingency variables that may affect the type of innovation capabilities required. Variables of particular interest in recent literature include industry type (e.g., Forsman, 2011), geographical area or region (e.g., Guan & Ma, 2003), firm size (e.g., Keskin, 2006), and innovation type (e.g., den Hertog et al., 2010).

The degree of novelty and market characteristics are two contingency variables that have proven to be particularly helpful in studies related to innovation management as well as strategic management. One way to classify innovation is through different degrees of novelty (Dewar & Dutton, 1986). On one end of the spectrum are firms with incremental innovations in the form of minor improvements of existing products, services or processes (Ettlie, 1983). On the other end of the spectrum are firms with radical innovations

in the form of considerable transformations of existing products, services or processes (Chandy & Tellis, 2000). Results of empirical studies indicate that radical innovation processes are different from more incremental innovation processes (e.g., Sandberg & Aarikka-Stenroos, 2014). The type of innovation capabilities required for success depends on the degree of novelty. For example, innovation capabilities that are needed to carry out radical innovation processes are different from those needed to carry out incremental innovation processes. In general this idea is also supported by empirical work (e.g. Forés & Camisón, 2016; Subramaniam & Youndt, 2005).

According to Teece et al. (1997), the RBV is only applicable to sustained competitive advantage in static market environments and not in changing and fast-moving markets. From this we could also expect that the innovation capabilities required in a static market environment would be different from the capabilities required in a more changing and fast moving market environment. This idea is also supported with some empirical studies. Carbonell and Rodriguez (2006), for example, found that innovation speed is contingent on the level of market uncertainty. However, there is some discrepancy in this area of research and as such, how the required innovation capabilities vary between different market characteristics is not well understood.

The existing literature is lacking discussion on how different *combinations* of the two contingency variables (novelty and market characteristics) affect required innovation capabilities. The current paper aims to address this gap in knowledge. Four contexts emerge from the two contingency variables: 1) static market with incremental innovation, 2) static market with radical innovation, 3) changing and fast-moving market with incremental motivation, and 4) changing and fast-moving market with radical innovation.

The four contexts are illustrated in Figure 1.

Figure 1 shows the core innovation capabilities hypothesized to be necessary in each context. The following is a discussion of the types of innovation capabilities required in the four different contexts in more detail. While there are many factors involved in innovation capabilities, such as vision, creativity, idea management, organizational structures and others (Lawson & Samson, 2001), we focus here on knowledge and knowledge transfer since they have previously been proposed as the main elements of innovation capabilities (Terziovski, 2007).

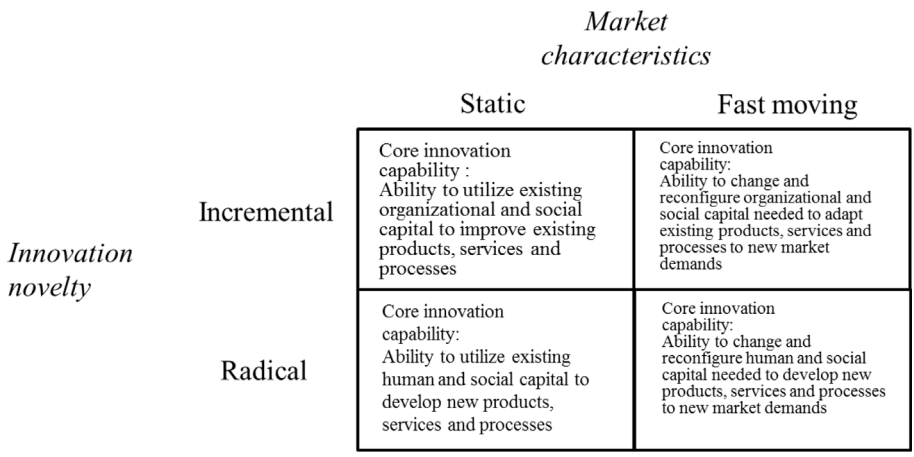

Figure 1. Four contexts for innovation capability based on degree of innovation novelty and market characteristics

Context 1 – Static market and incremental innovations

In a static market, a successful and established firm does not need to search for opportunities outside its existing market. Innovation in this context is focused on improving products and services the firm already delivers to its customers, as well as improving the production processes associated with these products and services. The firm in this case, must understand how *existing* customers perceive services and products and to what degree existing production processes are efficient. According to the findings of Subramaniam and Youndt (2005), knowledge in the form of organizational capital and in the form of social capital is necessary in these processes.

In Context 1, organizational capital refers to "institutionalized knowledge and codified experiences residing within and utilized through databases, patents, manuals, structures, systems and processes" (Subramaniam & Youndt, 2005, p. 451). Thus, organizational capital includes codified preserved knowledge related to how activities within the firm are carried out and to what degree these approaches have proven to be successful. In incremental innovation processes this prevailing knowledge is typically reinforced (Martin & Mitchell, 1998) leading to a path-dependent development of products, services and processes (Danneels, 2002).

In addition to organizational capital, social capital is necessary in a static market with incremental innovation. Social capital may be defined as "the knowledge embedded within, available through and utilized by interactions among individuals and their networks of interrelationships" (Subramaniam

& Youndt, 2005, p. 451). Research has indicated that interactions between employees and customers are beneficial in identifying how existing products and services may be improved (Laursen, 2011). Likewise, interactions between employees and suppliers are often important in incremental product-, service- and process- innovation (Song & Thieme, 2009). Lastly, incremental innovation processes benefit from interactions between employees that collaborate in teams since such collaboration improves how codified knowledge is updated (Subramaniam & Venkatraman, 2001).

Thus, to summarize the innovation capabilities necessary for success in Context 1 (static market/incremental innovation), a firm must both create knowledge internally and utilize external knowledge (Forés & Camisón, 2016). In this case, external knowledge flows from customers and suppliers to employees. However, knowledge from external actors outside the value chain, such as research institutions, universities, competing firms and consultancy firms, are not relevant in this context. The static market characteristics of Context 1 also imply that the firm does not need to change and re-configure resources and capabilities. Thus, dynamic capabilities as defined by Teece et al., (1997) and Teece (2014) play a limited role in this context.

Context 2 – Static market and radical innovations

As in Context 1, the market is static in Context 2 and as such, it is not necessary for an established firm to search for opportunities outside the existing market. In Context 2, innovation is about radically transforming the products and services a firm already delivers to its customers, as well as radically transforming the production processes associated with these products and services. Human capital is defined as "the knowledge, skills and abilities residing with and utilized by individuals" (Subramaniam & Youndt, 2005, p. 451). Radical innovation processes require "questioning prevailing norms and looking for fundamentally different solutions to existing problems" (Subramaniam & Youndt, 2005, p. 454). According to the findings of Subramaniam and Youndt (2005), the interaction of knowledge gained from human capital and knowledge gained from social capital positively influence the ability to carry out radical innovation processes. Organizational capital, on the other hand, plays a limited role in these processes. Creative and knowledgeable employees that are able to question existing solutions and routines and come up with or identify radically new ideas are needed for successful radical innovation (Tushman & Anderson, 1986).

Empirical research has indicated that creative and knowledgeable employees must interact with other employees within the firm during the radical innovation process (Cuevas-Rodríguez, Cabello-Medina & Carmona-

Lavado, 2014). Indeed, Martinkenaite and Breunig (2016) emphasize the role of individual employee learning in the organizational absorption process for successful learning capability and absorption capacity.

In addition to internal interactions within the firm, external interactions within the value chain are necessary for successful radical innovation processes (Soosay, Hyland & Ferrer, 2008). Traditional marketing research may not suffice since potential customers may have no prior experience with the planned innovations. However a firm may rely on design thinking (Brown, 2009; Kimbell, 2011; Lockwood, 2010) principles and encourage customer-centricity in the innovation and development process to allow for early feedback and experiences from the market.

External actors from outside the value chain are also beneficial to the radical innovation process. The findings of Belderbos, Carree, and Lokshin (2004), for example, confirmed that universities as well as competitors are important sources of knowledge during radical innovation processes. Thus, in Context 2 the firm needs a more developed absorptive capacity than in Context 1. The firm must identify, understand, obtain and use knowledge from a wide range of external organizations such as research institutions, universities, competitors, customers, and suppliers. The market environment in Context 2 is static and therefore, as in Context 1, the ability to reconfigure and change resources and capabilities is not necessary. The core innovation capabilities in Context 2 are associated with the firm's ability to build, buy, or source 'advanced' resources and exploit them.

Context 3 – Fast moving market and incremental innovations

The market environment in Context 3 is unstable and fast-moving and consequently, an established firm must continuously search for new opportunities both within and outside the existing market. Innovation in this context requires both the improvement of existing products, services and processes and the alignment of products and services with new markets and new customer needs. The core capabilities discussed in Context 1 are also relevant in Context 3 (see Figure 1). Thus, the firm must utilize organizational and social capital to succeed with incremental innovations.

However, in Context 3 the use of existing organizational and social capital is not sufficient. Due to a fast-moving market, a firm's existing resources, for example in the form of organizational and social capital, become less relevant. The following is an example to illustrate this concept: An electronics firm sells products to the oil industry, but due to reduced demand from the oil industry the firm must find new markets. Therefore, the firm decides to align and adjust their products and sell them to car manufacturers. This innovation is

considered incremental since the changes in the existing products may be minor (Ettlie, 1983). In this example, existing organizational and social capital may be insufficient during the innovation process. The electronic firm's social capital (interactions between employees within the firm and employees in the oil industry) is no longer relevant and the firm must build new social capital consisting of interactions with employees in the car industry. Likewise, organizational capital must be altered. The car manufacturers for example, may require that the firm implement a different production and quality system that aligns with standards in the car industry.

Consequently, success in Context 3 requires that the firm changes and reconfigures organizational and social capital and utilize new resources that emerge from this reconfiguration. According to Teece (1997), this ability is considered a dynamic capability.

Context 4 – Fast moving market and radical innovations.

As with Context 3, in Context 4 the market is unstable and fast-moving and therefore, established firms must continuously search for new opportunities both within and outside the existing market. Innovation in Context 4 however, is radical and involves developing entirely new products, services and processes that fulfil emerging needs of existing, as well as new customer segments. The core capabilities discussed in Context 2 are also relevant in context 4 (see Figure 1) in that the firm must utilize human and social capital to succeed with radical innovations.

However, as in Context 3, the ability to utilize existing resources is insufficient. The development of radically new products and services to new markets and customers in a fast-moving market may require a different human and social capital than that required in a stable market. In this context, the firm must adapt technical fitness to that of competitors and the preferences of the new customers (Helfat et al. 2007). Thus, in Context 4 a firm must change and reconfigure existing human and social capital and utilize this knowledge during the radical innovation process. Context 4 most closely resembles the high velocity (Eisenhardt & Martin 2000) and rapidly changing markets as recorded in extant dynamic capability literature (Teece, 2014) and as such, the ability to reconfigure human and social capital is considered a dynamic capability (1997).

CONCLUDING DISCUSSION

Due to the present ambiguities of the conceptualization of innovation capabilities (Lidija & Robert, 2014), this paper aimed to discuss the types

of innovation capabilities that are necessary for successful innovation performance. Moreover, due to the overlap of related concepts from the strategy and innovation literature, such as absorptive capacity (Cohen & Levinthal, 1990) and dynamic capabilities (Eisenhardt & Martin, 2000; Teece, Pisano & Shuen, 1997), the current paper also sought to provide an improved understanding of the strategy-innovation link.

The extant research includes a variety of approaches to innovation capability, with a wide variation in definitions and conceptualizations. Our assessment of the extant research literature revealed that in particular, two contingency variables could account for different approaches to innovation capability, as variation in definitions and conceptualizations might be based on an attempt to frame and define innovation capability within different contexts, without explicating how the understanding of the concept might be contingent on these contextual differences. Therefore, we suggest that the innovation capabilities necessary for success are contingent upon innovation novelty and market characteristics. The contexts that emerge from the combination of these two contingency variables clarify some of the discrepancies in the literature.

The discussion demonstrates that the knowledge and absorptive capacity necessary to carry out innovation varies between the contexts. For example, organizational capital is particularly important in incremental innovation contexts, while human capital is more important in radical innovation contexts. The capacity to understand external research based knowledge is more important in radical innovation contexts than in incremental innovation contexts.

The information presented contributes to the understanding of the relationship between innovation capabilities and dynamic capabilities. Dynamic capabilities are required for successful innovation in fast-moving markets, but have a more limited role in the context of static markets. There is therefore both an overlap and a separation between the concepts of innovation capabilities and dynamic capabilities, and as such, our framework (Figure 1) identifies distinctions between the related concepts of innovation capability, absorptive capacity and dynamic capability. This framework goes beyond the existing definition that innovation capability focuses more directly on the ability to change offerings, as opposed to dynamic capability that emphasizes environmental fitness. The presented framework illustrates that innovation capability is present both in contexts that require (Contexts 3 and 4) and contexts that do not require (Contexts 1 and 2) dynamic capability.

The suggested conceptual framework can be used by practitioners to identify the innovation capabilities an organization is able to build through their activities. Subsequently, this assessment can be used by managers

to determine the type of innovation capabilities they need focus on to successfully implement their innovation strategies.

It should be noted that the study has limitations and that the results should be used with some caution due to the conceptual nature of the study. Further empirical research is needed to verify whether conclusions reached may be observed in a true business environment. The results of the conceptual discussion suggest that future empirical research employs a contingency approach when innovation capabilities are examined. Moreover, further research should explore other potential contingencies, such as industry, geographical area or region, firm size, and innovation type, to further the understanding of how contingencies affect the strategy-innovation link in general, and innovation capability in particular.

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Abstract (in Polish)

Badania empiryczne potwierdziły istnienie pozytywnych relacji między realizacją działań innowacyjnych a przyszłymi wynikami organizacji. Firmy wykorzystują zasoby i możliwości do opracowywania innowacji w postaci nowych produktów, usług lub procesów. Niektóre firmy okazują się lepsze w odtworzeniu sukcesu innowacyjnego niż inne, a zdolność do tego określana jest jako zdolność do innowacji. Jednak termin ten nie jest jednoznacznie traktowany w literaturze. Istnieje kilka różnych definicji pojęcia, a rozróżnienie między zdolnościami innowacyjnymi a innymi rodzajami zdolności, takimi jak zdolności dynamiczne, nie zostało jednoznacznie określone, ani też zależności między tym pojęciem a innymi koncepcjami opartymi na zasobach i zdolnościach w teorii strategii. Chociaż zdolność do innowacji jest coraz bardziej identyfikowana jako kluczowa dla trwałej konkurencyjności przedsiębiorstwa we współczesnych, niestabilnych i złożonych rynkach, związek strategia – innowacje jest słabo rozwinięty w prowadzonych badaniach. Aby przezwyciężyć to wyzwanie, niniejszy artykuł podnosi następujące pytanie badawcze: Jaki rodzaj zdolności innowacyjnych jest potrzebny do pomyślnego wprowadzenia innowacji? Biorąc pod uwagę istniejące badania wybraliśmy konceptualny projekt badawczy po to, aby odpowiedzieć na nasze pytanie badawcze. W artykule uwzględniono ramy pojęciowe, aby omówić, jakie zdolności innowacyjne firmy muszą posiadać, aby odtworzyć sukces innowacyjny.

Biorąc pod uwagę dokładne zbadanie obecnej literatury dotyczącej zdolności innowacyjnych oraz powiązania strategia-innowacje, sugerujemy, aby zdolności innowacyjne rozpatrywać w dwóch wymiarach – innowacyjności i cech rynkowych. Te ramy umożliwiają identyfikację czterech różnych kontekstów zdolności innowacyjnych w matrycy dwa na dwa. Omawiamy rodzaje innowacji, które są niezbędne w czterech różnych kontekstach. Te nowe ramy przyczyniają się do zrozumienia powiązania strategiczno-innowacyjnego, a także wyjaśniają pojęcie zdolności w literaturze strategicznej i ustanawia związek między tymi strukturami a teorią zarządzania innowacjami.

Słowa kluczowe: *ramy koncepcyjne; zdolności; nowość; innowacyjność; cechy rynkowe; powiązania strategiczno-innowacyjne.*

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Inter- and Intra-firm Learning Synergy through Integrating Absorptive Capacity and Employee Suggestion Processes: A Case Study of the Firm Frauenthal Automotive Toruń

Andrzej Lis[1] and Agata Sudolska[2]

Abstract

The aim of the paper is to study relationships between the processes of absorptive capacity (inter-firm learning) and learning lessons through employee suggestions (intra-firm learning) and identify potential synergies between them. The research interest is focused on investigating the following problems: (1) How do organizations apply external knowledge to support intra-organizational learning processes? (2) How should the employee suggestion system be organized to increase (or build) absorptive capacity? The exploratory case study analysis is applied to answer research questions and achieve the aim of the study. The unit of analysis is constituted by inter-firm and intra-firm learning processes observed in the firm Frauenthal Automotive Toruń (FTO).

Keywords: *organizational learning; absorptive capacity; lessons learned; employee suggestion system.*

INTRODUCTION

Due to the fact that nowadays knowledge is treated as one of the most suitable resources to build a firm's competitiveness (e.g. Barlow & Jashapara, 1998; Zahra & George, 2002; Adams & Lamont, 2003; Rhodes, Lok, Yu-Yuan Hung & Fang, 2008; Beyer, 2011), in the contemporary competitive business environment the ability to learn becomes the priority of any ambitious company. Today, there is no doubt that the challenges of business reality require constant development of a firm's ability to integrate different kinds

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of knowledge, and to coordinate its usage, leading to valuable commercial outcomes (cf. Czerniachowicz, 2003; Beyer, 2012). Taking this into account, we assume that the enhancement of a firm's ability to learn, both through intra- and inter-firm learning, is a prerequisite for business success (in terms of its innovativeness and competitiveness).

Organizational learning is a process combining knowledge and change management, which results in cognitive and behavioral changes in an organization. The construct of organizational learning includes a variety of learning processes encompassing the areas of knowledge acquisition, information distribution, information interpretation and organizational memory (Huber, 1991). Learning processes may be sourced from external information and knowledge, as well as relying on knowledge developed internally by organization members. Inter-organizational learning requires a company to have an absorptive capacity which is defined as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128) or "a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic capability" (Zahra & George, 2002, p. 186). We assume the comprehensive view of the construct of absorptive capacity which consists of processes, routines and schemes, however, in our paper we will focus the research attention on the process of absorptive capacity due to the process-oriented perspective we applied in the study. Learning lessons from the experience of organization members is an example of intra-organizational learning processes supporting organizational efforts for continuous improvements. As pointed out by Garvin (1993), a successful continuous improvement program requires organizational commitment to learning. Combining all three constructs together, we may assume that absorptive capacity builds on the foundations of organizational learning, while implementing employee suggestion programs can be considered as an example of organizational routines and processes increasing the firm absorptive capacity[3].

Sun and Anderson (2010) examine the nature of relationships between absorptive capacity and organizational learning and they argue that absorptive capacity and organizational learning concepts share conceptual affinity. We take an assumption of the argument made by these authors that "ACAP [absorptive capacity] should be considered as a specific type of OL [organizational learning] which concerns an organization's relationship with external knowledge" (Sun & Anderson, 2010, p. 141). Similarly, Lis (2016) proves that the lessons learned process can be considered as an example of organizational learning processes and it follows the 4I model of organizational

3 The authors are grateful to the anonymous reviewer for this suggestion.

learning proposed by Crossan, Lane and White (1999). If both absorptive capacity and learning lessons through employee suggestion systems share conceptual affinity with organizational learning processes, then searching for links and synergies between both concepts seems to be something natural. The aim of this paper is to study relationships between the processes of absorptive capacity (inter-firm learning) and learning lessons through employee suggestions (intra-firm learning) and identify potential synergies between them. In particular, the research interest is focused on investigating the following problems:

- How do organizations apply external knowledge to support intra-organizational learning processes?
- How should the employee suggestion system be organized to increase (or build) absorptive capacity?

In order to explore the aforementioned relationships the qualitative approach focused on the case study analysis is applied. Inter-firm and intra-firm learning processes observed in Frauenthal Automotive Toruń (FTO) are the unit of analysis. The details concerning the sampling process, data collection and analysis are provided further in the section "Method of the study".

In our study, we adopt a position of methodological individualism as we support the claim that "social phenomena must be explained by showing how they result from individual actions, which in turn must be explained through reference to the intentional states that motivate individual actors" (Heath, 2015). According to the ontological claims to the methodological individualism, only individuals exist, all organizations consist of individuals (members), and organizations act through individuals (Kincaid, 2004, p. 301). We assume that the study of organizational learning processes is in line with the aforementioned statements. When considering the issue of organizational learning, it must be emphasized that only individuals can learn actively. Due to this, organizational learning is derived from transformation of individual knowledge into a firm's memory and routines (Mäkinen, 2002). As highlighted by Yli-Renko (1999), a company learns while any of its units or employees acquires knowledge recognized as useful to the firm's operations, which leads to potential behavior change. The significance of linking individual, group and organizational levels of learning is stressed also by Crossan, Lane and White (1999).

The paper consists of two parts: the theoretical grounding and the empirical research based on case study methodology. In the theoretical part, first of all, the idea and the process of organizational learning are examined. Secondly, the concept of absorptive capacity is discussed. Thirdly, the employee suggestion systems and the lessons learned methodology

are analyzed. Finally, the affinity between absorptive capacity and learning lessons through employee suggestion systems is explored. The literature review builds up the foundation for the empirical research. The empirical part of the paper starts with the presentation of the method of the study and the context of the study. Then, the paper explores the possibility to use external knowledge in support of the lessons learned process, triggered by employee suggestions. Finally, it discusses the role of employee suggestion systems to strengthen the company's absorptive capacity.

THEORETICAL GROUNDING

Organizational learning

Organizational learning is considered to be one of the key aspects of the knowledge management concept. In his model of knowledge management, Jashapara (2004, p. 12) enumerates organizational learning together with strategy, culture, and system and technology, among the dimensions of knowledge management in contemporary organizations. Organizational learning has been conceptualized in a variety of ways and there are numerous discussions concerning its nature and attributes. The lack of convergence is observed in the literature whether learning processes should be conscious and intentional, whether learning should always affect organizational effectiveness and whether it should result in behavioral changes (Huber, 1991, pp. 88-89).

As observed by Dodgson (1993), the construct of organizational learning is studied from various perspectives including: economic history, industrial economics, the theory of the firm and strategic management. The debate between the proponents of economic and behavioral perspectives contributed to the emergence and development of the concept of organizational learning (Olejniczak, Płoszaj & Rok, 2012; Olszewska, 2013; Jaskanis, 2016). Taking into account the aforementioned divergences in research findings and opinions, for further analysis the behavioral perspective will be applied i.e. we assume that organizational learning is a construct combining knowledge management processes (cognitive change) and change management processes (behavioral change). The choice of the behavioral perspective is motivated by the focus of our study on mechanisms and processes of learning, their antecedents and outcomes, and the role of relationships for learning processes.

According to Fiol and Lyles (1985), who follow the behavioral perspective, organizational learning is "the process of improving actions through better knowledge and understanding" (Fiol & Lyles, 1985, p. 803). In the literature there is a dispute whether organizational learning changes

actual or potential behaviors of an organization. Some researchers argue that organizational learning results in a change of a firm's actual behavior (e.g. Garvin, 1993; Holmqvist, 1999; Holmqvist, 2000). Garvin (1993, p. 80) highlights that, organizational learning refers to creating, acquiring and transferring knowledge for improved firm's actions. Some other researchers (Huber, 1991; Yli-Renko, 1999) perceive organizational learning as a change in the range of a firm's potential behaviors. Huber (1991, p. 89) claims that "[a]n entity learns if, through its processing of information, the range of its potential behaviors is changed". Despite differences in various approaches to define organizational learning, we can state that it combines the potential of knowledge with the efforts for the improvement and development of an organization.

Huber (1991) who applies the process-oriented perspective to study the phenomenon of organizational learning, identifies the set of processes and constructs which constitute organizational learning. His model includes: knowledge acquisition, information distribution, information interpretation and organizational memory. Due to the area of interest of the paper, special attention should be given to the process of knowledge acquisition which incorporates: congenital learning, experiential learning, vicarious learning, grafting knowledgeable individuals and organizations, and searching and noticing. The issues of learning from other organizations (vicarious learning) as well as searching and noticing external knowledge are associated with the concept of absorptive capacity to be explored in our study. Similarly, the concepts of lessons learned and employee suggestion systems share affinity with the assumptions of experiential learning.

Following the methodological individualism approach and assuming that all the processes of inter-firm and intra-firm learning occur through learning by individuals (organization members), the roles of organizational culture and knowledge signification (giving meaning to new knowledge) should be emphasized. The extraordinary role played by a learning culture is visible in the cases of both absorptive capacity and employee suggestion systems. As highlighted by Schein (2004), organizational culture directly refers to learning processes as it is defined by him as "a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and therefore to be taught to new members as the correct way to perceive, think and feel in relation to those problems" (Schein, 2004, p. 17). The approach presented by Schein underlies that organizational culture develops while knowledge is created on the level of enterprise assumptions. An organizational culture supporting learning strongly focuses on trust and interaction between employees, friendly relationships between co-workers,

efficient communication that gives employees the feeling of being listened to as well as the feeling of belonging and worth. Such values emphasized by a firm enable it to create a healthy environment fostering creativity, cooperation and knowledge exchange (Isaken, Lauer, Ekvall & Britz, 2001; Vera & Crossan, 2004; Freiling & Fichtner, 2010). As highlighted by several researchers, employees' teams characterized by a high ability to cooperate among team members and a trust in each other, deliver a better performance compared with the teams lacking good interpersonal relationships (Davidson & James 2007; Rowe & Guerrero, 2011). It results from the presence of discussion among employees and confronting different points of view. To behave this way, employees need to feel free while expressing their opinions, even if they are critical. However, people are open to a constructive exchange of critical feedback if they feel safe and rely on positive relationships and trust within a company. In turn, feeling safe and comfortable, they are more likely to take others' criticism and negative feedback as opportunities to learn and change. Moreover, according to the reference literature, learning culture strongly focuses on a self-motivated view of people and thus provides employees with challenging tasks and a wide range of freedom while performing, as well as leadership that allows risk-taking, experimentation and thus making mistakes. This means that organizational culture supporting learning processes involves tolerance for uncertainty and ambiguity in the workplace. Having such leaders, employees are not afraid of sharing ideas even if they are not perfectly sure about them (Ekvall 1996; Goleman, Boyatzis & McKee, 2000; Isaken et. al, 2001, Freiling & Fichtner, 2010).

Consolidating the study on learning cultures from the process-oriented perspective, Freiling and Fichtner (2010, pp. 161-166) identify the features of organizational cultures conducive to the components of the extended model of the organizational learning process. The catalogue includes:

- intuiting – "high willingness to actively shape the environment", "high willingness to interact with each other", "a self-motivated view on people", and "clear-cut mission and primary task";
- absorbing – "pragmatic orientation of people" and "the view that people are self-motivated";
- interpreting – "clear and common communication system", "leaders asking their employees for input"; "high ability to handle ambiguity" and "clear mission";
- integrating – "high willingness for discussion" and "informal internal coordination";
- institutionalizing – "flat hierarchy" and "clear mission and primary task".

In considering the processes of inter-firm and intra-firm learning, the issue of knowledge signification should be focused on. Due to the fact that

knowledge signification means giving meaning to new knowledge, it directly refers to the communication system within a firm. Knowledge signification concerns communicating to the employees why new knowledge is valuable, how it is linked to prior knowledge, how it is going to develop a whole company's body of knowledge, and how it can be used to deliver new values. It also refers to communicating to an organization's members, how the firm, and thus individual employees, will benefit from the new knowledge. Taking into account the nature of knowledge signification it can be treated not only as an aspect of a communication system within a company but also as one of the leadership aspects. It is indisputable that the ability and efficiency in giving meaning to new knowledge is a prerequisite for enhancing employees' activities concerned with learning (Nonaka, Toyama & Konno, 2000; Jonassen & Land, 2012).

Crossan et al. (1999) propose the 4I framework of organizational learning, consisting of interrelated processes of intuiting, interpreting, integrating and institutionalizing, observed at the individual, group and organizational level. Learning processes starting from intuiting and going through interpreting and integrating to institutionalizing are considered as feed forward, while the reverse direction (i.e. from institutionalizing to intuiting) is labeled as feedback. The process of organizational learning based on the 4I model is presented in Figure 1.

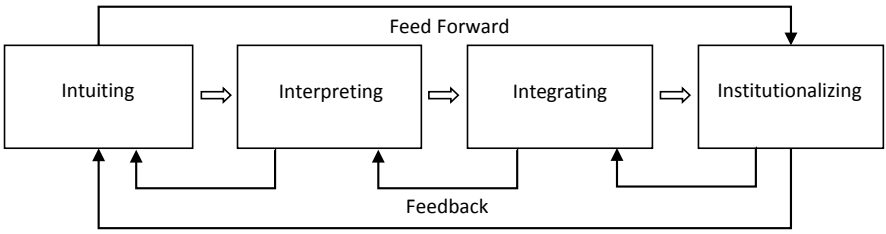

Figure 1. The process of organizational learning
Source: Authors' work based on Crossan, Lane & White (1999).

Intuiting, which occurs at the individual level, is defined as "the preconscious recognition of the patterns and/or possibilities in a personal stream of experience" (Crossan et al., 1999, p. 525; cf. Weick, 1995, p. 25). The foundation for intuiting is personal experience of an expert or an entrepreneur who express their feelings through images or metaphors, which leads to the process of interpreting. Interpreting means "the explaining, through words and/or actions, of an insight or idea to one's self and to others" (Crossan et al., 1999, p. 525). In the process of interpreting, organization members

develop their cognitive maps, and through conversation and dialogue build a shared understanding. Interpreting bridges both individual and group learning. Integrating, which occurs at the group level and the organizational level, is "the process of developing shared understanding among individuals and of taking coordinated action through mutual adjustment" (Crossan et al., 1999, p. 525). Institutionalizing, which takes place at the organizational level, is "the process of ensuring that routinized actions occur" (Crossan et al., 1999, p. 525). Through institutionalizing, the actions which produced positive outcomes become routines and then, when they are validated through diagnostic systems, develop into rules and procedures.

What should be emphasized is that the 4I model combines the aforementioned feed-forward processes with feedback processes of learning, which are used to exploit institutionalized knowledge in order to change the way of thinking and behavior of individuals and teams in an organization. As assumed by Crossan et al. (1999, p. 532), feedback learning processes begin at the organizational level (institutionalizing) and go on to the individual level (intuiting). However, as Freiling and Fichtner (2010, p. 160) claim, it has not been detailed which learning processes are included in the feedback loop and they make the proposal that the feedback consists of interpreting and integrating. As regards the feedback, Crossan et al. (1999, p. 532) point out the tension between exploration (feed forward) and exploitation (feedback). One of its consequences is the threat of driving out intuiting processes by institutionalized knowledge which may create barriers for innovative thinking and block the assimilation of new learning. It means that both individuals and organizations show tendencies to stick to outdated institutionalized knowledge. In order to mitigate such risks, the issue of unlearning should become a part of organizational practices. Unlearning is defined as "a process through which learners discard knowledge" (Hedberg, 1981, p. 18; quoted after Huber, 1991, p. 104) or "the process of reducing or eliminating pre-existing knowledge or habits that would otherwise represent formidable barriers to new learning" (Newstrom, 1983, p. 36). However, unlearning has both positive and negative effects. On the one hand, the unlearning process makes an 'empty space' for new knowledge but on the other hand an organization remains temporarily inactive (cf. Huber, 1991, pp. 104-105).

The 4I model focuses its attention on the intra-organizational learning processes and does not include the aspects of inter-firm learning which is crucial from the perspective of this study. Such a fact should be considered as a limitation for the applied research framework[4]. However, this weakness is mitigated by the extended version of the model proposed by Freiling and Fichtner (2010) who point out that knowledge generated within

4 The authors are grateful to the anonymous reviewer for this observation and their suggestions.

an organization is supplemented with knowledge absorbed from the environment. In consequence, Freiling and Fichtner (2010, p. 161) add to the 4I model the process of absorbing knowledge which occurs at the level of individual learning and makes a bridge between intra-organizational learning and the absorptive capacity.

According to several researchers, organizational learning may take place because firms make efforts to fill their knowledge gaps. It is observed that companies increasingly rely on external sources of knowledge to extend their knowledge assets to foster innovation and enhance performance (Haider, 2003; Lichtenthaler, 2009). Today, it is indisputable that a firm's ability to learn faster than its competitors is the only form of sustainable competitive advantage that entities of an entrepreneurial orientation have: and by focusing on being innovative and emphasising organisational learning as a way to discover something new that can bring added value, it allows them to strengthen their competitiveness (de Geus, 1988; Davenport & Prusak, 2000; Rhodes et al., 2008). Certainly, a company has a choice – it may create necessary knowledge itself (e.g. through intensive R&D activities) or may acquire desired knowledge from outside. However, even in the case of acquiring new knowledge, a firm needs an absorptive capacity to make use of this new knowledge in order to apply it to commercial ends. Taking into account the above, we can state that a firm's knowledge base is derived both from its managers and employees individual knowledge enhancement and a firm's embeddedness in various inter-firm relationships established in the market.

Absorptive capacity

Nowadays, there is considerable agreement between researchers on the view that inter-firm learning, through knowledge transfer or common creation of new knowledge necessary to sustain a firms' competitiveness, is a frequent reason for establishing inter-firm relationships. Inter-firm learning means learning by organizations having both formal business relationships such as strategic alliances, collaborations with suppliers and distributors or licensing agreements (Larsson, Bengtsson, Henriksson & Sparks, 1998) and informal contacts with business partners, trade fairs exhibitors, inter-firm platforms users etc. The expansion and complexity of knowledge increases rapidly nowadays, making it very difficult for a single company to contain and capitalize on all the relevant knowledge. Thus, firms operating in such a reality need to utilize business partnerships, boundary-spanning personnel, and other policies of inter-firm cooperation to increase their absorptive capacity (Anderson, Forsgren & Holm, 2001; Lane, Koka & Pathak, 2006;

Palakshappa & Gordon, 2007). Inter-firm learning is perceived as an extension of organizational learning, developing enterprise knowledge and providing new insights into the firm's strategy (Mohr & Sengupta, 2002). The process of inter-firm learning involves acquiring, disseminating, interpreting, using and storing the information within or across the firm which leads to creating knowledge that strengthens a firm's innovativeness and competitiveness (Sudolska & Lis, 2014). However, companies need absorptive capacities in order to combine external knowledge with their internal knowledge bases and produce positive outcomes.

The concept of absorptive capacity was first proposed by Cohen and Levinthal (1990) who use this term to label a firm's capability to innovate and thus be dynamic. The issue of absorptive capacity is studied both at the macro- and micro-economic level. A review of literature on the nation-level analysis of absorptive capacity is provided among others by Narula (2003) or Crisculo and Narula (2008). However, the focus of this paper is exclusively on the firm absorptive capacity.

According to Cohen and Levinthal absorptive capacity consists of "the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128). Absorptive capacity is described as the collective ability of a firm resulting from individual abilities of its members whose prior knowledge and experience provide the ability to recognize new information, assimilate it and create value out of it (Cohen & Levinthal, 1990; Sun & Anderson, 2010). Cohen and Levinthal (1990) propose that (the process of) absorptive capacity involves three key elements (stages): recognizing the value of new information, assimilating that information and applying it to commercial ends (cf. Figure 2).

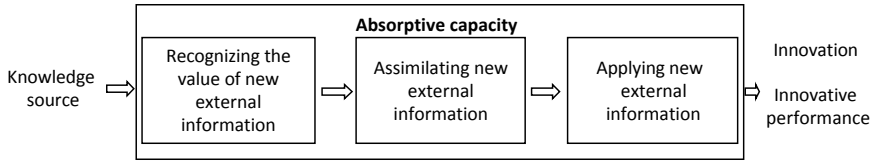

Figure 2. The absorptive capacity process based on the Cohen and Levinthal approach

Source: Authors' work based on Cohen and Levinthal (1990).

Since the concept of absorptive capacity was first proposed by Cohen and Levinthal (1990), subsequent researchers have given it extensive attention. Zahra and George (2002, p. 186) who reconceptualize the absorptive capacity concept argue that it is "a set of organizational routines and processes by

which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic capability". According to their approach, absorptive capacity (process) encompasses four components (stages): knowledge acquisition, knowledge assimilation, knowledge transformation and knowledge exploitation. Zahra and George (2002) combine these components into two subsets with different value-creating potentials: potential absorptive capacity (involving knowledge acquisition and assimilation) and realized absorptive capacity (involving knowledge transformation and exploitation) (cf. Figure 3).

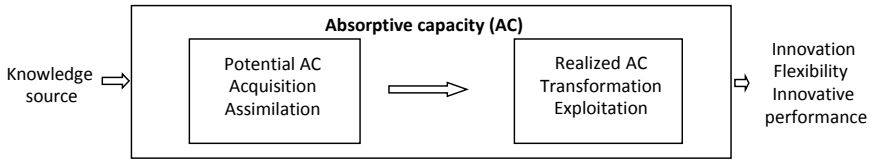

Figure 3. The absorptive capacity process based on the Zahra and George approach

Source: Authors' work based on Zahra and George (2002).

In the Zahra and George (2002) approach, knowledge acquisition "refers to a firm's capability to identify and acquire externally generated knowledge that is critical to its operation". Knowledge assimilation is described as "the firm's routines and processes that allow it to analyze, process, interpret and understand the information obtained from external sources". As far as knowledge transformation is concerned, Zahra and George perceive it as "a firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge". Finally, knowledge exploitation is defined as "the routines that allow firms to refine, extend and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into operations" (Zahra & George, 2002, pp. 189-191).

While deliberating the issue of absorptive capacity, it is important to stress that the Zahra and George (2002) conceptualization is criticized by some researchers e.g. Todorova and Durisin (2007) who call for reintroducing the elements of the original Cohen and Levinthal (1990) concept. According to Todorova and Durisin (2007) knowledge assimilation and knowledge transformation should be treated as two alternative, not sequential, processes as proposed by Zahra and George (2002). Todorova and Durisin also criticize distinguishing between potential and realized absorptive capacity, maintaining that the definitions of these two subsets of absorptive capacity components are ambiguous and unclear. Referring to the aforementioned

deliberations, we propose to illustrate the reconceptualized process of absorptive capacity in Figure 4.

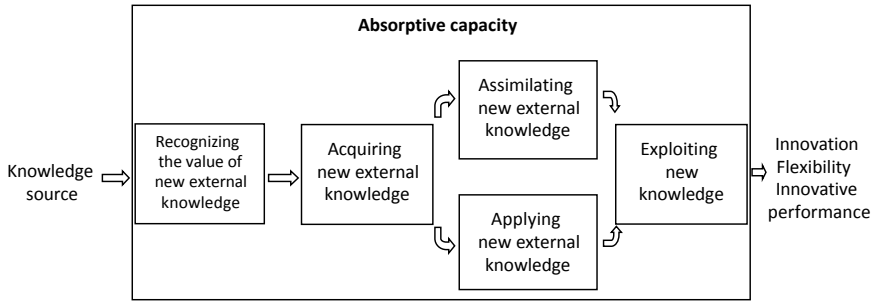

Figure 4. The absorptive capacity process based on the Todorova and Durisin approach

Source: Authors' work based on Todorova and Durisin (2007).

Taking into account the above presented approaches concerning the components (stages) of the absorptive capacity process, we assume that despite differences in distinguishing particular absorptive capacity elements, the heart of the issue is the same in all researchers' approaches. Absorptive capacity is a process of developing a firm's knowledge base through relations with outside sources and therefore leading to strategic change, responding to specific environment requirements, and thus to renewal of a company.

In literature, there are numerous studies aimed at identifying the antecedents and enhancers of absorptive capacity. The examples include:

- Cohen and Levinthal (1990): firm prior knowledge and experience, R&D investments, individual employees absorptive capacity and communication system;
- Zahra and George (2002): exposure to diverse and complementary sources of knowledge, firm experience, social integration mechanisms and regimes of appropriability;
- Sun and Anderson (2010): type of intuition represented by organization members who receive external knowledge, dialogue, diversity of team members' experience, environment supporting innovativeness, ambidextrous leadership, reward and recognition mechanisms and effective allocation of organizational resources.

Summing up, we appreciate and recognize as the most comprehensive the model of the absorptive capacity process based on the Todorova and Durisin (2007) approach presented in Figure 4. Nevertheless, we develop the assumptions of our study on the Sun and Anderson (2010) model of affinity between the processes of absorptive capacity and organizational

learning which is based on the Zahra and George (2002) reconceptualization of absorptive capacity. Therefore, we will use the Zahra and George (2002) model of absorptive capacity including such components as: acquisition, assimilation, transformation and exploitation.

The process of learning through employee suggestions

Employee suggestion systems are traditionally associated with Total Quality Management and Kaizen in particular (Imai, 2012). Nevertheless, an interesting resemblance may be observed between employee suggestion systems and lessons learned systems which are the examples of organizational learning. The similarities between the two aforementioned systems are manifested in their definitions, aims and processes.

Discussing an employee suggestion system, van Dijk and van den Ende (2002) refer to the definition provided by Ekval (1971) who characterizes it as "an administrative procedure for collection, judging and compensating ideas, which are conceived by employees of an organization" (van Dijk & van den Ende, 2002, p. 387). Lessons learned systems are defined as "knowledge management (KM) initiatives structured over a repository of lessons learned (LL). Lessons learned are knowledge artifacts that convey experiential knowledge that is applicable to a task, decision, or process such that, when reused, this knowledge positively impacts an organization's results" (Weber & Aha, 2003, p. 287).

As observed by van Dijk and van den Ende (2002, p. 387) "[f]rom a perspective of knowledge development and diffusion in the firm, suggestion systems aim at capturing good ideas, the first part of the 'knowledge-brokering cycle' (Hardagon & Sutton, 2000), and they are an example of externalization of knowledge (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995)". Lessons learned processes are considered to be the examples of knowledge externalization processes, too (Girard, 2004, pp. 22-23; Lis, 2014a, pp. 66-67). Similarly, the aim of lessons learned is to externalize the experiential knowledge of organization members and use it for improving an organization. For instance, as officially declared in military publications (NATO doctrine in this particular case), the aim of the Lessons Learned procedure is "to learn efficiently from experience and to provide validated justifications for amending the existing way of doing things, in order to improve performance, both during the course of an operation and for subsequent operations" (AJP-3(B) 2011, p. 4.19).

Neagoe and Marascu Klein (2010) point out four components of the employee suggestion cycle: encouraging employees to participate in the system, motivating them to write proposals, processing proposals (i.e.

reviewing them, evaluating and implementing validated ideas), and awarding payments and commendations. Focusing on learning processes Van Dijk and van den Ende (2002, p. 389) enumerate three following stages of the employee suggestion process: idea extraction, idea landing and idea follow-up. Idea extraction focuses on externalizing employee tacit knowledge and transforming it into explicit knowledge. Then, the knowledge externalized in the process of idea extraction is assimilated by an organization in the stage of idea landing. Finally, the submitted idea is processed and turned into innovations in the process of idea follow-up. As regards lessons learned, Milton (2010, pp. 16-20) indicates three steps in the lessons learned cycle: identifying lessons, assigning actions to resolve issues and institutionalizing the changes in an organization. The process of lesson identification is achieved through reviewing the experience of organization members, analyzing submitted observations and generalizing in order to propose conclusions and recommendations for change. A lesson identified, being an outcome of aforementioned operations is defined as "a recommendation based on analyzed experience (positive or negative) from which others can learn in order to improve their performance on a specific task or objective" (Milton, 2010, p. 17). As such, the process of lessons identification can be considered as an example of cognitive change in an organization. Assigning action is the second step in the lessons learned cycle. A lesson is not learned until the change is implemented, which means that cognitive change mentioned above must be followed by behavioral change to close the loop of learning lessons. According to such a way of thinking a lesson learned is defined as "a change in personal or organizational behavior as a result of learning from experience" (Milton, 2010, p. 16). The third step of the lessons learned cycle is labeled as institutionalization of lessons which focuses on disseminating lessons in an organization through broadcasting them via the channels of intra-organizational communication, and training and educating employees.

Fairbank and Williams (2001) claim the employee suggestion systems require supporting technology to encourage employee motivation to participate in such programs. They assume that an effective employee suggestion system technology should be founded on enhancing three pillars i.e. employee expectancy (employee feeling that they are competent enough to participate in the program), instrumentality (receiving appropriate feedback) and valence (offering attractive rewards). In their Creativity Transformation Model, Van Dijk and van den Ende (2002) identify organizational culture and structures as the key organizational success factors for the implementation of effective employee suggestion systems. Discussing how the aforementioned antecedents influence the processes of employee suggestion, they point out the roles of: "encouragement" by organizational culture at the stage of idea

extraction, "organizational support" from organizational culture and structure for idea landing and "committed resources" being a part of organizational structure for idea follow-up. The detailed items included into the Creativity Transformation Model are (Van Dijk & van den Ende, 2002):

- encouragement: "alignment", "possibility of reflection" and "emanation of idea receptiveness";
- organizational support: "idea receptiveness", "accessibility of the system" and "broadness of scope";
- committed resources: "intensity of evaluation", "use of rewards" and "processing of ideas".

Employee suggestion programs and lessons learned capabilities rely on the willingness of organization members to externalize their knowledge and share it with others. Therefore, effective reward systems, as well as organizational culture and a climate encouraging positive employee behaviors manifested in sharing knowledge, are considered to be the antecedents of paramount importance for the efficiency and effectiveness of such intra-firm learning processes (Van Dijk and van den Ende, 2002; Lis, 2012a, 2012b, 2014b; Marksberry, Church & Schmidt, 2014). Organizational culture conducive to employee suggestions programs and lessons learned processes should be oriented to creating organizational conditions and encouraging knowledge transfer, and to learning from both organizational failures and successes (Edmondson, 2007; Kazojć, 2013).

In search of synergy between inter- and intra-firm learning

As discussed earlier, the ability to identify and recognize the value of external knowledge is the first step in developing a firm's absorptive capacity. However, the ability to recognize the desired knowledge is the outcome of a firm's competences resulting from its prior related knowledge. As highlighted by many authors, most companies with a high level of receptivity to new knowledge are at the same time very successful in learning (e.g. Cohen & Levinthal, 1990; Child, Faulkner & Tallman 2005; Trott, 2008). Also a firm's success in combining the new knowledge with the one existing inside it, and then applying the new knowledge to create an innovative value, depends on both prior related knowledge and the activities aimed at gathering knowledge, and embedding it within a firm's routines (Cohen & Levinthal, 1990; Child et al., 2005; Nag & Gioia, 2012).

While examining the issues of intra- and inter-firm learning in the reference literature, we can observe the interchangeable use of organizational learning and absorptive capacity concepts. We assume that it results from the conceptual affinity of both concepts. Existing literature examining the relationships between absorptive capacity and organizational learning

concepts presents some divergent views. Several authors perceive absorptive capacity as an antecedent of organizational learning (Mowery, Oxley & Silverman, 1996; Szulanski 1996; Reagans & McEvily 2000; Meeus, Oerlemans & Hage 2001; Oliver 2001; Kim & Lee, 2002). As highlighted by these authors, firms with a high level of absorptive capacity are likely to recognize and utilize new knowledge from outside a company to strengthen their innovativeness and competitiveness. Following this approach, organizations must have the capacity to absorb inputs to be able to generate outputs. For example Szulanski (1996), who conducted research on knowledge transfers in 122 companies, found that lack of absorptive capacity was a main barrier to internal knowledge transfer within a firm. Such correctness is related to the fact that absorptive capacity results from a long-lasting process of knowledge accumulation (Szulanski, 1996; Tsai, 2001). According to another literature stream, absorptive capacity is viewed as an outcome of organizational learning (Liao, Fei & Chen, 2007; Schilling, 2002). The studies conducted by Liao et al. (2007), as well as by Schilling (2002), prove that knowledge sharing within a firm increases its stock of prior knowledge, which in fact means building a firm's absorptive capacity. Moreover, following the third approach, absorptive capacity and organizational learning are perceived as having a recursive relationship (Autio, Sapienza & Almeida, 2000; Barkema & Vermeulen, 1998; Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Tsai 2001). This approach suggests that a firm's absorptive capacity enables a company to learn from external sources (such as inter-firm R&D cooperation) and next this learning is invested and exploited by internal R&D activities, which build a firm's absorptive capacity. This in turn results in a firm's greater R&D cooperation with external sources and thus further learning.

Referring to the model of absorptive capacity proposed by Zahra and George (2002) and the model of organizational learning by Crossan et al. (1999), in their framework Sun and Anderson (2010) propose the following involvement of organizational learning processes into the components of absorptive capacity. Knowledge acquisition is argued to be a learning capability including intuition and interpretation processes at individual and group levels of learning. Knowledge assimilation is perceived as a group learning activity involving interpretation processes. Knowledge transformation is related to integration processes that are observed at group and organizational levels. And finally, according to Anderson and Sun, knowledge exploitation refers to the process of institutionalization at the organizational level (Sun & Anderson, 2010, pp. 141-146). In other words, Sun and Anderson suggest that absorptive capacity should be perceived as a concrete example of organizational learning that concerns a firm's relationship with new external knowledge (Sun & Anderson, 2010, p. 130).

Inspired by the study of Sun and Anderson (2010), Lis (2016) investigates the relationships between the concepts of organizational learning and lessons learned, and observes a similar affinity between them. In his study, Lis (2016) compares and contrasts the Crossan et al. (1999) model of organizational learning with the Milton (2010) lessons learned lifecycle (modifying it a little through splitting a lesson identification stage into two phases i.e. observation collection and analysis). According to the model, observation collection is an equivalent of the intuition process. In the stage of gathering observations, referring to their experience and expertise, organization members identify the gaps between the reality and expected (model) outcomes, notify best practices i.e. the behaviors not institutionalized yet which proved their effectiveness in solving organizational problems or they provide recommendations for organizational improvements. Identified observations are submitted to the lessons learned systems (cf. Milton, 2010; Jabłoński & Lis, 2012, p. 178). The externalization of observations made by organization members which is an equivalent of idea extraction in the employee suggestion process (cf. van Dijk & van den Ende, 2002, p. 389) matches to the idea of "the preconscious recognition of the patterns and/or possibilities in a personal stream of experience" i.e. intuition in the model by Crossan et al. (1999, p. 525). Analysis of an observation submitted refers to the process of interpretation. In the analysis stage, organization members make attempts to discover the root causes of identified problems, their antecedents and related aspects, and develop recommendations for further actions. This stage of the lessons learned process resembles idea landing in the model of the employee suggestion process (cf. van Dijk & van den Ende, 2002, p. 389) and shares affinity with interpreting in the 4I framework of organizational learning which is defined as "the explaining, through words and/or actions, of an insight or idea to one's self and to others" (Crossan et al., 1999, p. 525). Planning and implementation of remedial actions correspond to the process of integration and partially to institutionalization in the 4I framework. Planning and implementation of remedial actions establish the bridge between knowledge management and change management processes and they occur at the group and organizational levels. Their gist manifests in "the process of developing shared understanding among individuals and of taking coordinated action through mutual adjustment" (integration) and "the process of ensuring that routinized actions occur" (institutionalization) (Crossan et al., 1999, p. 525). Finally, dissemination of lessons and best practices may be considered as the embodiment of the institutionalization process in the 4I framework, as it is used as one of the tools for sharing institutionalized knowledge within an organization. The stages of planning and implementing remedial actions, as well as lessons dissemination, seem to share affinity with the phase of idea

follow-up in the model of the employee suggestion process (cf. van Dijk & van den Ende, 2002, p. 389). Summing up, lessons learned can be considered as a particular example of intra-organizational learning processes based on experiential knowledge of organization members. It should be highlighted that the aforementioned assumptions concerning the affinity of the model of the lessons learned process and the 4I framework of organizational learning, seem to be logical in the light of discussed theories but they are relatively fresh ideas which have not been tested empirically. Therefore, making the first attempt to their empirical validation will be an additional contribution of the paper.

Taking into account the aforementioned studies showing the affinities between absorptive capacity and organizational learning as well as lessons learned and organizational learning (cf. Table 1), an attempt can be made to combine them and analyze the relationships between them.

Table 1. The comparative analysis of the processes of organizational learning, absorptive capacity and lessons learned

Levels of learning	Individual	Individual and group	Group and organizational	Organizational
Organizational learning	intuiting	interpreting	integrating	institutionalizing
Absorptive capacity	acquisition	assimilation	transformation	exploitation
Lessons learned	lessons identification		planning and implementation of remedial actions	dissemination
	observation collection	analysis		

Source: Authors' work based on Crossan et al. (1999), Zahra and George (2002), Milton (2010) and Lis (2016).

Concluding, absorptive capacity and organizational learning concepts share several theoretical similarities and both are said to enable the strategic renewal of a firm. The dynamic capability of absorptive capacity is perceived as a building block, creating new core competences of a company that undergoes a strategic change. Also, organizational learning provides the new organizational competences needed for strategic renewal. Therefore, we follow the view of Sun and Anderson (2010) who argue that absorptive capacity should be perceived as a specific type of organizational learning that refers to a firm's relationships with external knowledge, and the view of Lis (2016) confirming the affinity between organizational learning and lessons learned processes. The empirical part of the paper is an attempt to exemplify the synergy of absorptive capacity and learning lessons through employee suggestions, upon the case study of the firm Frauenthal Automotive Toruń.

RESERCH METHOD

Method of the study

The single case study analysis is chosen as the research approach to achieve the aim of the study i.e. to explore the relationships between the processes of absorptive capacity (inter-firm learning) and learning lessons through employee suggestions (intra-firm learning) and identify potential synergies between them. The usefulness of the qualitative approach to analyze the issues related to absorptive capacity is highlighted by Duchek (2013) who claims that "a practice-based approach and the use of qualitative methods, such as ethnographies and narratives, are the most appropriate methods of identifying the routines or practices that build absorptive capacity" Duchek (2013, p. 325). The review of literature confirms that the case method is applicable to absorptive capacity studies and finds its proponents (cf. Kim, 1998; Van den Bosch, Volberda & De Boer, 1999; Easterby-Smith, Graça, Antonacopoulou & Ferdinand, 2008; Noblet, Simon & Parent, 2011; Duchek, 2013; Lis & Sudolska, 2015). Similarly, the case study methodology is used in research of organizational learning processes (cf. Crossan & Berdrow, 2003), lessons learned capabilities (cf. Burley & Pandit, 2008; Foley, Griffin & McCartney, 2011; Jabłoński & Lis, 2012) and employee suggestion systems (cf. van Dijk and van den Ende, 2002).

The research process followed the pattern recommended in methodology literature (cf. Yin, 2010; Strumińska-Kutra & Koładkiewicz, 2012, cf. Patton & Appelbaum, 2003; Stake, 2010) and included: (1) defining study questions; (2) selecting the unit of analysis and the sample within the studied case; (3) planning and collecting data; (4) analyzing data; and (5) writing a case study analysis. As the research is driven by exploratory philosophy, instead of formulating theses or hypotheses, two study questions were proposed:

- How do organizations apply external knowledge to support intra-organizational learning processes?
- How should the employee suggestion system be organized to increase (or build) absorptive capacity?

Inter-firm and intra-firm learning processes observed in Frauenthal Automotive Toruń (FTO) were chosen as the unit of analysis. Taking into account the macro-level perspective FTO, being a Polish subsidiary of an Austrian corporation, should be considered as a case operating in the pre-frontier or close to frontier-sharing stage context. In such a context it becomes more and more challenging to acquire new, external knowledge due to its increasing complexity and difficulties in getting access to valuable knowledge off the shelf. Therefore, emphasis is given to the development

of new knowledge through cooperative strategies such as joint ventures or alliances (cf. Narula, 2003).

In earlier studies, it was proved that FTO is a company representing a high level of absorptive capacity. Lis and Sudolska (2015) measured the level of potential and realized absorptive capacity in FTO with the use of scales proposed by Jansen, Van Den Bosch and Volberda (2005). Their findings indicate that FTO absorptive capacity is very close to the benchmark made by Jansen et al. (2005) and even exceeds it in the component of knowledge acquisition. Although u-bolts for trucks manufactured by FTO are not state-of-the-art products and there is little room for product innovations, the company operates in a highly competitive industry and makes every effort to defend its number one position in the European market and to diversify in related businesses. Therefore, FTO pays a lot of attention to learning processes both in the inter-firm and intra-firm context which are oriented to process innovations, in order to seek an increase in efficiency and to strengthen the firm's competitive advantage. Moreover, what is worth mentioning is that the management team at FTO is open to participate in research projects, which allows us to smoothly conduct the study process. Semi-structured interviews and the analysis of company documentation were applied for collecting data. Five managers at FTO contributed to the study as interviewees. The respondents were selected due to their knowledge and understanding of organizational learning processes. The primary parameters of sampling are presented in Table 2.

Table 2. Primary parameters of applied sampling

Characteristics of the sample	Informants
The company operates in the automotive components industry	Managing Director (MD)
The leader in the European market of u-bolts for trucks	Human Resources Manager (HRM)
Orientation to defend its market position and diversify in related businesses	Production Manager (PM)
Strong orientation to organizational learning including both inter-firm and intra-firm learning	Quality Manager (QM)
Representing a high level of absorptive capacity confirmed by earlier research	Continuous Improvement Leader (CIL)

The interviews related to inter-firm and intra-firm learning processes and relationships between them. Discussions focused on processes enumerated in the model presented in Table 1. First of all, it was our idea to externalize knowledge and opinions of the respondents focusing on structural aspects organized around the issues of applying external knowledge to support intra-organizational learning processes and organizing the employee suggestion

system to increase the company absorptive capacity. Structural dimensions were based on the phases of absorptive capacity and lessons learned processes and included the following components: (1) absorptive capacity: acquisition, assimilation, transformation and exploitation; (2) lessons learned: lessons (employee suggestions) identification, analysis, remedial actions implementation and lessons (employee suggestions) dissemination. We provided the respondents with short definitions for each dimension and we explained key indicators. Secondly, we enabled the interviewees to contribute to the study with the issues related to the subject which emerged during interviews. Each interview lasted on average about 90 minutes. All of them were conducted at the company's site in Toruń, Poland. In accordance with earlier arrangements with the management of the company, paper and pencil interviews (PAPI) were not recorded. The time perspective of interviews was concentrated on current operations of the company. However, some examples from the history were elicited having as reference points the takeover of the company by the Austrian corporation Frauenthal and a shift from a family business to a corporate model (2007) and the beginning of the Lean Management program implementation (2010). Moreover, the documentation of the company related to the employee suggestion system was analyzed. The analysis included: the procedure of staffing employee suggestions, compensation regulations related to employee suggestions, 'Trust Curve' charts presenting the number of ideas proposed within the employee suggestion system each month and comparing it with the number of improvements introduced out of these suggestions. While analyzing collected data, we applied a thematic content analysis method based on the units of meanings such as: words, events or practices. We used the stages of the absorptive capacity and lessons learned processes identified in Table 1 to categorize collected data. Moreover, we made an attempt to assess the influence the processes of absorptive capacity and learning lessons through employee suggestions have on each other. Initially, it was our intent to use the point assessment scale ranging from 1 to 10. However, during interviews we realized difficulties in applying the point assessment. Therefore, we followed the suggestions of our respondents and changed to the descriptive assessment scale including three levels measuring the intensity of mutual influence between the processes of absorptive capacity on learning lessons through employee suggestions i.e. low, medium and high influence (cf. Tables 3 and 4). Certainly, we are aware of the limitations related to such a simplification which should be eliminated in prospective studies.

In order to ensure the quality of the research we judged our case study against the criteria of construct validity, external validity and reliability. Applying the testing procedure we followed tactics recommended by Yin

(2010, pp. 201-206). Construct validity was assured by the use of a variety of data sources and a review of the draft of the case study report by key informants. As regards external validity we are aware of the limitations of a single case study method to develop generalization. However, relying on analytical generalization we made attempts to compare and contrast our findings from FTO against the theory and concepts of other researchers in the field. We used a case study protocol and a case study database to ensure that the research process was properly documented to provide the required level of reliability. As our research represents an exploratory approach, we followed the suggestion to exclude the test of internal validity, which according to Yin (2010), should be applied for explanatory or casual case studies but not for exploratory cases.

The structure of the case study analysis includes: the presentation of the study context, the analysis of the inter-firm and intra-firm learning processes identified in FTO, and the two sided analysis and discussion of relationships and possible synergies between inter-firm learning (with the focus on the absorptive capacity process) and intra-firm learning (focused on but not limited to learning lessons through the company employee suggestion system).

Context of the study

Frauenthal Automotive Toruń (FTO) is a Polish subsidiary of the Austrian corporation Frauenthal Automotive Components. FTO is a metal processing company operating in the automotive components industry. The company is number one in the European market for u-bolts (metal u-shaped elements with screw threads on both sides used to fix a chassis and a body of heavy trucks) and number two globally in this niche industry. Main customers of FTO are: Volvo (32% of sales in 2013), Scania (27%), BPW (21%) and Renault Trucks (15%).

FTO was established in 1993 by a Swedish entrepreneur under the name Pol-Necks. Since 2000, the company has been producing u-bolts, mastering in cold bending technology and (since 2003) in hot bending technology. In 2004, the standard ISO/TS 16949:2002 was implemented and production reached a level of 1 million of u-bolts. In 2005, the company introduced the in-house Dacromet painting technology enabling it to stand-out from its competitors. In 2007, the company was taken over by the Austrian corporation Frauenthal Automotive Components, the business portfolio was extended to include pins and screws, and ISO 14000:2004 and OHSAS 18001:2007 were implemented. In spite of problems in the automotive industry as a result of the world economic crisis (2008), the company showed high resilience and

quickly recovered, reaching a production level of 2 million u-bolts in 2010. Moreover, the change in ownership resulted in investment in new machinery and production process optimization (Historia firmy, nd), and in 2011 sales rocketed to 2.8 million units. In 2012, the company changed its name to Frauenthal Automotive Toruń and since 2016 has also been a supplier to Volkswagen.

FTO is a medium-size enterprise with ca. 150 people. The key components of the FTO organizational structure include: Production Department, Development Department, Finance Department, Sales Department, Quality Manager Office, and HR Business Partner Office.

ANALYSIS

Inter-firm learning process

Frauenthal Automotive Toruń actively searches for knowledge in its environment and is very open to inter-firm learning. The company makes attempts to learn from other companies within the Frauenthal group, its customers, suppliers and business partners. FTO shares lessons and best practices within the framework of the Frauenthal business family. As noticed by the HR Manager, for instance "[t]he approach of searching for internal and external knowledge has been applied while planning the implementation of the SAP system. We visited other plants in the Frauenthal Group which implemented SAP one or two years ago and have collected best practices as well as we have learned from their mistakes. On top of that we added to it our internal knowledge and expectations on how business systems work or should work." Learning from customers is achieved through analyzing their requirements and complaints. FTO pays a lot of attention to understanding the detailed specification of requirements of its customers and translating them into intra-organizational procedures and routines. Moreover, the company has established formal procedures to assimilate, transform, and exploit knowledge acquired from complaints submitted by customers. Customer requirements, reviews and feedback are used to optimize FTO internal processes. As highlighted in the interviews with the Managing Director: "Claims create an opportunity to learn and change things for the future. The team dealing with claims look for short- and long-term solutions". In order to better understand the needs of customers and their processes, FTO employees visit customer plants. The suppliers of machines and equipment are invited to share their expertise with FTO employees under the umbrella of "supplier days". FTO has established close learning relationships with the stakeholders in its local environment e.g. universities and technical

secondary schools. Business relations and visits to other companies play an important role in combining inter-firm and intra-firm learning. What is interesting is that the company is open for inter-firm learning through site visits even with some of its competitors. For instance, the FTO Managing Director during his visit to a competitor in Brazil (which is a potential partner for a joint venture), was inspired by the competitor's production system. As the result, he came up with an idea concerning the reduction of steel losses. The idea requires some changes (mostly technical) within the production system. Thus, the managers and employees of the production department have been tasked with proposing changes in order to reduce FTO steel losses. Another field of applying external knowledge to strengthen intra-organizational learning is sponsoring employees' studies at universities. When an employee is appraised highly by a supervisor and is willing to study, FTO will fund such education. In this case, an employee usually knows what areas of knowledge he/she lacks in particular and through attending university courses, he/she gets such knowledge. What is of significant importance is that an experienced employee has his/her own reflections concerning work, frequently resulting in some suggestions. Employee consciousness about the possible improvements in the company enables new knowledge acquisition, assimilation, transformation and finally exploitation. Also, employees who study are obliged to perform traineeships in other companies. This obligation results in sharing the experience of the studying employee with the workers of other companies and thus acquiring new knowledge. Then, this new knowledge is assimilated, transformed and exploited by FTO.

What is significant while considering combining inter-firm and intra-firm learning, is that FTO has developed several practices used for processing, assimilating and transforming new external knowledge in order to be able to exploit it properly. Such techniques involve: writing memos after business meetings and visits, disseminating new knowledge among other employees during working meetings, discussing the possibility of new knowledge exploitation in FTO. What is of particular note is that FTO employees expect their supervisors and colleagues to share the knowledge that they acquired during meetings with business partners. Thus, in order to facilitate knowledge processing and knowledge sharing among employees, FTO has established electronic knowledge repositories (Frauenthalpedia, Management Planet).

The interviews with FTO managers reveal interesting examples of positive outcomes of such a cooperation oriented to inter-firm learning. As observed by the Managing Director: "We have had a development program with one of the tools' suppliers (thread rolls). The effect of the collaboration is a design of new tools not available in supplier's catalogues. Before the improvements, one set of thread rolling tools was used to produce around

400 pieces – now it is 620 to 780 pieces per one set of tools". Another case is provided by the Continuous Improvement Leader who states: "We had a one-year-development-program involving three partners: machine supplier, tools' supplier and ourselves. There were minor changes implemented into the processes (FTO), the set-up of the machine (machine supplier) and the design of the tool (tools' supplier), which doubled the life-time of tools – from 40,000 to 80,000 pieces per tool".

Intra-firm learning process

As regards intra-firm learning by FTO employees, the company has two approaches: managers/engineers proposals and the employee suggestions system. First of all, there are some employees (e.g. managers or design engineers) whose job descriptions include the responsibility for intra-firm learning aimed at generating improvements and innovations. When approved, the ideas submitted by managers and engineers are usually implemented in the company as independent projects due to the fact that they are usually non-standard changes, they are mid- or long-term ventures and they need allocated resources. Managers/engineers proposals are a part of the white collar employee duties and they are not extra remunerated or awarded. All other members (mainly blue collars) are encouraged to contribute to organizational learning processes through the employee suggestion system. Submissions to the formal employee suggestion system are made on a voluntary basis and they are recognized and rewarded in accordance with compensation regulations included into the company remuneration policy.

The employee suggestion system is closely connected with implementation of the Lean Management philosophy which started in 2010. First of all, the 5S technique was introduced on the shop-floor. Then, the following Lean Management techniques and tools were added: Quality Control, SMED, Total Productive Maintenance, Value Stream Mapping, Gemba Walk and Poka Yoke. Certainly, the employee suggestion system as a prerequisite of the continuous improvement approach was founded and developed. FTO has formal procedures for the conduct of the suggestion process. Employees are invited to submit their suggestions for improvement to the committee responsible for analyzing them and validating the value of submissions. The company has introduced a suggestion form which is completed by a submitting employee. The main areas of interest of the employee suggestion program encompass: occupational health and safety (OH&S), quality, performance, ergonomics and organization of work. Submitted observations should define problems or possible areas for improvement and provide recommended solutions. If an employee submitting a suggestion is not able to analyze root causes of the

problem or develop recommendations for remedial actions, the committee appoints an expert who validates the value of the suggestion and elaborates on it in order to provide a solution. When submissions are positively assessed by the committee they are forwarded to the Managing Director for final approval. Depending on available resources and the CEO's decision, the company either implements remedial actions recommended in suggestions, maintains them in on hold, or refrains from any action. When a suggestion is approved for implementation by the Managing Director the remedial action body is assigned to it. Such a body is responsible for planning and implementing recommended changes. The employee suggestion procedure in FTO is consistent with the theoretical models proposed by Neagoe and Marascu Klein (2010) or Van Dijk and van den Ende (2002).

Employee suggestion processes are staffed and managed by the Continuous Improvement Leader and members of the committee including the representatives of the Departments of Production, Financial Control, Quality, OH&S and Sales. Managers, especially in the Production Department, are expected to provide employees with information on areas of particular importance, which are the guidelines as to where suggestions should be searched for. Shift leaders are also considered to play an important role in encouraging employees to submit suggestions and share knowledge between the teams. Employee contribution to the suggestion system is motivated with financial rewards. Showing a willingness to identify improvements and share knowledge with others are important criteria for recognizing the best workers of the month. Moreover, contribution to company improvement and innovation is an official requirement to be promoted to level 3 in the 4-grade hierarchy of blue collar positions. Transparency is an important characteristic of the FTO employee suggestion system. The company officially informs about submitted suggestions, contributors and the status of issue resolutions. The management shows a high level of concern about filling the gap between the number of submissions and resolved issues.

To encourage employees to come up with ideas for improvements, FTO has introduced a solution called 'Trust Curve'. The idea of 'Trust Curve' is measuring the number of ideas proposed within the employee suggestion system each month and comparing it with the number of improvements introduced out of these suggestions. What is important is that FTO management pays a lot of attention to keeping the gap between these two numbers as small as possible in order to show employees that the company appreciates their ideas, which leads to an increase in employee trust towards the company and managers, and employee commitment.

Applying external knowledge in the intra-firm learning

The first, and a very prominent, manifestation of using external knowledge for intra-organizational learning in Frauenthal Automotive Toruń is the company suggestion system. The idea of the employee suggestion system was recognized and imported from an external business partner by the Production Manager. Similarly, the reorganization and upgrade of the employee suggestion procedures were catalyzed by experiential knowledge acquired from an external company by the Continuous Improvement Leader.

As regards the possibility to apply external knowledge, due to the firm absorptive capacity in the processes of employee suggestions and managers/ engineers proposals implementation, it varies depending on the phases of the processes of learning lessons (cf. Table 3).

Table 3. The influence of applying external knowledge on learning lessons through employee suggestions

Lessons learned from employee suggestions		Lesson identification		Implementation of remedial actions	Dissemination
		Observation generation and collection	Analysis		
Absorptive capacity →	Managers/ engineers proposals (white collars)	high	medium/high	medium/high	low
	Employee suggestion system (blue collars)	low	low/medium	low/medium	low

Observations/suggestions collection

Generation of employee suggestions may be triggered by acquiring external knowledge by employees who confront it with the situation in the company. Identification of the gap may be a direct force motivating employees to submit an observation or a suggestion. An interesting example is the heating of steel rods before processing them in a hardening machine. The idea was observed by one of company engineers in other metal-processing companies and adapted to the FTO technological process. As highlighted by the respondents, the influence of external knowledge on the company intra-organizational processes is much more observable in the case of proposals submitted by white collars (managers and engineers), who usually have more opportunities to cooperate with external partners. During the interview, the Managing Director emphasized the paramount importance of such inspirations: “Sometimes it is enough to have one inspiring discussion for the

idea to be born. As soon as we see benefits from implementing the idea we consistently aim to achieve that. Such an example was a meeting with the CEO of Gnotec, one of the companies in the Frauenthal Group. He explained to us how their MRP system supports their processes of implementing new products. A year after we have our APQP process planned and monitored in our MRP system".

Observations/suggestions analysis

While employee suggestion is staffed, there may be a requirement to search for external knowledge and expertise in order to elaborate on the submitted issue and propose the solutions to observed problems. For instance, while proceeding with one suggestion concerning saving electrical energy, FTO invited a third party to audit the lighting in the factory and build-up a body of knowledge necessary to make decisions on remedial actions. Another example was provided by the HR Manager who observed: "When we face a problem we do not fully understand that we are actively looking for knowledge – I remember once an issue with electrostatics on the painting line. We asked a fourth-year-student of physics to deal with the topic during his internship. He collected data from our painting line and processed them with the help of mathematical algorithms. His results helped us to change the process parameters and at the end he conducted some training for our employees". Moreover, as highlighted by the respondents, while analyzing submitted problems or assessing submitted proposals, FTO searches for knowledge among partner companies in the Frauenthal Group. As proposals submitted by managers and engineers are usually more complex and multidimensional than blue collars' suggestions, this category of observations and lessons is more prone for analysis by engaging the knowledge of external actors.

Remedial actions implementation

Similarly, in the same way the knowledge of external parties may be absorbed in the phase of remedial actions implementation. The modernization and upgrade of the shot blasting machine was mentioned as an example of the remedial action driven by employee suggestions which required the company to combine its intra-organizational knowledge of processes with external technological expertise. However, as observed by the informants, sometimes FTO managers seem to be rather reluctant to involve external partners to implement improvement triggered by employee suggestions. On the one hand, FTO is the leader within its industry and the company shows technical advancement in comparison with competitors which may result in the emergence of the "not invented here syndrome". On the other hand

managers, who are expected to strictly control budgets, prefer implementing improvements with internal resources even if such solutions result in postponing remedial actions.

Lessons dissemination

As regards dissemination of lessons and best practices in the company, the influence of external knowledge is hardly observable. So, both in the case of managers/engineers proposals and blue collars suggestions the impact was assessed as low.

Applying intra-firm learning to strengthen company absorptive capacity

The respondents highly value the role of FTO intra-firm learning processes for the company absorptive capacity. According to their subjective opinions, this influence may be assessed as medium or high. The detailed insights concerning each component of absorptive capacity are pointed out in Table 4.

Table 4. The influence of learning lessons through employee suggestions on absorptive capacity

Absorptive capacity	Acquisition	Assimilation	Transformation	Exploitation
Lessons learned from employee suggestions/ proposals →	high	medium/high	medium	medium

The employee participation in the suggestion system enables FTO to identify the most effective learners among blue collars and engage them in scanning for external knowledge. As already mentioned, activeness in providing suggestions for improvements is an important criterion to nominate the best workers of the month. Such employees are included into the FTO delegations visiting sites of the company's business partners (e.g. production lines of leading world truck manufacturers). On the one hand it is a form of reward for employees, but on the other one FTO uses their learning capabilities to recognize and acquire external knowledge. It is also of high importance that engagement in intra-firm learning processes strengthens employee awareness of knowledge gaps, their capability to recognize valuable knowledge in the environment and bring this knowledge to the company, as well as developing employee openness to new ideas and solutions.

Strengthening the existing body of knowledge within the company is another important but indirect aspect of the influence of employee

suggestion systems on its absorptive capacity. As already mentioned, FTO has a strong orientation to improve and develop its capabilities on the foundation of intra-organizational knowledge. Therefore, while the company is working on a problem, first of all the intra-organizational processes are triggered. Then, external knowledge is searched, recognized, acquired and confronted with already existing knowledge resources. As a matter of fact, the company is making efforts to implement the philosophy of the learning organization concept. It is manifested in the declaration made in his interview by the Continuous Improvement Leader: "We [FTO] are a learning organization and we willingly use the knowledge of third parties. We want to learn from others".

For instance, FTO has a specific idea (procedure) that has been internally created and implemented and is called 'Tea after Tea'. When FTO employees, both white and blue collars, are delegated for any training course, they are obliged to prepare for it. It means that first they have to learn a bit about the issues that the training course includes. Thus, they can learn from books, but also from sharing knowledge and expertise with other employees. Such preparation is verified by a qualified employee (supervisor). Moreover, after the course they are obliged to solve a kind of problem related to the field of a training course. Again, this is verified by a qualified supervisor. Such an approach forces employees to deepen their individual knowledge and thus to be more active in the system of employee suggestions. On the other hand, deepening individual knowledge before training enables better and quicker acquisition, assimilation and transformation of new knowledge, finally leading to its exploitation.

Moreover, as FTO is a learning-oriented company, the engineers employed in the firm deliver "lessons of physics" to blue collars. The idea is called GILO and its purpose is to deepen workers' basic knowledge of physics and make them more conscious of physics' phenomena related to their job tasks. Thus, they become more able to come up with new ideas and improvements. Deepening employees' knowledge is done internally firstly, but if it is needed, experts from universities are invited to provide more knowledge on specific issues. Thanks to such activities, FTO combines intra-organizational learning with external knowledge acquired from the experts.

DISCUSSION

The results presented in the paper are aligned with the evidence found in the relevant literature which includes a number of works focusing on the enterprises' abilities to combine the processes of intra-firm learning with recognizing and acquiring, then assimilating and transforming as well as exploiting new external knowledge in order to generate new valuable solutions, technologies, products etc. Several authors highlight that the ability to recognize, acquire, assimilate, transform and exploit the desired knowledge, strongly depends on the enterprises prior knowledge generated, among others, through intra-firm learning (e.g. Cohen & Levinthal, 1990; Schilling, 2002; Child at al. 2005; Liao et al., 2007, Trott, 2008, Nag & Gioia, 2012). On the other hand, there are researchers who claim that absorptive capacity should be perceived as an antecedent of intra-firm learning (e.g. Mowery et al., 1996; Szulanski, 1996; Reagans & McEvily, 2000; Meeus et al., 2001; Oliver, 2001; Kim & Lee, 2002). Combining our research findings with those of the aforementioned authors it proves that developing both intra- and inter-firm learning through strengthening a firm's absorptive capacity leads to synergic outcomes. Moreover, the paper contributes to the literature and research on organizational learning processes as it is an attempt to highlight the affinity of the model of the lessons learned process and the 4I framework of organizational learning proposed by Crossan et al. (1999). Such an approach concerning theory as well as empirical validation is relatively new. However, the empirical contribution of the paper particularly refers to exploring how the techniques and best practices associated with FTO's ability to combine intra- and inter-firm learning, contribute to the company's knowledge and its outcomes.

From the FTO case we have learnt that several techniques and practices concerned with acquiring new knowledge (such as studying customer's requirements and complaints, other companies visits, external training and new knowledge sharing with other employees, university courses etc.) may have a high or at least a moderate influence on internal learning through the employee suggestion system. Workers' activity in the field of generating improvement-oriented suggestions is frequently triggered by some external knowledge acquired by employees, in particular those of managerial positions (e.g. from visiting business partners or trade fairs). External knowledge may be used to support the processes of analysis and remedial actions implementation, and to a lesser extent, lessons dissemination. Therefore, the proposal is set that absorptive capacity reveals itself on every stage of the organizational learning process (i.e. employee suggestion or lessons learned

process in this particular case) but with the use of different procedures and schemes[5].

While considering the influence of learning through employee suggestions on inter-organizational learning (throughout absorptive capacity development), our research findings allow us to assume that such an influence might be stronger in the case of potential absorptive capacity (acquisition and assimilation) at FTO. As potential absorptive capacity includes acquisition and assimilation of new knowledge, it seems important to stress that according to Sun and Anderson (2010), "assimilation is influenced by dialogue, diversity of team member experience, and a supportive environment for innovation, each of which makes it more likely for novel and frame-breaking insights to be verbalized and articulated" (Sun & Anderson, 2010, p. 144). Following this statement, we assume that implementing the employee suggestions program in FTO is an important activity that helps to enhance the absorptive capacity of the firm. Sun and Anderson emphasize the significance of dialogue within a company. This in fact refers to communication through which employees become familiar with one another and develop mutual trust. In turn they become more eager to share sensitive information that can lead to any novelty (Sun & Anderson, 2010). Our findings prove that sharing knowledge acquired by employees from external sources, such as a customer's requirements and complaints, other companies' visits or external training, is a common practice in FTO (e.g. Tea after Tea practice) that frequently brings new solutions to the firm's operations and outcomes.

With reference to realized absorptive capacity we found less explicit examples. However, we would like to emphasize that a good practice concerning the employee suggestion system in FTO, that is rewarding workers for coming up with improvement ideas, is a way of influencing realized absorptive capacity, particularly at the exploitation stage. Again following Sun and Anderson (2010), we stress that "exploitation is influenced by leadership activities involving reward and recognition mechanisms and the effective deployment of organizational resources by ensuring a timely and effective restructuring of organizational memory" (Sun & Anderson, 2010, p. 145)[6]. Exploitation refers to enterprise capability to incorporate the newly acquired knowledge and transform it into a firm's operations so it can be continuously refined and exploited (Zahra & George, 2002). In our opinion it is of significant importance that FTO management has introduced a very clear reward system related to employee suggestions that, as suggested by Sun and Anderson, ensures effective restructuring of FTO's organizational memory. Moreover, following Jansen et al. (2005) who claim that formalizing and documenting

5 The authors are grateful to the anonymous reviewer for their suggestion leading us to such a statement.
6 The authors are grateful to the anonymous reviewer for this suggestion.

any rules, procedures or processes in an organization positively influences the learning capability of exploitation, we argue that several practices related to the intra-firm learning of FTO described in the paper play an important role in strengthening a firm's realized absorptive capacity.

Summing up, we argue that the identified techniques, practices and procedures used by FTO to combine intra- and inter-firm learning in order to make progress and generate valuable novelty confirm applicability as well as high utility of such an approach. We follow Cohen and Levinthal who claim that "[a]bsorptive capacity refers not only to the acquisition or assimilation of information by an organization but also by an organization's ability to exploit it. Therefore, an organization's absorptive capacity does not simply depend on the organization's direct interface with the external environment – it also depends on transfers of knowledge across and within subunits" (Cohen and Levinthal, 1990, p. 131). An interesting case study illustrating the role of prior related knowledge and intra-firm learning processes for the effectiveness of inter-firm knowledge transfer is provided by Daghfous (2004). He studied a project related to technology transfer between a university research center and a plant of a multinational company operating in the microelectronic components industry. Referring to Daghfous (2004), Noblet et al. (2011, p. 368) observe that "[f]or an organization to increase its absorptive capacity, it needs to boost its ability to transform and implement external knowledge within the company so as to enhance its core competencies". The implementation of an employee suggestion system can be perceived as a firm's way to "boost the ability to transform and implement internal knowledge"[7]. The analysis of the FTO case study confirms this observation as, in order to come up with the new ideas for improvements, the employees have to learn (both on an individual and group level), study and analyze the existing processes and reflect on it to identify new potential solutions. At the same time employee participation in the suggestion system allows FTO to identify the most effective learners and engage them in searching for external knowledge as being rewarded they have an opportunity to visit sites of the company's business partners. Such an approach enables FTO, utilizing best employees' learning capabilities, to recognize and acquire external knowledge valuable for the firm.

The procedures related to sharing knowledge in FTO described in the paper prove the existence of knowledge transfer within the firm that constitutes the base for implementing more effective/innovative ways of performing and enhancing FTO core competences. Drawing on literature, we stress that increased learning in a particular field increases the firm's knowledge base in this field which further enhances its absorptive capacity and facilitates more learning in this domain (Barkema & Vermeulen, 1998; Autio et al., 2000; Lane

7 The authors are grateful to the anonymous reviewer for this suggestion.

et al., 2006). Developing its body of knowledge FTO invests in its absorptive capacity. It is indisputable that, without having proper prior knowledge existing within a company, absorbing any new technological knowledge is of little benefit. As proved by the FTO case, having prior knowledge, as well as effective processes of transferring it within an organization, help the speed and frequency of innovations within a firm.

To sum up, given the fact that relatively few studies have examined in depth the relationship between absorptive capacity and organizational learning (e.g. Szulanski, 1996; Reagans & McEvily, 2000; Tsai, 2001; Meeus et al., 2001; Oliver, 2001; Schilling, 2002; Kim & Lee, 2002, Lao et al., 2007), we assume that our findings provide useful managerial implications referring to the importance of matching the processes of intra- and inter-firm learning. The knowledge about the available techniques and best practices in this field, as well as potential results for a company, is fundamental for several managerial decisions. Thus, in our opinion, the paper contributes to the research on learning processes within an organization. We have explored and highlighted the role of the managers' focus on finding new ways to engage employees in learning processes and to make them conscious about the importance of learning from outside the firm.

CONCLUSION

Concluding, we assess that the paper's objective has been achieved. The paper's conceptual contribution is demonstrating and exemplifying the relationships between the processes of absorptive capacity and learning lessons through employee suggestions and proposals as well as identifying potential synergies between them. The considerations, both theoretical and empirical, presented in the paper have proved that both intra- and inter-firm learning can contribute to each other and, while combined, can generate novelty that would not (never) have been achieved based on intra-firm learning or inter-firm learning alone. We have sought to answer two research questions: How do organizations apply external knowledge to support intra-organizational learning processes and employee suggestion processes in particular? And: How should the employee suggestion system be organized to increase absorptive capacity? In particular, we have been interested in studying how specific techniques and practices applied in FTO support these two aforementioned processes.

The research findings present several techniques, practices and procedures utilized by FTO to combine intra- and inter-firm learning and increase a firm's ability to create novelty, which is of high managerial

importance. As known, a company enhances existing competences or acquires new ones by encouraging employees (both on at individual and team/group level) to learn. FTO showed a significant focus on both inter-firm learning and intra-firm learning and then on matching these two processes. Several good practices concerning acquiring new knowledge from the external sources and then assimilating and exploiting it were present in FTO and described in the paper. Also, we argue that the process of employee suggestions existing in FTO, considering its stages and course as an example of efficient intra-firm learning, is worth studying and applying in other organizations. We claim this, as the FTO case proves that such an organization of the employee suggestion system positively influences the firm's absorptive capacity. Thus, we assume that our findings provide valuable knowledge and empirical validation useful for managers making decisions concerned with building the absorptive capacity of their firms and developing the learning abilities of their organizations.

Finally, we are aware of the limitations of our study. The collected data illustrating the relationships between intra- and inter-firm learning are based on the case study of a single firm. The applied methodology of the single case study analysis enables the authors to analyze thoroughly and understand the examined issues in the given context, which is its primary advantage. However, generalizing and building theories on the basis of a single case study is almost impossible, unless it is a critical case (Strumińska-Kutra & Koładkiewicz, 2012, p. 15). In consequence, the constraints related to possibilities to build up generalizations should be listed as a limitation of the study. In order to mitigate such a limitation, the study should be replicated in the context of other organizations. Moreover, we are aware that the subject matter may include the subjectivity of opinions and interpretations. However, the presented study inspires us for in-depth investigations. According to our experience, it will be interesting to deepen the knowledge on possible techniques, practices and procedures created by other companies in the field of matching intra- and inter-firm learning. On the base of collected findings we aim to identify and describe a complex toolbox that can be used by managers to create synergy between intra-and inter-firm learning.

Applying the lens of relative absorptive capacity (Lane & Lubatkin, 1998) to study the relationships between organizational learning and absorptive capacity is another interesting aspect to be developed in further studies. Employing the Crossan et al. (1999) model of organizational learning it is possible to "model the feed forward and feedback processes of two different companies one by one". Such a modeling enables researchers to study the extended model of 4I (Freiling & Fichtner, 2010) "by knowledge spill-

overs between the two companies [and] mutual 'absorbing' processes"[8]. In consequence, applying the relative absorptive capacity logic to explore connections between the processes of organizational learning and absorptive capacity provides the opportunities to develop follow-up extensions of the model and potential new interpretations.

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Abstract (in Polish)

Celem artykułu jest zbadanie relacji pomiędzy procesami absorpcji wiedzy zewnętrznej (międzyorganizacyjne uczenie się) oraz uczeniem się z doświadczeń poprzez system sugestii pracowniczych (wewnątrzorganizacyjne uczenie się). Uwaga została skierowana na zbadanie następujących problemów: (1) W jaki sposób organizacje wykorzystują wiedzę zewnętrzną do wsparcia procesów wewnątrzorganizacyjnego uczenia się, a w szczególności procesów wykorzystania doświadczeń na podstawie sugestii pracowniczych? (2) W jaki sposób zorganizować system sugestii pracowniczych aby wzmocnić zdolność organizacji do absorpcji wiedzy zewnętrznej? Do rozwiązania wskazanych powyżej problemów badawczych zastosowano podejście eksploracyjne bazujące na metodzie studium przypadku. Jednostką analizy były procesy międzyorganizacyjnego i wewnątrzorganizacyjnego uczenia się w przedsiębiorstwie Frauenthal Automotive Toruń (FTO).

Słowa kluczowe: *organizacyjne uczenie się; zdolność organizacji do absorpcji wiedzy zewnętrznej; systemy wykorzystania doświadczeń; systemy sugestii pracowniczych.*

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Capable Design or Designing Capabilities? An Exploration of Service Design as An Emerging Organizational Capability in Telenor

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Abstract

This empirical paper examines a process, starting with the managerial decision to make service design an organizational capability, and follows it as it unfolds over time within one organization. Service design has become an established business practice of how firms create new products and services to promote differentiation in an increasingly uncertain business landscape. Implicit in the literature on service design are assumptions about strategic implications of adopting the prescribed innovation methods and tools. However, little is known about how service design evolves into an organizational capability enabling firms to transform their existing businesses and sustain competitiveness. Through a longitudinal, exploratory case study of service design practices in one of the world's largest telecommunications companies, we explicate mechanisms through which service design evolves into an organizational capability by exploring the research question: what are the mechanisms through which service design develops into an organizational capability? Our study reveals the effect of an initial introduction of service design tools, identification of boundary-spanning actors and co-alignment of dedicated resources between internal functions, as well as through co-creation with customers. Over time, these activities lead to the adoption of service design practices, and subsequently these practices spark incremental learning throughout the organization, alter managerial decisions and influence multiple paths for the development of new capabilities. Reporting on this process, we are able to describe how service design practices were disseminated and institutionalized within the organization we observed. This study thus contributes by informing how service design can evolve into an organizational capability, as well

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as by bridging the emerging literature on service design and design thinking with established strategy theory. Further research will have to be conducted to confirm if the same mechanisms are observable across contexts and in other firms, and several future research directions are identified. In addition, the study also has implications for practice as it demonstrates how service design methodology can be implemented and has strategic implications for organizations.
Keywords: *capability development; design thinking; organizational capabilities; service design practices; strategy-innovation link.*

INTRODUCTION

Service design is a rapidly evolving business practice – a buzzword 'du jour' of service innovation, which has created significant business and research attention over the past years (Brown, 2009; Kimbell, 2014; Lockwood, 2010; Reason, Løvlie & Flu, 2015; Stickdorn & Schneider, 2012). Empathy with users and co-creation, rapid prototyping, iterative learning and tolerance for failure are essential elements of how services are designed, delivered and experienced according to a service design framework. For some industry giants such as IBM, Samsung and GE, among others, service design has become more than a means for innovation. These firms have embraced service design as a core competence (Prahalad & Hamel, 1990) to discover new markets, create new organizational forms and ways of work, and manage change in increasingly volatile and complex service ecosystems (Yoo & Kim, 2015). Essentially, design thinking has become a primary set of management principles enabling large industrial organizations to servitize their business and transform into the modern entities of the digital age (Kolko, 2015).

Despite the strategic implications of service design (e.g., Brown 2009), theorizing it as an organizational capability has largely been missing in the management and strategy literature (Gruber, de Leon, George & Thompson, 2015). We still know little about how service design processes are routinized in the organization, and what implications they have on organizational structure, culture, work practices or performance (ibid). Consequently, extant literature has not sufficiently elaborated on the service design – strategy link. Bridging these two research areas may provide an end-to-end process understanding of capability development in modern organizations. Given that actors (customers, employees and third parties) are at the epicenter of design thinking (Kimbell, 2014), the lens provided by service design literature may also reveal how actors contribute to capability life-cycles and multiple development paths for organizational capabilities (Bingham, Heimeriks, Schijven & Gates, 2015; Helfat & Peteraf, 2015).

In this paper, we theorize service design as a recipe for organizational capabilities in-the-making. We seek to explain *when* (under what conditions) and *how* service design practices are diffused throughout an organization, become institutionalized (Crossan, Lane & White, 1999), and affect decision making processes and performance. More specifically, we ask: *what are the mechanisms through which service design develops into an organizational capability?*

The context in which we seek answers is the Telenor Group – one of the world's largest mobile telecommunications company that has been undergoing strategic transformation from a traditional telecommunications operator – to a mobile (and later digital) service provider since the 2000s. Faced with increasingly high uncertainty and disruption of the business mode (Christensen & Johnson, 2009; Osterwalder & Pigneur, 2010), Telenor Group aim at continuous innovation and defined service design as a core capability of the firm. We gathered data over a period of 8 years, both retrospectively and in real time, within multiple markets of operation. Our findings show that gradually, through the use and co-alignment of dedicated resources, service design tools, training programs and boundary-spanning activities, service design has emerged into customer-centric business practices throughout the organization, new ways of working and, increasingly, into a commonly shared language of service innovation. This study contributes by bridging the emerging theory on service design with established strategy theory on organizational capabilities.

In the first part of the paper, we provide a critical overview of service design and organizational capability literatures where we specify research limitations. The second part of this paper describes our research setting, the method, data collection and analysis. In the third part, some of our emerging research findings are provided. Finally, we discuss how service design and design thinking literature contributes to the management domain, and *vice-versa*.

THEORETICAL BACKGROUND

The literature on service innovation considers service design as a capability enabling firms to adapt to their changing environments and stay competitive sustainably (Kimbell, 2014; Ostrom et al., 2010). Various individual and organizational factors have been identified that facilitate or inhibit the service design thinking in an organization (Krinsky & Jenkins, 1997). Yet, surprisingly little is known about how an individual and an organization interact in the development of service design capability. The tension in individual-

organization interaction may vary at different stages of innovation process (Lane, Koka & Pathak, 2006). Overall, the process dimension is often implied in these studies, but not studied in depth (e.g., Hertog et al., 2010). The dynamic capabilities literature (e.g., Teece et al., 2016) has recently argued that a life-cycle view and a process approach to capability development may enrich organization research (Helfat & Peteraf, 2015; Laamanen & Wallin, 2009). In this paper, we seek to link the insights gained from service innovation studies to a capabilities view of the firm. More specifically, we aim to explain the underlying processes and 'higher-order' routines (Winter, 2003) through which service design evolves as a dynamic organizational capability.

Capability dynamics

Organizational capabilities have in extant research been suggested to be stable in order for the organization to utilize the capability to harvest rents over time (Winter, 2003). However, organizational capabilities are also expected to be amendable in order for the capability to support activities that are relevant for the organization to perform in an externally changing market (Teece, Pisano & Shuen, 1997). This can potentially lead to a rigidity paradox constituent in the conceptualization of dynamic capabilities (Schreyögg & Kliesch-Eberl, 2007). Some conceptualizations of this amenability explain how capabilities follow a life-cycle, much similar to product-life cycles, where capabilities develop, mature and decline at different stages (Helfat & Peteraf, 2003). Others suggest that some firms are better at changing their capabilities than other organizations when facing shifting external market conditions (Eisenhardt & Martin, 2000). These firms are suggested to have dynamic capabilities that act on, and change, underlying ordinary capabilities (Helfat & Maritan, 2007; Teece, 2014; Winter, 2003).

The term dynamic capabilities was coined by Teece et al. (1997). It refers to a pervasive framework in strategic management that attempts to explain sustained competitive advantage. The motivation behind the dynamic capabilities perspective was to integrate previous approaches such as competitive forces (Porter, 1980), strategic conflict (Shapiro, 1989), and the resource base view of the firm (RBV) (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). The concept of dynamic capabilities is defined as the "*capacity to renew competences so as to achieve congruence with the changing business environment*" (Teece et al., 1997, p. 516). The extant literature is adamant that dynamic capabilities are built and cannot be bought in a market (Collis, 1994; Makadok, 2001; Savory, 2006; Teece et al., 1997). In this respect, the dynamic capability literature clearly shows the connection to the theoretical origins of the RBV, and the underpinning assumption that

resources and capabilities explain competitive heterogeneity (Helfat, 2000). According to the RBV the resources that lead to competitive advantage are "*unlikely to be available from others under terms that do not strip them of the net present value of the rent stream they are capable of generating*" (Rumelt, 1987, p. 143), and should abide to the Valuable, Rare, Inimitable and Non-substitutable (VRIN) criteria (Barney, 1991).

Dynamic capabilities have been claimed to be central to innovation (Tidd, 2012), and the issue of how firms develop and renew their strategies (Volberda, Baden-Fuller & van den Bosch, 2001) has been linked to organizational learning (Crossan & Berdrow, 2003) and the development of organizational capabilities (Helfat & Peteraf, 2003). The dynamic capabilities literature has recently called for a life-cycle view and a process approach for improved knowledge on capability development (Helfat & Peteraf, 2015). Extant theory on capability development has emphasized how incremental, concurrent learning and managerial decisions influence the development of capabilities (Bingham et al., 2015). Researchers also argue that the development of new capabilities is related not only to the portfolio of existing capabilities but to the actions of competent individuals that enact organizational capabilities (Laamanen & Wallin, 2009).

Service design as an organizational capability

Despite being increasingly addressed amongst business practitioners, the concept of service design has received rather limited attention in the research community (Johansson-Sköldberg, Woodilla & Cetinkaya, 2013; Liedtka, 2014). Service design is defined as "an emerging occupation in which practitioners aim to understand customers, organizations, and markets; develop new or improved services and customer experiences; translate them into feasible solutions; and then help organizations implement them" (Fayard, Stigliani & Bechky, 2016, p. 6). Service design is rooted into the general area of design thinking, a human-centered approach of framing problems and solutions (Kimbell, 2011a) – aiming at a balance between desirability (people's need and want), viability (meets business objectives) and feasibility (technologically feasible) (Brown, 2009). Service design shares the same philosophy, but with an additional focus on the organizational side of the service provider delivering a new or improved service over time to customers (Fayard et al., 2016).

Service design is often described as "what designers do", referring primarily to methods and tools for problem solving (Johansson & Woodilla, 2009; Kimbell, 2011b) that are particularly relevant in contexts of high uncertainty and ambiguity (Liedtka, 2014; Waddock & Lozano, 2013). Several

management scholars have turned their attention to design in strategy (Dunne & Martin, 2006; Liedtka, 2014). Researchers draw on the foundational tenets of design thinking, such as iterative cycles of learning (Seidel & Fixson, 2013) and value co-creation which, as they argue, enable firms to adapt to changing environments and stay competitive sustainably (Kimbell, 2014; Ostrom et al., 2010).

The scant research on service design practices has been limited to discussions on the importance of design thinking to management (Gruber et al., 2015; Ostrom et al., 2010; Seidel & Fixson, 2013). We still know little about how service design (and design thinking) evolves into an organizational capability, though issues about the development and change of service innovation capabilities (among others) have received increasingly high scholarly attention (Helfat et al., 2007; Helfat & Peteraf, 2015). Various individual and organizational factors have been identified in the literature that facilitate or inhibit design thinking in organizations (Kimbell, 2014). Yet, surprisingly little is known about how an individual and an organization interact in the development of a service design capability.

In contrast to product innovations, service innovations have "game-changing" characteristics (Nordin, Kindström, Kowalkowski & Rehme, 2011), implying that even small changes to a service offering may require considerable changes within an organization as well as in interaction patterns with the end-users (Breunig, Aas & Hydle, 2016). Implementation of service design, therefore, requires orchestration of complex processes that may help to create a holistic service experience for customers, employees and business partners (Ostrom et al., 2010). Overall, the process dimension at multiple levels of analysis is often implied in these studies, but not studied in depth (e.g. Hertog, van der Aa & de Jong, 2010)

In this paper, we seek to uncover how multiple actors enact service design capabilities throughout an organization. By exploring the implementation of a service design initiative within one large international organization, we contribute to the life-cycle view of dynamic capabilities, and respond to the call for improved knowledge of the service design-strategy link (Michel, Brown & Gallan, 2008).

METHODOLOGY

We use a revelatory, theory-building case (Yin, 1994) in this paper and justify our approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) by the lack of knowledge of the service design-strategy link. We analyzed service design processes in a theoretically sampled research context – the Telenor Group – one of the world's largest mobile operators with more than 200 million subscribers and 36,000 employees operating in 13 markets across the Nordics, Eastern Europe and Asia. Faced with high uncertainty and disruption in the telecommunications industry since the late 2000s, Telenor embarked on a journey of implementing service design (SD) as a corporate capability. A number of strategic initiatives to incorporate SD practices in the operations and innovation activities were taken at the Telenor Group (HQ) and Business Unit level that led the company to discover new market opportunities, and redefine processes and managerial decisions. As such, our case company was an excellent exemplar of a large, multi-domestic corporation exploring service design as an organizational capability for innovation under high market uncertainty.

We used a longitudinal, exploratory case study approach because it allowed us to capture how service design practices evolved and led to multiple organizational outcomes, several of which were only observable over time. Examples of such outcomes are new leadership attitudes, incentive systems and ways of working. These organizational changes contributed to the creation of new interaction patterns with external stakeholders, thereby matching internal resource development with the demands of a rapidly changing business environment.

Our longitudinal data consists of historical and real-time data, which we gathered at different points of time, over the period 2008-2016. The use of service design methods and tools in various projects at the Group and Business Unit level (such as Customer Journey Mapping) served as multiple episodes. We conducted over 100 interviews with Telenor managers in corporate headquarters and in Business Units, participant and non-participant observations, took notes from multiple site visits and management training sessions, and collected other archival data (see Table 1 below). This approach allowed for triangulation of multiple data sources (Jick, 1979). We developed case narratives, used systematic analysis of informant stories and induced theoretical insights to identify and make sense of the emerging constructs (Gioia, Corley & Hamilton, 2013). Two of this paper's authors worked in the company's research department and followed organizational processes from the inside, taking field notes, conducting interviews and informal conversations with organizational members, as

well as participating and heading management training sessions for design thinking and innovation. Another co-author was external to the company who reviewed and commented on the findings. A combination of internal and external perspectives ensured the richness and trustworthiness of the data.

Table 1. Sources of data in different periods

Period	Data type	Description	Amount
2008-2013	Archival documents	Customer Journey Mapping (CJM) documents	40
		Company presentations on CJM	20
		Strategy documents (global and marketing strategy focus)	>10
2014-2015	Participant observations	Service Design Academies (SDA) across Telenor	10 (40 participants in each)
		Innovation workshops	3 (30 participants in each)
	Non-participant observations	mAGRI field visit (workshops, presentations)	3
	Interviews	Early frontrunners, including directors, project/program managers, telco-related experts, strategic advisors and in-house designers)	30
		Innovation interviews in Telenor BUs (senior and middle-level managers across functions)	75
		mAGRI project interviews (UX, service designers, product managers)	4
	Archival documents	Strategy documents (innovation focus)	>10
		Company´s intranet news	Sporadic
		Facebook@Work (interest groups on SD and innovation)	Sporadic
2016	Participant observations	Telenor leadership trainings (innovation, strategy execution)	2
		Telenor expert- and leadership trainings (Design thinking, innovation)	3
	Interviews	mAGRI project interviews (product managers)	2
	Archival documents	Strategy documents (BU focus)	>10
		Company´s intranet news	Sporadic
		Facebook@Work (interest groups on SD, design thinking and innovation)	Sporadic

Service design in Telenor 2008-2016

Empirically our study uses digital transformation in the telecom sector as a disruptive context to capture organizational capability development process. More specifically, we observe evolution in the service design capability in the case of one of the world's 15 largest mobile operators, Telenor. With its origin as a fixed telephony Norwegian state-owned monopoly, since the late 1990s Telenor has become one of the leading multinational mobile telephony operators. Through green-field investments and acquisitions, Telenor has evolved as a multi-domestic large corporation characterized by local autonomy of the affiliates. Each affiliate in the local market is defined as a Business Unit (hereinafter BU). In 2016, Telenor had over 200 million customers across its operations in 13 BUs in the Nordic region, Central and Eastern Europe and Asia, with annual revenues of NOK 131 billion (USD 15,2 billion) and a workforce of 36,000.

Facing severe threats to traditional revenue sources, Telenor has moved swiftly into a strategy of exploring new business models aimed at transforming the company into a "Digital Service Provider". In order to reach growth ambitions, the company proactively considers the possibilities of building new, global digital products and services and replicating their use across the 200 million-customer base in 13 BUs. During the last decade a number of centralized functions, such as products and marketing, R&D and technology were established to foster better integration of the Business Units and facilitate knowledge sharing across units and geography without losing the decentralized nature of the company. In that journey, building service design and design thinking as organizational capabilities for innovation is seen as important, and defined as a core capability in Telenor. Telenor has transitioned from exploiting customer frameworks of a limited scope across the BUs to strategically building innovation practices and new, agile ways of working with implications to culture across the overall Group.

In the following section we present the implementation of the customer journey mapping framework as one of the early episodes in the development of service design capability in Telenor. Then we move on to describing how design thinking practices were introduced and have become shared and replicable patterns of innovation and intrapreneurship throughout the organization. We emphasize the key challenges and dilemmas of Telenor in its journey of institutionalizing new capability where new and old business logics have to co-exist.

Early episodes of service design – customer journeys

As a response to Telenor's strategic intent to offer a superior customer experience, the Customer Journey mapping Framework (CJF) was initiated in 2009. The framework was piloted in several Business Units and further developed in-house over the next four years (2009-2013). These pilots identified gaps between actual and planned customer journeys, and the implications to business in terms of, e.g., churn possibilities, overthrown customer service, and, ultimately, bad customer experience. Those insights caught management attention and contributed to some key managerial decisions that, in turn, brought institutional changes throughout the Telenor Group.

With the increased sense-making among middle-level managers, the CJF soon became a managerial metric for measuring customer experience and for implementing a new product into a service journey. This type of metric, however, implied tensions of using CJM instrumentally and as a strategic symbol only, i.e. by not engaging the customer and the customer experience in the mappings. One of our informants explained; *"We are doing this [customer] mapping from the Telenor perspective actually because it is important for us to see what kind of resources we need for the service."* Such usage of CJF was considered valuable for assessing the set-up of the value chain. However, it was utilized as a service blueprint bypassing the original intention to measure the customer's own experience of the existing value chain. Moreover, the customer journey mapping contributed to an increased understanding and practices of resource integration among different business actors across the existing value chains. Through the use of CJF, a cross-functional collaboration was induced and a mutual understanding of superior market offerings from a customer perspective was created. One of our informants emphasized the CJF implications to the ways of working and thinking in Telenor: "*[The customer journey maps] have helped us to think from a customer perspective, by bringing together process owners and customer-facing personnel. (…) For an organization that is used to thinking [of] profit perspective as the simple truth, it has changed our way of thinking."* Gradually, the rhetoric of customer journey became a common and institutional language throughout Telenor.

Alongside creating new corporate language, the use of CJF increased consciousness regarding the root causes of bad customer experience. Over time, the Net Promoter Score (NPS) reporting standards have been used as a non-financial KPI (Key Performance Indicator) at different management levels across the entire organization. Due to a widespread uptake of NPS across Telenor, it has become a particularly useful means to gather insight into most prominent aspects of the service process that shape customer experiences. Yet, tensions between different corporate functions emerged, and a lack

of end-to-end responsibility was highlighted. In parallel, and partly due to experiences gained from the CJF projects, an initiative to leverage strategic value of service design thinking was brought by Telenor HQ in late 2015/early 2016. The CJF was exploited as a corporate strategic tool across the overall Group, and service design was defined as a core organizational capability.

Later episodes of service design – Design thinking as innovation practice

In 2016 executive management, expert- and leadership training programs on design thinking and innovation processes were launched as part of the new Digital Service Provider strategy in Telenor. Our observations indicate that certain principles of design thinking contributed to new leadership attitudes and managerial decisions. Gradually these evolved into commonly shared practices of innovation and intrapreneurship across Telenor. Design thinking has become more of a new philosophy – a new way of doing things – in the organization. As one of our informants underlined, *"[The President] talks a lot about this, and this affects the organization gradually to develop."*

By implementing the design thinking philosophy managers were able to seize new business opportunities, which they developed from synthesizing insights from in-depth user research and prototyping with customers. This represented a radical change in how and for what purposes user research was used in the organization. Beyond mere quantitative representation of market research and value chain mapping, user research practices have increasingly become the catalysts of innovation mindset in the organization, which was characterized historically by strong technology focus. One of the project managers explicitly emphasized this: *"People generally think innovation is something like an idea. But before innovation comes research, and believe me: user research is the hardest and most important part of the process (…). You are not out there for finding solutions; you are out there for understanding – trying to understand what their thoughts, needs and problems are"*. To be able to discover unmet needs and potential new solutions, the value of empathizing with customers and rapidly getting feedback in learning loops of prototyping, has gradually seized changes in managerial decisions for innovation processes. One of our informants emphasized that "*the decisions must follow what the customer values the most*", and not making decisions based on assumptions or ready-made technological solutions: *"We decided upon some few assumptions that our solution was based on, and tested and validated them through very simple rapid prototyping. Traditionally, we used a lot of time going back and forth in endless discussions*".

A mobile agriculture service launch in Telenor Pakistan is a good example how principles of design thinking were utilized in the organization. In the

mAGRI project, the challenge was to develop digital services in an untapped market with 50% of the country's working population in rural areas. Telenor Pakistan is among the country's leading mobile operators, and the project aimed at improving the livelihoods of farming households by empowering them with better access to information and financial inclusion. This ambition raised several challenges since tapping into this market involved limited literacy and technical experience as well as very limited customer purchasing power. The project team needed to involve local farmers to understand how services could be designed in a way that would be intuitively understood by potential users, yet maintaining a low cost structure. As put by one of the project leaders, *"When you give a farmer a mobile and ask her to ring up a number, she listens to the service. Because we talked to her, we realized that the buttons were too hard for her to press. Insights like these are valuable for the process of creating new services.*" Faced with a complex value chain in the industry and an unknown customer base, mAGRI relied on service design methodologies to gain customer insight and, more importantly, alter leadership attitudes and organizational routines for service innovation, thereby matching the demands of rapidly changing environments.

This new way of thinking and doing things implicated a managerial sensing of the changes needed to the governance model for project execution. The dominant project governance model in Telenor was characterized by a business case in the initial phases, contained sequential steps with clear goals, pre-defined resources and large investments, and in which progress and success were measured against pre-defined deliverables and outcomes. To navigate in a highly uncertain environment and meet the demands of rapidly changing markets, the dominant project governance model was increasingly perceived as obsolete, particularly for innovation projects outside the core telco business. As described by one of the managers, "*Telenor has a decision process and case approach that is tailored for large upfront investments with revenues spread over a long period of time. That process needs to be revised to cater for new business models*". This area of tensions was identified by managers and generated new prototypes of governance models for innovation projects. As the Telenor Group CEO emphasized, "*we must dare to establish projects without a clear business plan*".

Over time, service design and design thinking have stimulated new, more creative ways of working and contributed to the creation of a shared language of innovation throughout Telenor. The initially scattered service design practices have gradually become shared and replicable patterns of service innovation throughout the organization. Yet, at the time of writing the paper, this journey was not complete and had been marked by a number of organizational challenges and dilemmas. Telenor and the telco industry, more

generally, has been historically characterized by low risk appetite and risk aversity, relying on external vendors and consultancy services, which made it difficult to implement experimental and agile ways of working in-house. One of our interviewees argued that *"people are (still) stuck in their old ways, afraid to make mistakes, always going for the known and safe option. (…) Words and speeches are all well and good, but actions and words have to be aligned for this change to happen."* Furthermore, a traditional decision process was not suited to new ways of working (including design thinking and innovation). Experimenting within a hierarchical organizational structure was also difficult, and the company was lacking autonomous teams empowered to take rapid decisions. As put by one of the senior managers, *"a degree of autonomy in decision making that is not tied to the usual corporate decision process is needed to translate an agile way of working into an actual outcome".*

CONCLUDING DISCUSSION

The goal of this paper is to enlighten the mechanisms through which service design develops into an organizational capability, and by doing so, to bridge the emerging theory of service design and design thinking with established strategy theory on organizational capabilities. Through a longitudinal, exploratory case study of one of the world's largest telecommunications companies, we focus on how scattered service design practices become shared and replicable patterns of service innovation throughout the organization. Examples of such outcomes are new leadership attitudes, incentive systems and ways of working.

Our findings show how the initial pilot project was underpinned by a service design thinking related to customer centricity. Telenor utilize Customer Journey mapping frameworks (CJF) to compare Customer journeys. These CFJ are used to plan, identify gaps and in order to improve when necessary. As the CJF proved valuable to the way organizational members understood, interacted and made decisions concerning their customers. This way of work became increasingly diffused throughout the organization and institutionalized through new performance measures and training. Implementation of the customer journey framework was only one episode in the development of service design capability in Telenor, but it revealed critical dimensions of service design (such as customer co-creation, actor engagement across various components of a service) beyond the methodology itself. For example, a standardized use of an NPS metric, and subsequent KPIs, demonstrated an increasing ability (and shared language) to handle customer centricity. As such, service design thinking gradually disseminated throughout the entire organization. In this context, it is thus

evident that managerial intentionality affects the multiple paths to capability development, as the service design initiative was a managerial decision. It is however, also important to point out that management did not have a direct role in all the customer-centric projects and subsequent learning situations, thus management intentionality can be understood as an initiating condition but further research is required to unmask the role of management throughout the process of building organizational capabilities. Further research should be emphasized on explicating how design thinking competence becomes diffused and institutionalized above organizational level, e.g., routines at the individual- and group-levels (Crossan et al., 1999). Moreover, as the project is still ongoing, we currently seek to identify to what degree locally built best practices and capabilities are transferable to other business units within the Telenor group, or to what extent they are susceptible to knowledge stickiness (Szulanski, 1996). There are also potential implications to practice from this study as it demonstrates how service design methodology can be implemented and have strategy implications for organizations.

Current research on organizational capabilities calls for an increased understanding of the emergence of organizational capabilities and their life-cycles (Volberda et al., 2010; Helfat & Peteraf, 2015). Our study contributes to this stream of research by exploring the emergence of service design capability and theorizing the design-strategy link.

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Abstract (in Polish)

Ten empiryczny artykuł bada proces postępowania, począwszy od decyzji menedżerskiej, w którym projekt usług jest zdolnością organizacyjną, zgodnie z tym, jak rozwija się w czasie w ramach jednej organizacji. Projekt usług stał się znaną praktyką biznesową, diagnozującą w jaki sposób firmy tworzą nowe produkty i usługi w celu promowania zróżnicowania w coraz bardziej niepewnym otoczeniu biznesowym. Niejawne w literaturze dotyczącej projektowania usług są założenia dotyczące strategicznych implikacji przyjęcia określonych metod i narzędzi innowacyjnych. Jednak niewiele wiadomo na temat tego, jak projekt usług zmienia się w organizacyjną zdolność, umożliwiającą firmom przekształcanie istniejących firm i utrzymanie konkurencyjności. Poprzez podłużne, odkrywcze studium przypadku dotyczące praktyk projektowania usług w jednym z największych na świecie firm telekomunikacyjnych, przedstawiamy mechanizmy, dzięki którym projekt serwisowy ewoluuje do możliwości organizacyjnych, zadają pytanie badawcze: jakie są mechanizmy, dzięki którym projekt serwisowy rozwija się w organizacyjną zdolność? Nasze badania ujawniają wpływ wstępnego wprowadzenia narzędzi do projektowania usług, identyfikacji podmiotów zajmujących się zakresem granic oraz współregulacji zasobów dedykowanych między funkcje wewnętrzne, a także poprzez współtworzenie z klientami. Z biegiem czasu działania te prowadzą do przyjęcia praktyk w zakresie projektowania usług, a następnie te praktyki są wprowadzane stopniowo w całej organizacji, zmieniają decyzje kierownicze i wpływają na wiele ścieżek rozwoju nowych możliwości. Raportując ten proces, możemy opisać, w jaki sposób praktyki projektowania usług zostały rozpowszechnione i zinstytucjonalizowane w organizacji, którą obserwowaliśmy. Niniejsze opracowanie przyczynia się w ten sposób do informowania, w jaki sposób projekt usług może ewoluować w możliwości organizacyjne, a także poprzez powiązanie powstającej literatury poświęconej projektowaniu usług z myśleniem o projektowemu z ustaloną teorią strategii. Konieczne będą dalsze badania w celu potwierdzenia, czy te same mechanizmy są możliwe do zaobserwowania w różnych kontekstach iw innych firmach, a także kilka przyszłych kierunków badań. Ponadto badanie ma również implikacje dla praktyki, ponieważ pokazuje, w jaki sposób metodyka projektowania usług może być wdrożona i ma strategiczne implikacje dla organizacji.

Słowa kluczowe: *rozwój zdolności; myślenie projektowe; możliwości organizacyjne; praktyki projektowe usług; powiązanie strategiczno-innowacyjne.*

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Dynamic Capabilities and Innovation Capabilities: The Case of the 'Innovation Clinic'

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Abstract

In this explorative study, we investigate the relationship between dynamic capabilities and innovation capabilities. Dynamic capabilities are at the core of strategic management in terms of how firms can ensure adaptation to changing environments over time. Our paper follows two paths of argumentation. First, we review and discuss some major contributions to the theories on ordinary capabilities, dynamic capabilities, and innovation capabilities. We seek to identify different understandings of the concepts in question, in order to clarify the distinctions and relationships between dynamic capabilities and innovation capabilities. Second, we present a case study of the 'Innovation Clinic' at a major university hospital, including four innovation projects. We use this case study to explore and discuss how dynamic capabilities can be extended, as well as to what extent innovation capabilities can be said to be dynamic. In our conclusion, we discuss the conditions for nurturing 'dynamic innovation capabilities' in organizations.

Keywords: *dynamic capabilities; innovation capabilities; service innovation; healthcare.*

INTRODUCTION

In this paper, we seek to understand dynamic innovation capabilities, as compared (and related) to dynamic capabilities and innovation capabilities, respectively. A long research tradition has focused on organizations' resources

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as sources and limitations of growth, competitive advantage and innovation (e.g., Penrose, 1959; Bower, 1970; Wernerfelt, 1984; Barney, 1991). Extending this tradition, capabilities, rather than resources or products, have been suggested to explain the challenge of achieving superior fit with shifting environments (Teece, Pisano & Shuen, 1997). Eisenhardt and Martin (2000) explicitly challenged the resource-based view, arguing that there are identifiable processes that can explain the nature of competitiveness. Later research on capabilities has focused on how higher-order routines constitute dynamic capabilities (Winter, 2003). To meet the demands from new markets, revolutionary changes in technology or new business models, firms need to renew themselves (Chakravarthy & Doz, 1992) and be innovative. There have been a number of theoretical studies of dynamic capabilities (e.g., Eisenhardt & Martin, 2000; Teece et al., 1997; Teece, 2007; Teece, 2014), but one of the key remaining challenges is to understand the relationship between dynamic capabilities and innovation capabilities, as pointed out by Breznik and Hisrich (2014). The relationship between dynamic capabilities and innovation capabilities shows overlaps, inconsistencies, and contradictions (Breznik & Hisrich, 2014, p. 368,). Thus, our research questions are: How are capabilities related to innovation? And, relatedly, what are the premises for dynamic innovation capabilities, and how can they be developed?

In this paper, we will use Teece's (2014) definition and operationalization of dynamic capabilities into *sensing* opportunities to meet customer needs, *seizing* opportunities to mobilize resources and capture value, and continued renewal through *transformation*. There are few studies of innovation capabilities in practice, and our aim is to use a case study of an innovation unit at a major university hospital as a vehicle to explore potential differences and similarities between dynamic capabilities and innovation capabilities.

We do this by reviewing and discussing some central contributions to the literature on capabilities, dynamic capabilities and innovation capabilities, while seeking to clarify the distinctions between the terms. We then present a case study of an 'Innovation Clinic' at a large university hospital. Towards the end of the paper, we discuss the potentially dynamic aspects of innovation capabilities and why they are important in large research-oriented service organizations.

LITERATURE REVIEW

An outline of dynamic and innovation capabilities

Capabilities

Capabilities can be understood as what makes firms different among their competing and partnering organizations. For example, different car producers are all participants in the same industry, but they show very different performance. The variation between firms' performance, then, cannot be explained by the industry itself (Rumelt, 1991; Porter & McGahn, 1997). Rather, this variation can be explained by firm-specific differences due to different strategic capabilities, as the firms deploy resources and competences (Johnson et al., 2014). There are important distinctions between capabilities and resources (Amit & Schoemaker, 1993), as it is not sufficient to control tangible or intangible resources for long-term survival; the ability to configure and reconfigure resources over time is also needed. Penrose (1959) discussed the challenge and limitations of growth in terms of management capacity to hire, train and implement new management in an organization. Firms cannot easily acquire or get rid of specialized resources, and specialization tends to create a stickiness effect. For instance, time and effort must be used to align resources after acquisitions or mergers. Leonard-Barton (1992) discusses the challenges regarding how core capabilities also create core rigidities, in her analysis of product development teams. When investing in and learning certain capacities, firms will also find that it is costly to change focus, and, therefore, specializing in certain capabilities will create rigidities.

There are several descriptions of capabilities, not necessarily 'dynamic' capabilities, in the literature. This is a good starting point to understand dynamic capabilities, innovation capabilities, and dynamic innovation capabilities – the three core concepts we will use in this paper. Amit and Schoemaker (1993) argue that capabilities can be functional and rooted in specific areas of the firm. Teece, Pisano and Shuen (1997, p. 512) use the term 'operational' capabilities to describe the ordinary routines of Southwest Airlines that were difficult for competitors to copy. Later, Helfat and Winter (2011) used the terminology of operational and dynamic capabilities to describe first- and second-order capabilities. Ordinary capabilities are explained by Winter (2003) as the capacity to fix ad-hoc problems or challenges. This type of capability is not dynamic but is only suited for situated problem solving. Thus, these are not capabilities enabling long-term or higher-order changes in the organization. For further use in this paper,

we will use the simple term "capabilities" interchangeably with operational, functional or ordinary capabilities as discussed in the literature.

Dynamic capabilities

We define dynamic capabilities, in line with Teece et al. (1997) and Teece (2007), as not only direct production or development of market offers but also a higher-order capability to build, integrate and reconfigure operational capabilities. Capabilities have two intrinsic qualities (Helfat & Peteraf, 2003, p. 999), those that perform individual tasks and those that coordinate individual tasks. In order to try to discuss what makes capabilities dynamic, we will look at some of the advances in this research stream. Dynamic capabilities can be understood, for example, by observing industry dynamics over time. Capabilities can be easy to define in theory but quite hard to identify in practice. Therefore, we offer an example from the music player and camera industry in order to provide an idea of the kind of role dynamic capabilities actually play in practice. Sony was once a market leader in portable music, first selling portable cassette players, then establishing itself in the market for portable CD players and, later, in the mini-disc market. New technology came with the MP3 format to dominate the industry. However, Sony did not capture any significant part of the MP3 market for portable music, as Apple and others came in to dominate the market. However, Sony moved on to use its capabilities to establish itself in the camera market, and by 2014 they had captured 13% of the high-end market for cameras with changeable lenses (Petapixel.com, 2015), which had earlier been dominated by firms such as Nikon, Canon and Olympus. From this example, we can gain insight into how resources, competences, R&D and market insight, as well as managerial talent are deployed in different areas over time, and we can understand from a practical point of view what constitutes dynamic capabilities. This example also illustrates the challenge of understanding the nature of dynamic capabilities in time and space (e.g., over time and in several markets).

One of the early contributions to our insight on the nature of dynamic capabilities originates from Collis (1994), who used the term 'organizational capabilities', arguing that dynamic capabilities are simply capabilities that make it possible to change ordinary capabilities over time. According to Collis, dynamic capabilities are subject to three challenges; erosion, substitution and learning about higher-order capabilities over time. Teece et al. (1997, p. 516) defines dynamic capabilities, with reference to Leonard-Barton (1992), as *"the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms*

of competitive advantage given path dependencies and market positions". Eisenhardt and Martin (2000, p. 1105) argue that dynamic capabilities consist of a set of specific processes, such as product development, strategic decision making and alliancing. They argue that these capabilities are identifiable and typically have similar characteristics across firms, in terms of basic processes and activities, but they are not equal across industries. The challenge with Eisenhardt and Martin's (2000) view on dynamic capabilities is that they become just another set of processes, not describing how capabilities are renewed over time. Another aspect is how Eisenhardt and Martin (2000) identify a more active managerial role than, for instance, Teece et al. (1997) do. While Teece et al. (1997) rely more on routines and procedures, Eisenhardt and Martin (2000, p. 1117) argue that competitive advantage comes from how managers use dynamic capabilities, rather than from the capabilities themselves.

Winter (2003) suggests a useful way of distinguishing between ordinary capabilities and dynamic capabilities; however, Helfat and Winter (2011, p. 1245) argue that it is difficult to make a distinction between dynamic and operational capabilities. We can only know afterwards where the change is coming from, the size of the change, and what effects the change will have. For firms involved in R&D, there might be spill-over effects on production, as small improvements in a fabric or substance might alter the production process itself. Thus, it is difficult, a priori, to tell the difference between dynamic and operational capabilities, because one could lead to the other and vice versa. This is one of the reasons why there is a need for longitudinal studies of capabilities in time and space.

Table 1. Four different definitions of dynamic innovation capabilities

Teece, Pisano, and Shuen (1997, p. 516): "We define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions."
Eisenhardt and Martin (2000, p. 1118): "Dynamic capabilities include well-known organizational and strategic processes like alliancing and product development whose strategic value lies in their ability to manipulate resources into value-creating strategies. Although idiosyncratic, they exhibit commonalities or 'best practice' across firms….They evolve via well-known learning mechanisms."
Winter (2003, p. 991): "One can define dynamic capabilities as those that operate to extend, modify or create ordinary capabilities."
Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece, and Winter (2007, p. 4): "A dynamic capability is the capacity of an organization to purposefully create, extend or modify its resource base."

As can be seen in Table 1, there are two major, and somewhat different, perspectives on capabilities. Eisenhardt and Martin (2000) argue that dynamic

capabilities can be understood as routines of "best practice" and, further, that capabilities must be robust in order to handle fast changes. Firms operating in high-velocity environments need to rely on heuristics for changes, quickly developing new combinations of resources when needed. Teece (2014), on the other hand, argues that Eisenhardt and Martin's (2000) concept of 'dynamic capabilities' is quite similar to Teece et al.'s (1997) concept of 'ordinary capabilities'. Eisenhardt and Martin (2000, p. 13) argue that dynamic capabilities are simply "best practices" and are shared among several firms in the market. Teece (2014, p. 332) describes ordinary capabilities in terms of technical efficiency in business functions, based on the ability to buy or build learning. An ordinary capability can be based on a best practice, which is not very difficult to imitate, such as when managerial emphasis is placed on cost control. In terms of modus operandi, ordinary capabilities involve aiming at doing things right and efficiently, with technical fitness as a result.

There are several literature reviews discussing the nature and the origins of dynamic capabilities (Ambrosini et al., 2009; Breznik & Hisrich, 2014; Easterby-Smith, Lyles & Peteraf, 2009; Helfat et al., 2007; Wang & Ahmed, 2007). A majority of these studies of dynamic capabilities treat Teece et al. (1997) as the original definition of dynamic capabilities. The purpose of dynamic capabilities is to achieve congruence with business opportunities and user needs by learning, based on signature processes that are difficult to imitate (Teece, 2014). As an operationalization for analytical purposes, Teece (2007, p. 12319) argues that *"dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets"*. Hence, we will use the dimensions of sensing, seizing and transforming as analytical dimensions in this paper. The modus operandi focuses on doing the right things through entrepreneurial action, and the goal is to create evolutionary fitness through innovation. As Teece (2014) argues, there is a potential for focusing on the nature of innovation within the dynamic capabilities literature in general, and innovation capabilities in detail, as we will do in the next section.

Innovation capabilities

The concept of innovation capabilities is somewhat confusing. On the one hand, capabilities in themselves involve routines – and specifically, as defined by Winter (2003), routines for daily business – while dynamic capabilities are routines for higher order changes or adaptation. In this respect, dynamic capabilities have covered most of the themes discussed in the innovation

literature, at least at a strategic management level of analysis. As described by Eisenhardt and Martin (2000), dynamic capabilities are discovered in product development processes, in addition to strategic decision making, integrating resources, and acquisitions. Teece (2007, p. 1321) describes the role of the entrepreneur, as not only adapting to, but actually shaping, the environment. With this in mind, dynamic capabilities involve product development as well as entrepreneurial action, and thus innovation capabilities are already covered by the contributions of dynamic capabilities. However, Wang and Ahmed (2007, p. 37) use the term 'innovation' to describe the nature of innovation capabilities, in addition to adaptive and absorptive capabilities, as the three main forms of capabilities that exist. Teece (2007) argues that selecting products and business models is part of the micro-foundations of dynamic capabilities. These two core business processes are central to innovation. On the other hand, we can see that dynamic capabilities are more than only innovation capabilities, as discussed by Helfat and Peteraf (2011, p. 1249), as, for instance, product development may also relate to existing business. From the literature on strategic management, we can argue that innovation and innovation capabilities refer to an important part of dynamic capabilities; in fact, it is one of the central entities of dynamic capabilities.

On the other hand, if we look at studies on innovation and search for the connection to innovation capabilities, this might reveal interesting insight into use of the terminology. We conducted a literature review on innovation capabilities, analyzing contributions using the terms "innovation" and "capabilities" together. In doing so, we discovered traces back to Lawson and Samson's (2001) study of innovation management. They developed a construct from a theory review and a case study of Cisco Systems, consisting of seven elements: vision, competence base, organizational intelligence, creativity, idea management, organizational structures and systems, culture and climate, and management of technology. They portray innovation capability as a meta-capability to achieve outstanding innovation performance. Lawson and Samson (2001, p. 380) state that innovation capability *"is proposed as a higher-order capability, that is, the ability to mould and manage multiple capabilities. Organisations possessing this innovation capability have the ability to integrate key capabilities and resources of their firm to successfully stimulate innovation"* (i.e. dynamic capability).

Studies of innovation capabilities are mainly concerned with either industry- or firm-specific factors. Several studies focus on industries, geographical areas or more general development of innovation capabilities in different regions. Guan and Ma (2003) investigated innovative capabilities and export performance among Chinese firms, concluding that export growth was closely related to the total improvement of innovation capability dimensions,

except for manufacturing capabilities. However, the core innovation assets (a set of R&D, manufacturing and marketing assets) alone did not lead to sustainable export growth. There are also studies of technology and innovation capabilities (Yam et al., 2004; Wang et al., 2008), focusing on how firms cope with uncertainty. Several studies focus on innovation capabilities in small and medium-sized enterprises (SMEs). Keskin (2006) reported a positive relationship between market orientation, learning and innovation capabilities in SMEs. Forsman (2011) examined innovation patterns in SMEs and demonstrated that manufacturing and service firms were not very different, instead finding larger differences between sectors (Forsman, 2011, p. 748). However, our focus in this study is on organization-specific factors, not industry-wide application and development of innovation capabilities. Hertog et al. (2010) developed a conceptual framework for capabilities to manage service innovations and specified six dynamic service innovation capabilities – namely, signaling user needs and technological options, conceptualizing, (un-)bundling capability, co-producing and orchestrating, scaling and stretching, and learning and adapting. Terziovski (2007) studied how innovation capabilities can be developed and exploited, arguing that the essential building blocks for innovation capabilities are collaboration and knowledge transfer. Oskaya (2011) and Oskaya et al. (2015) argued that innovation capabilities mediate the relationship between knowledge and product innovation, as well as the relationship between inter-functional cooperation and product performance. As a critical remark to the studies of innovation capabilities, few of these studies relate their concepts to the *long-term* survival of the organizations at hand. To conclude, the studies on dynamic capabilities are related to the overall strategy of the firm, while studies on innovation – utilizing the innovation capability terminology, take a more functional stance towards innovation. In both areas, innovation and innovation capabilities play an important role, and to some extent they overlap, but from a different starting point. Studies on dynamic capabilities consider the overall strategic implications, while studies using the terminology of innovation capabilities look at innovation as a driver for performance.

Clarifying the concepts of dynamic capabilities and innovation capabilities

With the preceding discussion in mind, how can we conceive of the relationship between dynamic capabilities and innovation capabilities? Helfat et al. (2007, p. 4) define dynamic capabilities as *"the capability of an organization to purposefully create, extend and modify its resource base"*, and above we explained that innovation capabilities could be seen as potentially

dynamic or non-dynamic (Teece et al., 1997). According to these authors, typical innovation activities, such as product development and R&D, are not necessarily dynamic if they do not contribute to the long-term capacity to adapt to changing environments. Hence, innovation capabilities may in fact operate under relatively stable environmental conditions, or they may lack the features necessary to aid in reinterpreting and reconfiguring knowledge and resources according to changes and instabilities in the environment, not to mention the ability to partake in shaping the environment. On the other hand, as emphasized by Lawson and Samson (2001) and Terziowski (2011), innovation capabilities may be highly dynamic, in that they contribute to radical reinterpretation, recombination and transformation of the organization's knowledge and resources in ways that influence and adapt to changing environments. Furthermore, this way of looking at innovation capabilities as potentially dynamic is fully within the scope of Teece and colleagues' (1997; 2007; 2014) version of dynamic capabilities, emphasizing the sensing, seizing and transformation of *capabilities* over time. In other words, it is the *capability of transforming capabilities*, including innovation capabilities, over time, that qualifies as 'dynamic capabilities'. Hence, in order to study the relationship between dynamic capabilities and innovation capabilities empirically, we will utilize the framework of Teece (2014) to analyze and discuss the development of dynamic innovation capabilities in practice.

RESEARCH METHODS

We have conducted a process-oriented single case study of an innovation unit in a big organization in order to explore complex relationships over time (Hoholm & Araujo, 2011; La Rocca et al., 2017). Our case study analysis has been characterized by abductive back-and-forth movements between empirically rich descriptions, analysis, and theory development (Dubois & Gadde, 2002; 2014). It is challenging to study capabilities, and dynamic capabilities are best understood across time and space. Hence, we conducted a longitudinal case study of the Innovation Clinic at a major University Hospital, including a series of their innovation projects. The case was chosen for its potential to enable an exploration of dynamic innovation capabilities in practice. The data are based on retrospective constructions (documents and interviews) as well as prospective process observations by the third and the fourth authors. Numerous field interviews, field observations and field talks were done by these authors throughout the whole period. At the end of each innovation project, the Innovation Clinic wrote case evaluation reports

in order to develop their methods and capacity to (1) document the value of, and the barriers to, innovation projects; and (2) contribute to actual and important innovation processes. These project reports were exploited as important data materials in our study, documenting aspects of the process, as well as methods and routine development. In addition, the successive development of innovation practices across the projects was analyzed to identify the Innovation Clinic's learning about innovation management over time. The first author was included at a later stage, contributing to the theoretical and analytical frameworks, and to the discussion of findings, with the critical gaze of the 'outsider'. The second author contributed empirically, while not being a participant in any of the innovation projects, as well as to the analysis and discussion of findings. In our experience, the authors contributed a productive mix of different views and experiences to create new insights. The purpose of the study was to develop knowledge of the development of dynamic innovation capabilities at the organizational level. Thus, we chose to describe a selection of innovation projects that we found to demonstrate the emergence of new capabilities across time.

In our analysis, we identified major happenings, meetings, conflicts and decisions made throughout the different projects reported in this paper. Four innovation cases were chosen from a wider pool of 11 project reports, as they could most clearly illustrate the line of development over time, emphasized by the theoretical framework of this paper. The study covers the time period from 2007 to 2016. Hence, this paper benefited from a longitudinal case study (Hoholm & Araujo, 2011), while coping with the challenges of 'nativism' (Gioa & Chittipeddi, 1991) through distance, discussion and ideas from the more 'external' authors. We used an abductive approach, moving back and forth between analysis and theorizing (Dubois & Gadde, 2002; 2014), in order to get a better analytical grip on how dynamic innovation capabilities may be developed. The results of our study are found at the level of 'analytical generalizations', encouraging further research to complement our insights across cases and contexts (Dubois & Gadde, 2002).

A case study of innovation capabilities development in a hospital

We will now direct our focus to describe the efforts of the "Innovation Clinic" (IC) at a major Norwegian university hospital, including their facilitation of four different innovation projects. We analyze how the IC and each of the four innovation projects may be said to contribute to the development of dynamic capabilities and innovation capabilities in the hospital. The studied university hospital has more than 20,000 employees and serves the population of a major city and its surrounding area, as well as the national

population in some specialized medical fields. Overall, the university hospital is one of the larger hospitals in the European context. Hospitals have been considerably knowledge-intensive for decades, and their practices are increasingly knowledge-based, in line with the emergence of the medical sciences. However, while medical personnel at this hospital published around 350 scientific papers in 2007, only one innovation was reported. The organization found it to be more challenging to develop and implement innovations, which often required organizational and institutional changes, than to develop research-based medical knowledge closely related to daily medical practices. Hence, the Innovation Clinic was established in 2007 to develop innovations within and at the borders of the university hospital. There seemed to be a large potential to improve dynamic capabilities and support a stronger development of innovation capabilities in the organization, particularly in terms of services and organizational aspects. The Innovation Clinic formulated four different aims in the startup phase: (1) With top-down support, build bottom-up infrastructure for innovation; (2) investigate and document the economic value of innovations; (3) communicate and document innovation benefits; and (4) establish an innovation network at the national level. Through the early phase, a series of 11 different innovation projects were used instrumentally to provide insight and experience in documenting value and benefits to employees, patients, their families, hospitals, the healthcare sector, and society at large. This strategy was considered to be important for getting the attention of decision makers as well as the whole organization. Through close contact with several clinics and practices at the hospital, the Innovation Clinic developed methods to promote and facilitate healthcare innovation. They also worked to develop capacity for guiding innovation project participants on using these methods and frameworks. Their methodological approach was built on the following principles:

1) Capture patients and professionals' needs for improvement in regular practice. This was usually done through a first meeting at the clinic. The "Innovator" (patient, health provider, decision maker, etc.) met with an innovation advisor from the Innovation Clinic to identify bottlenecks within current practice.
2) Mobilize resources for a valuable intervention. The Innovation Clinic held a strong belief that an interdisciplinary approach was needed in order to create a robust intervention. Workshops that gathered patents, professionals and decision makers proved to be an important tool in this phase.
3) Iteration and stepwise implementation. The distance between need, intervention and implementation was often recognized to be quite substantial, and usually the first attempt at an intervention did not fully cover the needs. A stepwise approach to implementation was thus

developed to reveal inefficiencies and insufficient understanding of the problem while the intervention was still transformable.

In the following sections we present four of the 11 innovation projects to show how the Innovation Clinic worked to promote and facilitate innovation through this early phase. These four projects were selected for our analysis due to their potential to display how IC learned to facilitate service and organizational innovations across the hospital.

We have utilized the framework from Teece (2009, 2014) as an operationalization of dynamic capabilities into 'sensing', 'seizing' and 'transforming'. We have reviewed the empirical data from the four innovation projects analyzed, utilizing the different concepts for classification of the activities in each project. Next, we have analyzed the similarities and differences across the projects, including how these could indicate learning across projects over time. This analysis formed part of our attempt to investigate the relationship between dynamic capabilities and innovation capabilities.

Advanced Home Hospital for Children

Sensing and shaping opportunities

This project had the aim of improving the hospitalization of children with long-term treatment needs. This is an idea that had been circulating across many hospitals for a few years, but its realization had been slow. A project titled 'Advanced Home Hospital' (AHH) was initiated at the hospital, aiming at improving health care for small children, as well as solving capacity challenges of the hospital. Especially in cases with chronic conditions, being away from family and friends can be traumatic for the patient and stressful for the family involved. The AHH project started with an extensive medical literature review, establishing evidence that hospitalization at home had great potential without downgrading treatment quality. According to available studies, the families and children did not have any adverse opinions about safety or treatment. Instead, they reported greater well-being than during normal hospitalization. The next step was the development of a simulation model of costs and benefits of the AHH solution. The simulation showed indications that home hospitalization could provide large cost savings over inpatient practice. The major savings came from reducing overhead and salary costs.

Seizing the opportunity

Based on the indications from the literature and the simulation, the decision was made to implement AHH as a part of the Child and Youth Clinic at the hospital. Soon, however, it became clear that the AHH innovation was not well anchored with the physicians in the clinic. Pediatric nurses were involved early into the project, whereas the physicians would normally be at the top of the clinic hierarchy, and the lack of a strong alliance with the physicians seemed to inhibit the nurses' commitment to and support of the project. In addition, there was a challenge of understaffing, and therefore high work pressure, at the clinic. To undertake the home treatment of children demanded a different orientation towards practice, as well as a redesign of the work processes. Even though the project was implemented, it did not reach enough support and alignment with the management of the Child and Youth Clinic to reach the estimated potential.

Transforming practices and capabilities over time

A few years later, AHH still operated with insufficient resources compared to the identified need, and it could only extend treatment to a limited number of patient groups. However, in line with the networking role of the Innovation Clinic, activities were initiated to introduce AHH at an adjacent university hospital, with higher management commitment and more resources. Despite the challenges and shortcomings, the AHH project seemed to contribute to the Innovation Clinic's learning and thus development of innovation capabilities, such as building coalitions, creating change and understanding existing work practices. However, a good idea, good international medical studies and great benefits for the patients and their families were not enough. Resources, existing work practices, and top management support, as well as support from the physicians, were identified as ingredients of high importance. As such, this project contributed in the form of 'trial and error learning', which, arguably, is necessary to develop both ordinary and dynamic innovation capabilities in a complex organization.

The wound support network

Sensing and shaping opportunities

The Innovation Clinic became involved in two different projects related to wounds. Through conversations with the wound treatment expert group at the Department of Dermatology at the hospital, the IC learned that traveling and waiting time at the hospital represent considerable challenges for patients in need of treatment of severe – and sometimes chronic – wounds.

These patients typically live at nursing homes or have access to home nursing services. Generally, the waiting times for this kind of treatment are long, despite the fact that the probability of healing decreases the longer it takes to get access to qualified help. One of the challenges is that the expertise on wounds is located at the University Hospital, and not within the home health service.

Seizing the opportunity

The key unit in what were referred to as 'wound support networks' were the wound contact nurses who supported the home care service in a district. When an innovation project was established to improve and document the wound support network, three wound contact nurses became part of the pilot in three different city districts. Their task was to provide specialized insight into how to perform wound treatment, in order to support primary care nurses in their respective districts. Thus, the wound contact nurses served as a link between the hospital department and the primary health care services. The wound contact nurses visited and helped all wound patients in their districts, together with the home care service practitioners, every four weeks during the three-month project period.

The Innovation Clinic used both qualitative and quantitative measures in the study of wound healing rates, cost/benefit analyses, and studies of knowledge transfer in the project. Economic indicators were used for the hospital, for the municipality of Oslo and for the total picture across all service providers. Improved clinical results were identified, in addition to the obvious benefits to patients and primary care practitioners, and this also led to cost savings. They estimated that the potential to reduce health care spending could amount to more than USD 4000 per patient year.

Transforming practices and capabilities over time

A new economic challenge was identified, however: while reducing the total costs by 37% in contrast to existing work processes, reducing the number of patients would also reduce the income for the hospital by 26%. This loss of compensation became a hurdle in implementing large-scale changes, despite great benefits to most parties involved. In addition, changing the work practices of the Department of Dermatology at the hospital was in itself not an easy task.

Through this process, the Innovation Clinic learned more about how the capability to analyze, create and implement service innovations, such as the wound support network, could create large benefits to society, in addition to significant cost savings. However, the University Hospital lacked

financial incentives to implement the large-scale changes. The government incentive system was not easy to change. Hence, from this project we can learn that innovation capabilities might also need to be extended into the area of economic organizing – to take care of economic incentives (in this case, ruled by politicians and governmental actors), even at the level of the ministry of health and care. Inter-disciplinary and inter-organizational collaboration, such as collaboration between the government, the hospital and municipalities, requires attention and willingness to change from the respective top management groups, politicians and committed health care personnel.

Outpatient Tele-Medicine treatment of wounds

Sensing and shaping opportunities

For a long time, telemedicine has been on the agenda in Norwegian hospitals, mainly because of the country's challenging geography. The technical solutions have long been ready for use on smaller scales, but very few services have capitalized on them. This second wound project was a collaborative project with a specialized rehabilitation hospital, the Department of Biostatistics and Epidemiology at the University of Oslo. The Innovation Clinic served as advisors on the project, estimating the costs and benefits of the new forms of treatment to society.

Seizing the opportunity

The project started by investigating the hypothesis: What would be the benefits to society be if we used telemedicine to treat back wounds and pressure wounds? Treatment of wounds in this patient group is complicated and requires a high level of expertise and continuous observation. The downside of unsuccessful treatment is clear: If the cure process shows adverse effects, amputation may be necessary. As mentioned, this project was located at a specialized rehabilitation hospital, and a goal of the project was to explore the benefits of using outpatient tele-medicine on a larger scale.

Patients with severe back injuries as a result of traffic accidents, sports accidents, or diseases were the primary targets. Seven patients with severe back injuries, having lived with this condition for between 5 and 46 years, were enrolled in the project. They had previously experienced between 33 and 601 days of hospitalization. In terms of health care professionals, three home care employees joined the project. The results of this preliminary test showed

that all patients were very satisfied by the treatment via videoconference. On the other hand, they missed the social contact and knowledge sharing with fellow patients.

A core idea behind the project was to help patients avoid hospitalization by supporting home care service teams via telemedicine. In this way, local home care service personnel got new skills and updated knowledge on treating severe wounds. It was found that the time used to treat patients via this method was shorter than at the hospital. However, it took some time at the first treatment in order to set up the video conference equipment and to coordinate the different professionals involved. Estimates showed that the national potential for cost savings could amount to around USD 52 million. The remaining factor of uncertainty was the risk of re-hospitalization in cases in which wounds did not heal according to expectations; still, however, the economic potential was significant. In addition, the new practice provided substantial benefits to the patients and more efficient utilization of the expertise at the rehabilitation hospital.

Transforming practices and capabilities over time

This project showed how innovations related to outpatient telemedicine treatment could be used in several novel areas, potentially with large economic benefits to society (see also Irgens et al., 2015). In addition, the project participants gained experience in using new methods and ways of organizing the work processes and service provision to create less strain for the patients. The weight of the evidence in terms of economic, clinical and patient satisfaction benefits, alongside several similar projects elsewhere, seemed to produce broader agreement among national stakeholders regarding the need for national policy, strategy and funding for scaling telemedicine services. Still, at the time of our study, the long-term outcomes remained to be seen. To sum up, the innovation activities demonstrated in this project, similar to previous projects, required the involvement and coordination of several professional groups, top-down anchoring of the change process, and bottom-up mobilization of resources.

Breast cancer diagnostics

The last project we will present in our analysis of innovation capabilities at the university hospital ultimately had a large-scale impact on the treatment of patients. The outcome was a major service innovation that made the national headlines both during and after the innovation process.

Sensing and shaping opportunities

Before this project, when a breast tumor was detected, patients were typically forwarded to the hospital by a general practitioner, with the next stage consisting of a set of activities to diagnose whether or not the tumor was dangerous. Through initial explorative investigations, they learned that one of the most difficult challenges was the high variation in the information collected by the general practitioners. In addition, there are many different professionals involved in breast cancer diagnosis, such as general practitioners, radiologists, pathologists and oncologists. To add to the complexity of the process, the hospital's treatment activities were organized at two different locations and with different work processes. In sum, these aspects led to severe coordination problems across different professional groups, departments and organizations, which resulted in long waiting times for the patients.

Seizing the opportunity

The ambitious goal of this project was to reduce the waiting times by 75%, at least for the diagnosis process. The project was designed to improve efficiency, effectiveness, and service quality, as well as patient satisfaction. This time, the project group was successful in mobilizing commitment and participation by the top management of the University Hospital, as well as by leaders at the relevant clinics. A design-based innovation approach was used, and patient experiences were investigated through semi-structured interviews. Coordination and collaboration challenges were explored through multi-stakeholder workshops, leading to streamlining information flows and requirements, patient flows, and more efficient resource utilization. This time, no economic aspects were investigated in the first part of the project. An economic analysis was conducted at a later stage, comparing in-house treatment to outsourced solutions.

Transforming practices and capabilities over time

As a direct result of the project, work processes were permanently re-configured across the participating actors, reducing waiting times for breast cancer diagnosis by 90%. Before this tremendous improvement, the patients were usually left with unanswered questions and distress for months; afterward, the average waiting times decreased from 12 weeks to less than 48 hours. The hospital demonstrated service and organizational innovation capabilities at a new level. The project's success in mobilizing professionals across several disciplines, gaining legitimacy from top management, and facilitating the re-organization of work processes gained wide attention.

To sum up, a rather complex set of investigations and interventions were combined to achieve ambitious aims, including the ability to choose a project with strategic impact, and with the potential to attract attention both internally and externally.

ANALYSIS AND DISCUSSION

Based on the discussion of the capabilities and the dynamic capabilities literature, as well as the subsequent presentation of the Innovation Clinic case study, we will in the following paragraphs discuss the development of dynamic innovation capabilities. We will also develop an argument for the relative importance of making innovation capabilities dynamic. In our investigation of the Innovation Clinic, we saw the emergence of a set of routines, methods and actions resembling innovation capabilities, particularly related to service and organizational innovation. As argued in the literature section, such innovation capabilities may in some cases be classified as ordinary capabilities. We need, therefore, to discuss the premises for *dynamic* innovation capabilities.

There are several conceptual discussions in the literature regarding what dynamic capabilities can be and what they are not (e.g., Teece, 2007, 2012, 2014). A remaining challenge is to produce empirical insights into how dynamic capabilities can be understood, as well as how we can identify and understand their sources and development. We suggest that the emerging service and organizational innovation capabilities we have identified in this case study can be categorized as dynamic. The reason for this, we would argue, is that they seemed to be (1) applicable to different service areas or markets, (2) evolving over time, and (3) transferable to various actors and coalitions within the organizational space.

In our case study presentation, we used the three criteria of sensing, seizing and transforming (Teece, 2014) to identify the capabilities involved in the Innovation Clinic. Due to the relatively short time span of our empirical study, we cannot argue categorically that the Innovation Clinic contributed to dynamic innovation capabilities across the University Hospital at large, as there are, of course, other forces in motion. Likewise, we cannot be sure that the identified capabilities remained dynamic over longer periods of time. Still, the Innovation Clinic was clearly set up with this purpose. As far as we could observe, the Innovation Clinic worked to facilitate strategic innovation, to change ordinary capabilities over time, and to develop innovation capabilities in new areas through its different projects. This was done both within and at the borders of the organization and the surrounding network of actors. One of the important questions in this theoretical landscape is this;

What makes organizational capabilities dynamic, and, more specifically, how are dynamic innovation capabilities constituted? Answers to this question should be sought in the interface between the theoretical framework and empirical research. From our case study, we find that dynamic innovation capabilities may emerge from a combination of entrepreneurial management and organizational elements, much in line with Teece's (2012, 2014) conceptualization of dynamic capabilities. Before going further into the discussion of dynamic innovation capabilities, we will first take a closer look at the role of organizational elements and of entrepreneurial management.

Organizational elements

In the case study, we identified the systematic development of particular processes, methods and routines in the work of the Innovation Clinic. Some of these organizational elements related to *sensing* by focusing on 'capturing' needs and opportunities within and across hospital clinics and departments, and then performing initial evaluations or simulations of the potential benefits of developing a solution to the problem. Further, several of the organizational elements related to *seizing*, in that they were set up to support the mobilization of resources. Arguably, some of the trial-and-error learning procedures also contributed to seizing, as they were primarily helping the local project to develop unique solutions to the current problem at stake. Other parts of the trial-and-error activities pointed more towards the *transformation* of capabilities across settings and time. The tools for simulating, modelling and evaluating service innovations were continuously developed across all the projects, gradually increasing the argumentative power of top management and other stakeholders. Project by project, the IC personnel learned more about a number of important barriers and enablers that needed attention, as well as about the tactics of managing innovation processes.

By partially emulating and modifying common methods and routines in medicine, such as medical cases, clinical trials and health technology assessments, the IC gradually maneuvered into a position from which they could advocate for what we would call innovation routines. Some of the routines for innovations included a digital idea portal, new methods such as service design methods; a method for modelling, simulating and assessing innovations; and stepwise trial-and-error processes facilitated by the Innovation Clinic team. As shown in the case study, the major aim of the Innovation Clinic was to challenge the status quo by facilitating service innovation throughout the organization. They pursued relatively radical ideas of patient-centricity, mobile and digital service provision, and inter-disciplinary

and inter-organizational reconfiguration of services. Hence, we can suggest, firstly, that the Innovation Clinic was set up to create or strengthen the dynamic innovation capabilities of the organization, and secondly, that the IC demonstrated some success in actually facilitating dynamic capabilities, although not without difficulties and limitations.

More operational innovation activities, such as 'lean' projects, as well as more radical changes strictly related to advanced and specialized medical procedures, were left to each of the medical clinics and the general administration. This is not to say, however, that specialized medical innovation capabilities do not need to be dynamic. Indeed, the hospital had already established other units to facilitate innovation in certain advanced medical technologies (see, e.g., Mørk et al., 2012, on medical innovation). Still, hospitals have traditionally shown a stronger ability to make radical shifts related to highly specialized medicine, while generally under-performing on innovation related to *service*, *coordination* and *organization*.

Entrepreneurial management

While important, organizational processes, routines and methods are probably not sufficient to maintain innovation capabilities *dynamically* over time. We would expect such organizational elements to easily become specialized and limited to narrow aspects of practice or, alternatively, to stabilize into inflexible and self-referencing procedures over time. Hence, entrepreneurial management seems to be important for the 'dynamic' element of innovation capabilities. In our case study, the Innovation Clinic performed a strong entrepreneurial role in the organization and its network of partners and stakeholders. Notice, for example, how the Innovation Clinic personnel worked very proactively in identifying clinical managers with 'mature problems', who were therefore ready to collaborate to find novel solutions. They also focused on building alliances with research institutions, administrators of innovation policy instruments and funding, and the hospital's important partners, such as primary health care providers.

Any organizational routine or method may soon become stiff and contribute more to conserving and incrementally improving established practices than to reorientation and radical innovation. It seems necessary to maintain active boundary spanning across the organization and its network, visionary agenda setting, and competent change management in order to stay alert to sensing, seizing and transforming capabilities in order to creatively adapt to changing environments. Reflecting on the case study, we can see that the 'dynamic' aspect is precarious; it seems that the dynamism of this organizational setup relies mainly on only a few individuals in the

Innovation Clinic and their combined experience, attitudes, social networks, and competencies. It is therefore a potent question to ask to what extent the university hospital may be seen to develop and maintain dynamic innovation capabilities in the long run (i.e., beyond the timeframe of our study).

We suggest, in line with Teece (2012), that it is precisely this combination of particular routines, processes and methods, with a strong entrepreneurial management role, that may facilitate the emergence of dynamic innovation capabilities over time. The presence of entrepreneurial management without the necessary organizational elements in place would most likely produce innovation capabilities that are utopian, fragmented, and short-lived. On the other hand, to install organizational routines to support innovation, without entrepreneurial roles, could quickly lead to non-dynamic and inflexible arrangements, at best classified as functional or ordinary innovation capabilities. This leads to the following question: How can entrepreneurship be maintained over time? Stark (2009) and Moreira (2012) identified 'entrepreneurship' as embedded into organizational configurations and, thereby, possibly achieving a more robust entrepreneurial organizational role than the more individual and team-based model identified in our case study. Stark (2009) argues that 'heterarchical' arrangements may be put in place, in which multiple and *competing* principles and criteria of evaluation are regularly allowed to confront each other, to challenge the status quo, and to produce novel interpretations of opportunities and resources. We find this way of performing and organizing the entrepreneurial role beyond the individual level in organizations to be a highly interesting avenue for further research.

Nurturing dynamic innovation capabilities

Finally, we will discuss the importance of nurturing dynamic innovation capabilities, relative to functional innovation capabilities, for strategic management. While the systematic and incremental improvements typically produced in the daily activities of highly specialized and competent organizations like this University Hospital provide considerable value, we find reasons to argue that the dynamic aspects deserve more attention from the top management of large and complex service organizations. Some authors have claimed that the continuous improvements during daily activities account for a larger share of value creation than the earlier radical leaps that brought the organization onto the new path. Still, looking at a large university hospital, we can see how, at least in relation to medical procedures, quality improvement work is already in place, permeating the whole clinical organization; every medical profession is trained for systematic improvement

and is rewarded for merit in mastering established practices. This system of merits and rewards, of course needs to be regulated, monitored and encouraged, but, still, the nurturing of dynamic capabilities remains to be handled by many top management teams. A public and research-oriented service organization like the University Hospital may be seen as a strong case in this respect, having more stakeholders and a more complex mandate than many private firms but an equally fast-changing environment.

In terms of analytical insights from this study, we started out with the research question regarding understanding the relationship between dynamic capabilities and innovation capabilities. The various definitions and subsequent theories on dynamic capabilities and innovation capabilities overlap somewhat and are sometimes unclear and inconsistent (Breznik & Hisrich, 2014). This has been the starting point for this investigation. As we have seen, there are several definitions of dynamic capabilities and of innovation capabilities. For practical and operational purposes, we chose Teece's (2009) conceptualization of dynamic capabilities as a way to sense and seize opportunities, and transform assets. From the empirical data and our analysis based on Teece (2009; 2014), we observed how some projects were adopted and realized in the larger organizational system, while other projects faced more difficulties in realizing their aims.

We saw how the capabilities to sense opportunities could be developed relatively easily, such as through initiating dialogues with clinical managers about their experienced challenges and problems. Seizing and transforming, on the other hand, required systematic learning over time in order to develop methods for estimating and evaluating *value* to the organization and its partners, as well as managing attention and alignment of interests in other ways. Hence, dynamic innovation capabilities seem to be realizable through relatively advanced combinations of methods, routines and processes on the one hand and entrepreneurial management on the other.

The concept of dynamic capabilities was developed in the field of strategic management research. On the other hand, innovation capabilities emerged from studies on innovation and must be regarded with this in mind. From the project universe of the Innovation Clinic, innovation capabilities arose as closely related to innovation practices, while dynamic capabilities, ensuring long-term adaptation and survival, seem to require transformational capacities at both the operational and the strategic levels of the organization. There are clearly overlaps, and in some periods the innovation capabilities may contribute to modify or interact with dynamic capabilities, while in other periods innovation capabilities seem to be more functional as parts of the daily practices of the innovation clinic and other organizational units. As discussed by Winter (2003), it is sometimes difficult to know exactly when a

capability is dynamic and when it is operational. To some extent, we can only understand and analyze afterwards whether learning, change or modification of routines has occurred.

CONCLUSION

Our ambition in this paper has been to gain a better understanding of what makes organizational capabilities dynamic and, more specifically, how dynamic capabilities can be constituted and nurtured. We utilized Teece's (2007; 2014) framework on dynamic capabilities as an analytic framework, in order to elaborate on the existing theory. From our analysis of the four different projects, we argue that dynamic innovation capabilities comprise the following elements. Firstly, the systematic development of processes, methods and routines was related to *sensing* and *seizing* opportunities – or, as it was phrased by the Innovation Clinic, 'capturing' needs – and subsequently working systematically with iterative development and implementation. Secondly, the role of entrepreneurship produced dynamics related to sensing and was, perhaps, particularly important for *seizing* by mobilizing resources and aligning stakeholders with diverging interests in the innovation. Thirdly, the combination of strategic and entrepreneurial management of innovation across time and domains may serve to support the continued capacity for *transformation*.

In terms of managerial implications, we argue that managers should be particularly oriented towards the following factors to develop innovation capabilities:

- Systematic development of processes, methods and routines to sense and seize opportunities, including the facilitation of inter-group learning, the evaluation of innovation hurdles and potential value, and iterative and effective implementation.
- Organizing and nurturing entrepreneurial roles, in the organization and its network, of partners and stakeholders, as well as the subsequent entrepreneurial management to make innovation and transformation happen.
- Nurturing dynamic innovation capabilities instead of focusing only on functional innovation capabilities, by emphasizing innovation capabilities at both the operational and strategic levels, hence becoming an integrated part of strategic management and execution.

As a final note, we would like to pinpoint some of the limitations of our current study of dynamic capabilities and innovation capabilities. First, the time span of this study is too limited to ensure that we fully understand the nature of dynamic innovation capabilities, and it might be preferable

for capabilities to last through more than one business cycle in order to be clearly dynamic. There is a need for longitudinal studies of the development of dynamic capabilities, innovation capabilities and dynamic innovation capabilities, in order to be sure that the capabilities are really dynamic over time. Second, this study is of a public organization, whereas the concept of competitive advantage might be more natural in a corporate setting. The nature of competition for resources and endowments in a public organization differ from that of private enterprises. However, we argue that long-time adaptation to the environment is as important for public sector organizations in general and for university hospitals in particular, as for private firms. Furthermore, it would be interesting to gain a better grasp on how dynamic capabilities alter operational innovation capabilities. Many firms and public sector organizations employ institutional mechanisms similar to those of the innovation clinic, with various levels of success. Comparative studies of various institutional mechanisms that contribute to innovation in larger for-profit and not-for-profit organizations would be highly interesting.

In this case study, we have investigated an Innovation Clinic's efforts to develop service and organizational innovation capabilities over time and across several settings. We have demonstrated how the conscious development and employment of innovation routines and methods at the project and organizational levels, in combination with entrepreneurial management, may well contribute to developing innovation capabilities. The development of such combinations, however, is not likely to be easy, considering the significant number of institutional, organizational, epistemic and financial elements to be upgraded and recombined for project outcomes to stabilize and scale, in addition to the challenges of utilizing the experiences of such efforts for building *dynamic* innovation capabilities across settings and over time. Due to the limited time-span and scope of our case study, we are only partially able to shed light on one crucial aspect of dynamic capabilities – namely, the 'transformation' of capabilities across time and space. The emergent learning and development of methods and routines across the series of multi-stakeholder projects seems to be in line with Teece's (2009) conceptualization of dynamic capabilities. Nevertheless, it was not possible within the time limits of our study to evaluate whether we are seeing the transformation of capabilities in ways that significantly contribute to the renewal of the hospital over time and across a variety of contextual changes.

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Abstract (in Polish)

W badaniu tym zbadamy zależność między dynamicznymi zdolnościami a innowacyjnością. Dynamiczne zdolności są podstawą zarządzania strategicznego, jeśli chodzi o to, jak firmy mogą zapewnić adaptację do zmieniających się warunków w czasie. Nasz artykuł przedstawia dwie ścieżki argumentacji. Najpierw przeanalizujemy i przedyskutujemy znaczący wkład w teorie dotyczące zwykłych zdolności, zdolności dynamicznych i zdolności innowacyjnych. Staramy się zidentyfikować różne rozumienie omawianych pojęć, aby wyjaśnić różnice i relacje pomiędzy dynamicznymi

zdolnościami a zdolnościami innowacyjnymi. Po drugie przedstawiamy studium przypadku „Kliniki Innowacji" w głównym szpitalu uniwersyteckim, w tym cztery projekty innowacyjne. Korzystamy z tego studium przypadku w celu zbadania i omówienia sposobów rozszerzania zdolności dynamicznych, a także w jakim zakresie zdolności innowacyjne można uznać za dynamiczne. Podsumowując, dyskutujemy o uwarunkowaniach rozwijania „dynamicznych zdolności innowacyjnych" w organizacjach.
***Słowa kluczowe**: zdolności dynamiczne; zdolności innowacyjne; innowacyjność usług; opieka zdrowotna.*

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Dynamic Capabilities and Network Benefits

Helge Svare[1] and Anne Haugen Gausdal[2]

Abstract

The number of publicly funded initiatives to establish or strengthen networks and clusters, in order to enhance innovation, has been increasing. Returns on such investments vary, and the aim of this study is to explore to what extent the variation in benefits for firms participating in networks or clusters can be explained by their dynamic capabilities (DC). Based on survey data from five Norwegian networks, the results suggest that firms with higher DC are more successful in harvesting the potential benefits of being member of a network.

Keywords: *innovation networks; Regional Innovation Network Organizations (RINOs); network benefits; network events; innovation; dynamic capabilities.*

INTRODUCTION

Over the last decades, there has been a significant increase in the number and size of publicly funded initiatives aiming to strengthen networks and clusters, with the purpose of enhancing innovation and value creation (Ferreira, Raposo, Rutten & Varga, 2013). Inspired by e.g. cluster theory or innovation system theory, these initiatives are built on the recognition that innovation emerges more *between* actors, or through the productive interplay of actors, than through the endeavour of individual actors alone, whether the actors are individuals, firms, universities, research institutions or other relevant entities. Central concepts in this respect are knowledge flows or knowledge sharing, learning and collaboration (Asheim, Arne, Moodysson & Markku, 2011; Berg Jensen, Johnson, Lorenz & Lundvall, 2007; Pai, Chang & City, 2013; Toedtling, Asheim & Boschma, 2013).

Despite the number and size of such publicly funded initiatives, and the fact that they have appropriated an extensive amount of private and public

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resources, returns on these investments vary. For instance, not all firms benefit from being part of such an initiative, or benefit to the same degree, and there is also variation between networks and clusters (Gausdal, Svare & Möllering, 2016). There exists an extensive literature discussing such variation and its causes. While some studies focus on how networks are managed or orchestrated (Batterink, Wubben, Klerkx & Omta, 2010; Busquets, 2010; Gausdal & Nilsen, 2011), others concentrate on the presence and function of intermediaries (Dalziel & Parjanen, 2012; Gassmann, Daiber & Enkel, 2011; Howells, 2006), on social capital (Johnsen, 2012; Rutten & Boekema, 2007), on the composition of the clusters or networks, or on other structural features (Capaldo, 2007; Olsen, Elvekrok, Gausdal, Nilsen & Scholderer, 2013). Typical of these explanatory endeavors is that they focus on the network or the cluster as a whole, and in this sense, they consider factors that are common for all the members of the network or cluster. Consequently, they may be able to explain why some networks or clusters succeed better than others. This approach, however, is less appropriate for explaining variation *between* firms within a network or a cluster. In this study, we focus on the latter issue, exploring how firms' dynamic capabilities (DC) may explain such variation. Moreover, our focus is firms within what we denote as *regional innovation network organizations* (RINOs), i.e. regional networks with a formal organization structure. This structure includes a strategic, operative and coordinating governance form at the network level (Provan & Kenis, 2008). Five such RINOs in Southeast Norway constitute the empirical part of this study.

The DC concept was originally introduced to account for the competitiveness of firms in a general sense. A presupposition of the present study is that firms' dynamic capabilities are also significant in RINOs. If we consider the essence of DC as the ability to detect, grasp and realize potential benefits (D. J. Teece, Pisano, & Shuen, 1997), firms with higher levels of DC should be expected to be more successful in harvesting the potential benefits that a RINO membership opens up for.

The original contribution of this paper is twofold. Firstly, it bridges two research discourses, on networks and DC, which, to the best of our knowledge, have not been previously conjoined. Although forming alliances is discussed in the DC literature, this does not mean that a systematic discussion of how DC affects firms in network organizations like RINOs has been undertaken. Secondly, it contributes to extending the application of DC theory to very small firms, i.e. firms with less than ten employees, since so far most of the DC literature has concentrated on larger firms (D'Annunzio, Carattoli & Dupleix, 2015; Danneels, 2000; Deeds, DeCarolis & Coombs, 2000;

Majumdar, 2000). In the present study, more than half of the firms have ten employees or less.

The paper is structured as follows: First, a theoretical background presenting the main concepts of the study, leading up to the hypotheses to be tested. Then, the main body constituted by sections about the method and the findings, followed by a discussion and a conclusion.

LITERATURE REVIEW

Theories of industrial districts (Marshall, 1920) and clusters (Porter, 1998a; Porter, 1998b) primarily described non-intentional, spontaneous dynamics emerging within specific industries and geographical areas, resulting in heightened frequencies of innovation and increasing value creation. Other theoretical approaches present similar views, like national-, regional-, or sectorial innovation system theory and triple helix theory (Asheim & Isaksen, 2002; Asheim, Smith & Oughton, 2011; Balland, Boschma & Frenken, 2015; Cooke, 2001; Etzkowitz & Leydesdorff, 2000; Freeman, 1993; Leydesdorff, 2012; Lundvall, 2010). Common to all these approaches is the view that innovation is a distributed and interactive process, involving a multitude of actors embedded within dynamic systems that no individual member of the system controls alone. Further, knowledge flows, and knowledge management and learning, are seen as essential drivers of innovation, both within the firm, and across the larger system (Arundel, Lorenz, Lundvall & Valeyre, 2007; Jensen et al., 2007; Lorenz, Lundvall, Valeyre & Holm, 2010).

In light of these theories, regional and national governments as well as other developmental agents have for a long time taken initiatives to *deliberately* establish, develop or enhance systems that copy or mimic those described in the original theories, or to strengthen already existing systems. In this way they aim to promote innovation and value creation (Belussi & Sammarra, 2010). Often, such initiatives involve the establishment of more formal network organizations. In this paper, we address RINOs as one such type of organization. RINOs recruit firms from one industry, or a related set of industries, along with relevant R&D institutions and universities, NGOs, NPOs and service providers. Most RINOs are defined by regional boundaries, or have a regional foundation, and their formal governance is ensured by an elected board and one or more full-time employees. They are often initiated by national or regional governments, or – alternatively – by industry representatives, and their funding is typically covered from both national and regional programs and membership fees (Underthun & Svare, 2015). RINOs may have different goals in addition to innovation, and firms joining

a RINO may do it for different reasons depending on their individual needs or ambitions (Barney, 1991; Contractor & Lorange, 1988; Dyer & Singh, 1998; Pittaway, Robertson, Munir, Denyer & Neely, 2004; Williamson, 1991). Besides innovation, the motives are typically related to costs and risks (Sydow, Schüßler & Müller-Seitz, 2016). However, as a rule, when a firm joins a RINO it expects a return in the form of benefits.

There is variation between RINOs with respect to how well they achieve their aims. In addition, firms within RINOs harvest benefits from their RINO membership to a varying degree. In this study, we ask how this latter variation may be explained. Even if our attention is directed mainly at the individual firm, the answer to this question may also have implications for why some RINOs are regarded as more successful than others: The more benefits the individual members harvest, the more satisfied they are likely to be with their RINO, and the more it will be considered a success.

Although several theoretical contributions have been proposed to explain variation between RINOs, or why some succeed better than others, not all of them explore network organizations conforming to our definition of a RINO. Some study more loosely coupled business networks, other more mature clusters; others again use a version of innovation system theory as their analytical framework. Still, many of these theoretical contributions are also relevant for explaining variation in RINOs. This applies for instance to those looking at structural features, such as the horizontal or vertical structure of a network or cluster. While a vertical structure implies that the whole value chain is represented within the network or cluster, a horizontal structure implies that the main part of the member firms are located at the same level in this chain, which may be associated with a more competitive atmosphere (Olsen et al., 2013). Explanatory approaches looking at the mix between larger or smaller firms (Carlsson & Stankiewitz, 1991), and the presence and engagement of universities and R&D institutions (Mitra & Formica, 1997) may also be relevant to RINOs, as may those approaches focusing on trust or social capital (Johnsen, 2012; Rutten & Boekema, 2007). Finally, we have the explanatory approaches focusing on network orchestration (Batterink et al., 2010; Busquets, 2010; Gausdal & Nilsen, 2011), and on the existence and function of intermediaries (Dalziel & Parjanen, 2012; Gassmann et al., 2011; Howells, 2006). Typical of these explanatory factors is that they attend more to the network, cluster or RINO as a whole, than to individual members. Consequently, few of them have much potential to explain variation in RINO benefits between RINO members. As an alternative explanatory approach, bringing this latter variation to the foreground, we introduce the dynamic capability (DC) theory. The assumption is that firms with higher levels of

DC are more successful in harvesting the potential benefits that a RINO membership represent.

Dynamic capabilities

In the original formulation of DC theory, DC is discussed in relation to the firm's competitive advantage or wealth creation in general (Teece et al., 1997, p. 509). High DC firms are generally considered able to spot opportunities and draw benefits from them, in any area. In an early, and still much referred-to contribution, Teece, Pisano, and Shuen (1997, p. 516) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (cf. also D. Teece & Leih, 2016). There is, however, no consensus in the literature regarding how the notion of DC should be further specified, nor which capabilities should be included under the heading. At a general level, DC is seen as the firms' capacity to change and adapt to a changing environment. Compared to other firms, High DC firms are characterized by a certain agility in this respect. DC theory also frequently distinguishes between so-called zero and higher-level capabilities. Zero-level capabilities correspond to "ordinary" capabilities, i.e. those allowing a firm to "make a living" in the short term (Winter, 2003). In contrast, DC are seen as "higher-level" capabilities that operate to change ordinary capabilities (Barreto, 2010; Winter, 2003; Zahra, Sapienza & Davidsson, 2006). Teece (2007) suggests three classes, or clusters, of dynamic capabilities, associated with the functions of sensing, seizing and reconfiguring. In other contexts, the latter is also referred to as adaption (Augier & Teece, 2009) or continued renewal (Teece, 2011). In this paper, we use Teece's three-fold DC concept from 2007 as our starting-point.

As for the distinction between zero- and higher-level capabilities, we find the distinction acceptable if by zero-order capabilities is understood mainly those capabilities involved in the daily operation of the firm's current business model. If, however, the concept is extended to include any capability exercised on a daily basis, some challenges arise. Sensing threats and opportunities, for instance, could well be a daily, ongoing activity, and still, in our view, count as a DC. Therefore, the defining character of DC, as we see it, depends not so much on whether they are "higher" or "lower", but on whether they enable productive or innovative changes in a firm's business model. As we see it, this is also the idea underlying Teece's (2007) three-fold concept of DC.

Sensing, seizing and reconfiguration

Sensing, in Teece's terminology, involves being observant towards opportunities and threats (Teece, 2007, p. 1324). This includes constantly scanning, searching and exploring technologies and markets, both locally and further away. It also entails investment in research activity as well as the probing and re-probing of customer needs and technological possibilities. Moreover, it involves understanding the latent demand and structural evolution of industries and markets, and likely supplier and competitor responses (Teece, 2007, p. 1322). Merely collecting information, thus, is not enough: sensing includes learning and interpretation.

Once a new (technological or market) opportunity is sensed, it must be addressed (or "*seized*") through new products, processes or services, which usually requires investments in development and commercialization (Teece, 2007, p. 1326). Timing is also relevant here. The firm, moreover, must define a business model for its commercialization strategy and investment priorities; in fact, business success depends as much on the design of business models, as it does on the selection of physical technology (Teece, 2007, p. 1327).

A key to sustained profitable growth is the ability to recombine and to *reconfigure* assets and organizational structures as the firm grows, or as markets and technologies change. This may require the re-organization of tasks and resources (Helfat & Peteraf, 2009; Iansiti & Clark, 1994; Teece, 2007), as well as the ability to orchestrate and deploy tasks, resources, and activities in new ways. Since a potential tension exists between stability and evolution, reconfiguration also requires that firms face and overcome at least two constraints – cognitive limitations and framing biases arising from established assets (Teece, 2007).

In discussing sensing, seizing and reconfiguration, Teece et al. (1997) refer to them as "clusters" of dynamic capabilities, each with their own set of micro-foundations. Rather than talking about clusters, we suggest that sensing, seizing and reconfiguration should be regarded as three general DC functions that may be present within a firm to a higher or lower degree. These functions can then be realized by a multitude of various micro-foundations, such as organizational routines, technical infrastructure, and individual skills and so on – or, as Helfat and Peteraf (2015) argue, by managerial skills or competencies, or even their psychological underpinnings.

An ongoing discussion within the DC literature concerns commonality, i.e. whether DC display some common features across firms, or whether they are unique to the firm. Even if studies of DC in SMEs do exist (see e.g. Borch & Madsen, 2007; Carlos, 2011; Døving & Gooderham, 2008), there is a tendency in DC theory to use larger firms as cases for the focus of attention. When DC are claimed to be founded in underlying organizational routines, for instance, and when we look at how these routines are described, they

are such that they can only exist in larger firms (Deeds, Decarolis & Coombs, 2000; Majumdar, 2000; Danneels, 2011; D'Annunzio, Carattoli & Dupleix, 2015). By assuming that DC – understood as the three general functions referred to above – may be found to a larger or lesser degree in any firm, and that the micro-foundations underlying them may involve also individual skills (Helfat & Peteraf, 2009; Helfat & Peteraf, 2015), we envisage the possibility that even firms with only very few employees may be analysed using DC theory as a theoretical framework.

Hypotheses

As already suggested, the basic assumption of this study is that firms with higher levels of DC are more successful in spotting the opportunities for value creation that a RINO membership may provide. They are better at generating ideas based on their discoveries, better at bringing these ideas back home, and better at doing what is necessary to actually generate value from them. Based on this assumption, we propose four hypotheses. The first hypothesis is based on the idea that the full opportunities present within a RINO can only be discovered by actually attending RINO meetings and events. It is true that some information distributed within the RINO may come in the form of newsletters or may be found on websites; still, the most valuable opportunities, or the information leading to them, can be seized only by being present at meetings, talking to other RINO members or to others invited into the RINO, such as researchers, investors or representatives of major customers, endowed with relevant and potentially valuable resources. We assume that higher DC RINO members realize this necessity, hence the first hypothesis:

H1: Higher DC RINO firms take a more active part in RINO meetings and events.

The second hypothesis relates to the ability to achieve valuable outcomes from the opportunities spotted. As we have seen, DC theory posits that firms high in DC are better at transforming resource input (potential value) into actual value (Teece, 2014; Teece et al., 1997). While the original theory stated this at a general level, the assumption of the present study involves that this is also valid for resources made available through a RINO membership more specifically. This leads to the second hypothesis:

H2. Higher DC RINO firms harvest more benefits from their RINO participation.

A benefit that merits particular interest is innovation, not least because an essential aim of a RINO is to stimulate its members to become more innovative, or to innovate more. We assume that this is also an essential aim for higher DC firms that join a RINO, and – as part of their generally more developed capacity for harvesting RINO benefits – they also become more actively involved with innovation. The third hypothesis is therefore:

H3. Higher DC RINO firms benefit from their RINO participation by becoming more actively involved in innovation.

Most firms today have learned from the contemporary innovation discourse that entering into productive interactions with others may enhance future innovation. However, a lack of cognitive and cultural proximity due to differences in backgrounds or knowledge bases may be a challenge in such interaction (Knoben & Oerlemans, 2006). We assume that higher DC firms, as part of their generally more developed capacity for spotting and seizing opportunities, are also better at overcoming such challenges, for instance by displaying more developed communicative skills. A potential outcome is that they collaborate not only with other firms similar to themselves, but also with other RINO member categories such as universities, customers, consultants, etc. This leads to the fourth hypothesis:

H4. Higher DC RINO firms collaborate more for innovation across different RINO member categories.

It must be kept in mind that the validity range of all these hypotheses is restricted to RINO firms only. This is due to the data, collected through a survey in five RINOs, against which the hypotheses will be tested. Given the particular nature of these data, we cannot infer to which extent non-RINO firms conform to the findings.

We also wish to add to our hypotheses a research question, relating to the more specific dimensions underlying the DC notion. As we have seen, the concept of DC employed in this paper may be analysed into three sub-dimensions. The research question asks whether some of these dimensions are more significant than others in explaining the potential effect of DC, as stated in the above hypotheses. The research question is:

R1: Which of the underlying dimensions of the DC concept, if any, are involved in explaining the potential effects implied by H1-H4?

RESEARCH METHOD

Data, survey and sample

In testing these hypotheses, the paper draws on data from a survey sent to core firms of five RINOs in Southeast Norway. Each RINO organizes firms pertaining to either one single industry, or to a set of related industries. Core firms are those firms which operate within the industry(ies) specific to the RINO. Prior to the survey distribution, therefore, firms who did not meet this criterion were removed from the distribution list, for instance generic service providers and non-firm RINO members such as universities, NPOs and NGOs.

The survey was designed and administered by the authors, while data were supplemented with information from Statistics Norway on firm size and firm age. For some firms, i.e. the smaller ones, or those that had recently been established or restructured, Statistics Norway possessed no data. In these cases, data on firm size and firm age was collected by contacting the firms themselves, or looking at their websites. The survey was distributed in June 2015 to the persons that the firms had registered as their main RINO contacts. In the smaller firms, this was typically the manager.

Table 1. RINO and sample characteristics

RINO	Founded	No of members 1.6.15	No of core members 1.6.15	No of responses	Response rate %	% of total sample
Oslo Renewable Energy Cluster (OREEC)	2006	60	43	13	30	10
OSLO Medtech (Medtech)	2009	179	124	62	50	47
Norwegian Centre of Expertise – Micro and Nano technology (NCE-MNT)	2003	46	43	20	47	15
Clean Water Norway (CWN)	2007	70	52	27	52	20
Vestfold Film Forum (VFF)	2009	20	20	11	55	8
Total sample		375	282	133	47	100

Source: RINO member lists and survey.

In the larger firms, the contact person could also be an employee with the role of managing the contact between the RINO and the firm. The survey remained open for two months, but most of the respondents answered during the first few days; those who did not, received a maximum of two

reminders. In total, the survey was sent to 282 firms, of which about half responded. By manually comparing the responding firms to the distribution list as a whole, we were not able to discover any particular pattern among the respondents relative to the non-respondents. Table 1 gives an overview of the RINOs and the response pattern.

The majority of the sample firms are small and medium-sized – more than half of the firms have less than 10 employees, and only a few have more than a hundred. The majority of the firms, moreover, are younger than 20 years, and almost half of them are younger than ten years. Table 2 shows the distribution of the sample firms according to size measured by employee numbers.

Table 2. Descriptive statistics. Sample firms distributed according to size for each RINO and the total sample (%)

Number of employees	Medtech	NCE-MNT	OREEC	CWN	VF	Total sample
1	29	15	39	15	82	29
2-5	19	20	15	19		17
6-10	13	15	23	15	9	14
11-20	16	5		11	9	11
21-50	15	15	15	25		16
51-100	3	20		15		8
>100	5	10	8			5

Source: survey, N=133.

Measuring dynamic capabilities

Several instruments have been designed to measure the DC of firms. Janssen, Castaldi and Alexiev (2016) have developed a measurement adapted to service innovation (*measure a*), while an instrument adapted to product development units in larger enterprises (*measure b*) has been offered by Pavlou and Sawy (2011).

Measure a consists of 18 items: four under the heading of *sensing*, four under the heading of *conceptualizing* (which roughly corresponds to what in this paper is called seizing), three under the heading of *coproducing and orchestrating*, and five under *scaling and stretching*. Measure b consists of 20 items: four under the heading of *sensing capability*, four under *learning capability*, five under *integrating capability*, five under *coordinating capability* and two under *reconfiguration capability*.

In setting up our measure of DC, we have consulted both of these instruments. However, none of them really fitted our needs. Measure a, for

instance, was too specialized towards the service sector, and the last group of items measuring *scaling and stretching* focussed on DC functions which are not included in our DC concept. Measure B, on the other hand, had a number of items referring to the specific conditions characterizing product development units within larger enterprises, which were of little relevance to most of the firms in our sample as they are too small to have separate R&D units. We also reacted to the wordings of some of the items, which we judged to involve unnecessarily complex phrasing and use of technical terms.

We consequently decided to design our own instrument. It consists of five statements along the three dimensions/functions of sensing, seizing and reconfiguration. Response scores are distributed along a five-point Likert scale ranging from "Totally disagree" to "Totally agree". The statements are:

- We closely monitor the needs/demands of our customers (SENS1).
- We continuously seek knowledge and ideas that may be used in the development of new products and/or services (SENS2).
- Our employees are good at using the knowledge and ideas that we bring back to the company as a basis for developing new products and/or services (SEIZ).
- We do not limit the company's work with innovation to only a few employees, everyone has the opportunity to contribute (ORG1)
- Sometimes we reorganize our work with innovation based on earlier experience from such processes (ORG2).

Statement 1 and 2 relate to sensing, 3 relates to seizing, while 4 and 5 relate to reconfiguration.

The motivation behind the design was to arrive at a measure that, based on our knowledge of the firms, used a language that would be easily understood. Thus, we tried to use plain language, avoiding technical terms. In addition, the statements constituting the items should be as general as possible, and not refer to specific conditions that would exclude any of the firms. We included only items directly related to the three dimension of DC included in the DC definition used in this study. The number of items was also of relevance. The measures were to be integrated into a survey with a significant number of other items, and in testing the survey before the final distribution, it was criticised for being too long. Although we did benefit from consulting both of the measures that were mentioned above, we needed one with fewer items. Statement 1 in our measure may be seen as a modified version of the following statement from measure a: "We systematically observe and evaluate the needs of our customers." Statement 2 may be seen as a modified version of the following statement from measure b: "We have effective routines to identify, value, and import new information and knowledge." Statement 3 is inspired by the following statement from measure b: "We are effective in utilizing knowledge into new products."

Statement 4 was added as we predicted that a potential characteristic of higher DC firm is their involvement of most of, or all their employees in the innovation process (Høyrup Pedersen, 2012; Svare, 2016). Statement 5 may be seen as a modified version of this statement from measure b: "We often engage in resource recombination to better match our product-market areas and our assets."

Tested on the survey data, the scale has a medium level of internal consistency, as determined by a Cronbach's alpha of 0.62, based on 117 valid cases out of 133 (88%). In most standard textbooks, the recommended value of Cronbach's alpha is 0.7 or higher. However, Cortina (1993) warns that such general guidelines need to be used with some caution, and that values lower than 0.7 are sometimes also acceptable, especially when a scale only has few items, as is the case in this study. Few items give proportionally lower Cronbach's alpha values if everything else is equal.

Table 3 shows the distribution within the variables representing the five dimensions of DC, as well as the merged DC variable.

Table 3. Descriptive statistics. Distribution of values within each of the DC variables and the merged DC variable (%)

	DC	SENS1	SENS2	SEIZ	ORG1	ORG2
1 (Low)		1	1	1	3	1
2	3	2	2	3	7	5
3	4	5	8	18	16	18
4	50	21	26	26	22	33
5(High)	74	72	64	51	52	44

Source: survey, N=122-133.

Table 4 shows the mean levels of DC in the total sample distributed according to firm size (measured by employee numbers). The DC scale runs from 1-5, where 1 represent "a very low level", 5 represent "a very high level", and 3 the medium level.

As we can see from Table 4, the mean DC value varies little in relation to firm size, except for slightly lower values in larger firms. There is almost no variation in DC measured against firm age, and consequently, firm age was not included in the further analysis.

Table 4. Descriptive statistics. Mean DC levels versus firm size

No. of employees	Mean DC	N	SD	Minimum	Maximum
1	4.37	38	.819	2	5
2-5	4.61	23	.499	4	5
6-10	4.63	19	.597	3	5
11-20	4.64	14	.842	2	5
21-50	4.67	21	.483	4	5
51-100	4.10	10	.316	4	5
>100	4.00	6	.632	3	5
Total	4.49	131	.672	2	5

Source: survey, N=131.

Other measures

To test H1 we used a survey variable measuring the number of RINO-events at which some representative of the firm had participated during the last year, or the same number in average for the last three years (FREQ). Table 5 shows the share of the firms within each RINO who placed themselves under the various response categories of this variable, and for the total sample.

Table 5. Average number of RINO-events attended yearly for each RINO and the total sample (%)

Number of events attended	Medtech	NCE-MNT	OREEC	CWN	VF	Total sample
1	16	10		15	27	15
2	7		17	19	27	11
3	49	20	67	56	27	46
4	21	25	17	7	18	18
5	7	45		4		11

Source: survey, N=130.

H2 was tested against the merged variable *total benefit* (TOTBEN), summarizing 12 specific RINO benefits measured in the survey. Each of the items was introduced by the following question: "To what extent has [the name of the RINO] contributed to the following for your firm?" Among the benefits specified, were social benefits (increased knowledge of, or better relations with, relevant potential collaboration partners inside or outside of the RINO), better access to customers or markets, better access to financing, etc. Included were also a set of questions where the respondents were asked

to evaluate the benefits derived from RINO services such as websites or counselling services. The answers were distributed along a five-point Likert scale from "To a very small degree" to "To a very high degree". Table 6 shows the distribution of the firms along the variable values in per cent within each RINO, and the same for the total sample.

Table 6. Total RINO benefit (TOTBEN) for each RINO and the total sample (%)

Total benefit level	Medtech	NCE-MNT	OREEC	CWN	VF	Total sample
1 (Low)	20		46	19	33	20
2	34	37	18	31	33	32
3 (Medium)	20	16	18	23		19
4	15	26	18	19	33	19
5 (High)	10	21		8		10

Source: survey, N=130.

H3 was tested against a variable summarizing the answers to the following three survey items:

"To what extent has [the name of the RINO] contributed to the following for your firm?"

- A more systematic effort within the firm to innovate.
- Increased collaboration with others for innovation.
- Innovations that would not have taken place, had the firm not been member of the network.

Response to each of the items was distributed along a five-point Likert scale from "To a small degree" to "To a high degree". The resulting variable is *innovation benefit* (INNOBEN). Table 7 shows the distribution of the firms along the variable values in per cent within each RINO, and the same for the total sample.

Table 7. Innovation benefit (INNOBEN) for each RINO and the total sample (%)

Innovation benefit level	Medtech	NCE-MNT	OREEC	CWN	VF	Total sample
Low	36	16	64	31	45	35
Medium	44	42	27	50	33	43
High	20	42	9	19	22	22

Source: own survey, N=130.

H4 was tested against a variable constructed as follows: those who reported of having collaborated with others within their RINO during an innovation process, were also asked with whom this collaboration had taken place, or more specifically, whether it had involved a firm "similar to yours", a customer, a supplier, a university, some other research institution, or a consultant. By using the COUNT command in SPSS, a new variable was constructed, where collaboration with one such partner type produced the value 1, collaboration with two such types of partners produced the value 2, etc. The resulting variable is called *plural collaboration* (PLURCOLL). Table 8 shows the distribution of the firms along the variable values in per cent within each RINO, and the same for the total sample.

Table 8. Collaboration across RINO member categories (PLURCOLL) for each RINO and the total sample (%)

Number of member categories involved in collaboration	Medtech	NCE-MNT	OREEC	CWN	VF	Total sample
1	37	26	50	29	40	34
2	17	37	25	33		25
3	31	16	12	24	60	26
4-6	15	21	13	14		15

Source: own survey, N=130.

Controls

We also introduced a set of control variables. Based on previous research (Fitjar & Rodríguez-Pose, 2011), the controls include the size of firms measured by the number of employees (EMPL). Size is seen as potentially relevant, because large firms have more resources to invest in collaboration, and therefore could perhaps be expected to harvest more benefits from such collaboration, also in RINOs. Alternatively, one could argue that smaller firms have more to gain from collaborating with others and therefore would both engage themselves more actively in such collaborations and harvest more benefits from them. Exactly how firm size affects the dependent variables, however, is not our main concern here: merely that it may have a potential relevance. How long a firm has been a member of a RINO may function in the same way: With more years as a RINO member, a firm has had more opportunities to establish productive collaborations with other RINO members, and to harvest RINO benefits. *Length of RINO membership* (MEMB) was thus added as a control variable.

A fourth control variable is trust (TRUST), specified as the trust of a firm toward the other members in their RINO. Trust was included as a control as

it has been proven in earlier studies to significantly influence the quality of communication within collaborations, as well as the propensity to collaborate in the first place (Abrams, Cross, Lesser & Levin, 2003; Anderson, Steinerte & Russell, 2010; Büchel, Nieminen, Armbruster-Domeyer & Denison, 2013; Gausdal, 2012). Trust was measured by a set of three questions/statements. The set was introduced by the following question:

"To what degree do you think that the following statements fit as descriptions of the other members of the network?"

- They act honestly and uprightly.
- They are capable and competent in their fields.
- They value their own interests over others' (reversed).

These statements measure trust between RINO members indirectly, by tapping into the respondents' perceptions of the other RINO members' trustworthiness, specified according to Mayer et al.'s (1995) three dimensions of trustworthiness; integrity, ability and benevolence. Response was again distributed along a five-point Likert scale from "To a small degree" to "To a high degree". The variable TRUST was constructed by summarizing the three underlying variables.

Tested on the survey data, the trust scale has a medium level of internal consistency, as determined by a Cronbach's alpha of 0.62, based on 117 valid cases of 137 (85%).

Table 9 gives an overview of the variables included in the analysis with their properties.

Table 9. Descriptive statistics. Characteristics of variables included in the analysis

	FREQ	TOTBEN	INNOBEN	PLURCOLL	DC	SENS1	SENS2	SEIZ	ORG1	ORG2	EMPL	MEMB	TRUST
N	131	129	124	88	131	131	129	125	128	125	133	133	122
Mean	3.10	3.02	2.66	2.22	4.49	4.61	4.49	4.24	4.13	4.14	3.08	2.02	4.11
Std. Error of Mean	0.09	0.10	0.11	0.11	0.06	0.06	0.07	0.08	0.10	0.08	0.16	0.06	0.07
Std. Deviation	1.00	1.16	1.27	1.08	0.67	0.73	0.80	0.92	1.11	0.93	1.87	0.69	0.76
Variance	1.00	1.34	1.61	1.16	0.45	0.53	0.64	0.85	1.23	0.87	3.51	0.48	0.58
Skewness	0.17	0.06	0.35	0.29	-1.42	-2.27	-1.77	-1.00	-1.14	-0.90	0.46	-0.03	-0.99

	FREQ	TOTBEN	INNOBEN	PLURCOLL	DC	SENS1	SENS2	SEIZ	ORG1	ORG2	EMPL	MEMB	TRUST
Std. Error of Skewness	0.21	0.21	0.22	0.26	0.21	0.21	0.21	0.22	0.21	0.22	0.21	0.21	0.22
Kurtosis	-0.20	-0.72	-0.98	-1.22	2.56	5.93	3.27	0.32	0.41	0.22	-1.00	-0.88	2.07
Std. Error of Kurtosis	0.42	0.42	0.43	0.51	0.42	0.42	0.42	0.43	0.43	0.43	0.42	0.42	0.44
Range	4.00	4.00	4.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	6.00	2.00	4.00
Minimum	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	7.00	3.00	5.00

Finally, we added a dummy variable for the RINOs, to be able to control the possibility that systematic differences between the RINOs were influencing the outcome.

ANALYSIS

H 1-4 were tested through ordinary least squares (OLS) regression analysis. The model takes on the following form:

$$Yi = \alpha + \beta\ DC + \gamma 2\ Controlsi + \epsilon i, \quad (1)$$

where Y refers to the independent variables and β is the coefficient for the variable representing DC (the merged variable *and* the five underlying variables), and ϵ depicts the error term. The independent variables are FREQ, PLURCOLL, TOTBEN and INNOBEN. For each independent variable, the model was run two times, one for the merged DC variable, and then one time for the underlying five variables (SENS1, SENS2, SEIZ, ORG1 and ORG2). VIF tests were conducted, with no multicollinearity problems detected. Table 10 gives an overview of the variables' bivariate correlations.

DC satisfy the assumption of linearity relative to all the dependent variables. The same applies to EMPL relative to the two benefit variables (TOTBEN and INNOBEN).

Table 11-12 present the results of the regressions. For all tables, the first number in each row denotes the coefficient, followed by the standard error in the parenthesis, then by the standardized coefficient after the parenthesis. R2 represents the adjusted R square.

Table 10. Bivariate correlations

	FREQ	TOTBEN	INNOBEN	PLURCOLL	DC	SENS1	SENS2	SEIZ	ORG1	ORG2	EMPL	MEMB	TRUST
FREQ	1	.513**	.521**	.241*	.188*	.164	.130	.170	-.085	.050	.014	.241**	.298**
TOTBEN	.513**	1	.692**	.264*	.285**	.048	.238**	.161	.069	.281**	-.233**	.019	.258**
INNOBEN	.521**	.692**	1	.260*	.297**	.091	.132	.203*	.033	.187*	-.174	.127	.346**
PLURCOLL	.241*	.264*	.260*	1	.198	.125	.279**	-.055	.018	.201	.083	.333**	.099
DC	.188*	.285**	.297**	.198	1	.391**	.562**	.494**	.566**	.536**	-.045	.083	.168
SENS1	.164	.048	.091	.125	.391**	1	.365**	.211*	.077	.138	.091	.104	.287**
SENS2	.130	.238**	.132	.279**	.562**	.365**	1	.490**	.192*	.293**	-.030	.050	.231*
SEIZ	.170	.161	.203*	-.055	.494**	.211*	.490**	1	.304**	.253**	-.076	.078	.292**
ORG1	-.085	.069	.033	.018	.566**	.077	.192*	.304**	1	.406**	-.137	-.076	.071
ORG2	.050	.281**	.187*	.201	.536**	.138	.293**	.253**	.406**	1	-.212*	-.082	.049
EMPL	.014	-.233**	-.174	.083	-.045	.091	-.030	-.076	-.137	-.212*	1	.327**	-.054
MEMB	.241**	.019	.127	.333**	.083	.104	.050	.078	-.076	-.082	.327**	1	.138
TRUST	.298**	.258**	.346**	.099	.168	.287**	.231*	.292**	.071	.049	-.054	.138	1

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 11. OLS estimation of the empirical model – DC

	FREQ	PLURCOLL	TOTBEN	INNOBEN
DC	.19(.13).13	.26(.18).16	.42(.15).24***	.43(.17).23**
EMPL	-.07(.05)-.13	-.01(.07)-.02	-.16(.06)-.26***	-.18(.06)-.26***
MEMB	.35(.13).24***	.49(.18).32***	.03(.15).02	.23(.17).13
TRUST	.22(.11).17**	.04(.16).03	.28(.13).18***	.41(.15).25***
RINO_d1	.94(.24).34***	.08(.35).03	.75(.30).23**	.81(.32).23**
RINO_d2	.05(.29).02	-.13(.42)-.04	-.50(.35)-.13	-.37(.38)-.09
RINO_d3	-.24(.22)-.10	-.01(.31).00	.15(.26).05	.23(.28).07
RINO_d4	-.43(.32)-.12	.00(.47).00	.16(.39).04	-.23(.42)-.05
Constant	.77(.71)	-.6(1,03)	.32(.86)	-1,00(.95)
R2	.24***	.05	.19***	.23***
N	122-133	88-133	122-133	122-133

*P < 0.1; **P < 0.05; ***P < 0.01.

Table 12. OLS estimation of the empirical model – the five underlying DC variables

	FREQ	PLURCOLL	TOTBEN	INNOBEN
SENS1	.03(.14).02	-.07(.18)-.05	-.22(.16)-.14	-.18(.18)-.10
SENS2	.01(.13).01	.47(.16).35***	.25(.15).18*	-.01(.16)-.01
SEIZ	.03(.11).02	-.40(.15)-.34***	-.10(.13)-.08	.04(.15).03
ORG1	-.13(.09)-.14	-.02(.11)-.02	-.05(.10)-.05	-.08(.11)-.07
ORG2	.11(.11).10	.26(.14).22*	.30(.12).24**	.27(.14).20**
EMPL	-.07(.05)-.14	-.02(.07)-.03	-.16(.06)-.26***	-.18(.07)-.26***
MEMB	.37(.13).25***	.57(.17).36***	.11(.16).07	.31(.17).17*
TRUST	.23(.12).18*	.08(.16).06	.34(.14).22**	.49(.16).29***
RINO_d1	.82(.26).30***	.11(.34).04	.72(.30).22**	.72(.33).20**
RINO_d2	-.03(.30)-.01	-.20(.39)-.06	-.59(.36)-.15	-.50(.39)-.12
RINO_d3	-.33(.23)-.13	-.04(.30)-.02	.18(.27).06	.23(.30).07
RINO_d4	-.60(.36)-.17*	-.34(.47)-.09	-.31(.42)-.07	-.71(.47)-.15
Constant	1.39(.82)*	-.26(1.06)	1.07(.96)	.44(1.06)
R2	.22***	.17**	.19***	.19***
N	122-133	88-133	122-133	122-133

*P < 0.10; **P < 0.05; ***P < 0.01.

As can be seen from Table 11, the hypotheses H2 and H3 received confirmation. H1 and H4 did not receive confirmation. Although the effect is not very strong, the result confirms that RINO firms with higher DC harvest more RINO benefits in general, including innovation benefits. Addressing R1 (cf. Table 12), we see that ORG2 correlates significantly with both of the two benefit variables (TOTBEN and INNOBEN) while SENS2 does so even with TOTBEN. While DC did not yield significant findings relative to PLURCOLL (Table 12), in Table 14, SENS2 and ORG2 did turn up positive coefficients. In addition, SEIZ turns up a negative coefficient, however, this variable fails to live up to the assumption of linearity relative to its dependent variable, and is therefore disregarded in the further discussion. The other significant coefficients are associated with variables that have a linear relation to their corresponding dependent variables.

Due to the significance of EMPL as a control variable, we transformed it into a dummy and ran a set of extra regressions on the dependent variables relative to which EMPL failed to meet the assumption of linearity, with no significant change in the outcome.

DISCUSSION

Typically, a RINO is established with the aim to benefit the participating firms. However, earlier research (e.g. Gausdal, Svare & Möllering, 2016) along with the present study (cf. Table 6 and 7) show that there is variation regarding the extent to which this aim is realized, both when we compare RINOs and when we compare firms within a RINO. The literature points to a number of factors that may explain this variation, such as network structure, network composition, network orchestration, trust, social capital, etc. In this paper we focus on the variation between firms, and we explore whether variation in achieved benefits from being part of a RINO may be explained by variation in firms' DC.

More specifically, we started out with the assumption that successful RINO firms are more active in identifying and attending RINO meetings and events where opportunies may be spotted, they are better at seizing these opportunities, also by initiating collaborations with others, and at realizing the value inherent in them. How does this assumption measure up to our findings?

Firstly, and perhaps most importantly, the regressions confim that firms with higher levels of DC harvest more benefits from their RINO membership. This includes both the general benefit as measured by TOTBEN and, more specifically, increased activity in the field of innovation as measured by INNOBEN. We interpret this as a confirmation of the core assumption that we started out with in this study, namely that higher DC RINO firms are better at identifying opportunies made available through their RINO, they are better at seizing these opportunities, and at realizing the value inherent in them.

Our findings seem to dismiss the idea of a connection between higher DC and more frequent participation in RINO meetings and events. A possible explanation may be that the RINO benefits explored in this paper derive not so much from the frequency of RINO participation, as from the way the firms utilize the opportunities that such participation opens up for. It may even be that the capacity to prioritize participation at certain meetings or events rather than others is an aspect of the skills that higher DC firm exercise (as part of its *sensing*), or more specifically the capability to distinguish between more or less relevant sources of information.

Our findings also seem to dismiss the idea of a connection between higher DC and more collaboration across various member categories within the RINO. As we will see below, however, when we proceed to look at the regressions involving the five variables underlying the merged DC variable, this conclusion may need to be slightly revised.

Turning to these five variables, and focussing again on the two benefit measures included in our study, we see that one variable is involved in explaining the variation in both of them. This is the variable that is based on the response to the statement: "Sometimes we reorganize our work with innovation based on earlier experience from this kind of task." (ORG2). Those who have high scores on this variable, also score highly on the two benefits variables.

A possible interpretation of this result follows from reflecting on what skills such a reconfiguration requires. Not only does it presuppose that the firm is already involved in innovation. It also implies a certain ability for critical reflection and learning, combined with an understanding of the nuts and bolts of the organization itself. Finally, and just as importantly, it involves the ability and energy to act on this understanding. As innovation typically involves collaboration, it also implies the presence of communicative skills and practices. High scores on this variable (ORG2), thus, are likely to be associated with both highly developed cognitive, pragmatic and communicative skills. This may explain why higher scores on this variable are connected to higher levels of RINO benefits. An additional point, is that this variable, or what it measures, lies very close to the dynamic core of how the DC discourse originally conceptualized dynamical capabilities as a higher-level capability, having to do with the firm's ability to change appropriately relative to a changing environment (Barreto, 2010; David J Teece, 2011; Winter, 2003; Zahra et al., 2006). Only those firms who score high on this variable, thus, deserve to be called dynamic in the sense that DC theory defines.

Another of the five variables involved in explaining variation in the variable measuring RINO benefits in general (TOTBEN), is the one based on the response to the following statement: "We continuously seek knowledge and ideas that may be used in the development of new products and/or services" (SENS2). Surprisingly, no association was found between this variable and the variable measuring innovation benefits. Still, it makes sense that, employees who are active in "seeking knowledge and ideas" to innovate, would also be good at identifying promising opportunities more generally within the field of opportunities that a RINO may be said to represent.

Notice that this latter variable (SENS2) is also involved in explaining variation in another of the dependent variables, namely collaboration across member categories within the RINO (PLURCOLL). This also makes sense, as the skills implied in those who are "seeking knowledge and ideas" may also easily be imagined to involve the ability and energy to scan different *sources of information* and to overcome the cognitive distance involved in understanding and appreciation them – for example when a firm communicates with researchers at a RINO event.

A question that may be raised relative to the findings reported in Table 12 concerns the variables that did *not* yield any significant findings. This question may invite a rather extensive discussion. However, let us focus at the variable based on the response to the following question: "We do not limit the company's work with innovation to only a few employees; everyone has the opportunity to contribute" (ORG1). Many of the firms in our sample are small and young. Typically, they have been founded by an entrepreneur with a special talent for innovation, and even if the firm has since then hired more employees, the founder is still in control of the strategic decisions. Often, he/she also manages the firm's external relations. In some of the larger firms, on the other hand, work is divided between a smaller development department and a larger production department, whose employees may not be involved in either the generation of new ideas or in strategic decision processes. We may assume that in neither of these groups of firms would employee participation stand out as relevant for the respondents when being asked to respond to the question in 4. This may explain the lack of significant findings related to this variable. In hindsight, we may also ask whether the construct measured by this variable should be included as a dimension in DC at all. Even if it addresses an aspect of the internal organization of a firm, and as such, has some potential relevance to the dimension of reconfiguration, it may be said to lie somewhat outside the field that the DC discourse addresses.

One aspect worth noticing in our study is the small size of most of the firms involved: the majority have ten employees or less. However, the merged DC variable, and more specifically ORG2, contribute to explaining variation in both of the two RINO benefit variables included in the study, even when controlling for firm size. We see this as evidence that DC are relevant in explaining why some smaller firms also succeed better than others in realizing the values opened up for them by their RINO participation. Although previous DC studies including smaller firms do exist, the majority focus on larger firms; moreover, the way in which the dimensions of DC are typically conceptualized seems to imply that the construct is more relevant to larger firms – that is, firms large enough to establish organizational routines with a certain independence to specific employees.

The original contribution of this paper, thus, proceeds along two lines. The first relates to the RINO context; to the best of our knowledge, this study is the first to assess the significance of DC to firms within a RINO in their pursuit of RINO-derived benefits. The second line relates to firm size: this study demonstrates that DC are a relevant explanatory factor even for very small firms.

A question that deserves further discussion, is how the DC of smaller firms, including firms with ten employees or less, are grounded in underlying

micro-foundations. This question is based on our earlier suggestion that sensing, seizing and reconfiguration should be regarded as three general DC functions that may be present within a firm to a higher or lower degree. In turn, these functions can be realized by a multitude of various micro-foundations, such as organizational routines, technical infrastructure, and individual skills and so on – or, as Helfat and Peteraf (2015) argue, by managerial skills or competencies, or even by their psychological underpinnings.

Our assumption is that, in smaller firms, more of these micro-foundations relate to individual skills than to organizational routines or technical infrastructure. The present research seems to confirm this, for instance by confirming a positive association between employees' "seeking knowledge and ideas" and RINO benefits. Another skill highlighted by the study, which is probably best seen as exerted by individual firm employees, or managers, is the cognitive, pragmatic and communicative capacities associated with successful reorganization of an enterprise to better accommodate future innovation. As we have argued, this involves a certain ability for critical reflection and learning, combined with an understanding of the nuts and bolts of one's own organization, as well as the ability and energy to act on this understanding. As innovation typically involves collaboration, it also implies the presence of communicative skills and practices. If this is right, the significance of these skills seems, in our study, to be no smaller in larger firms, and so let us not exclude the significance of individual skills in larger firms. Our point is only that they are no less important in smaller firms, and probably more.

This study also has practical implications. Most significantly, when entering a RINO, new members should be informed that their own DC would most probably influence the benefits they will achieve in return. Even though a RINO may be described as an attempt to form a concentrated "field of opportunities", in order to benefit from such opportunities it is not enough to merely be a member. This is true even if the RINO membership opens up for a privileged access to these opportunities that non-member firms' lack. As with every other opportunity, they have to be spotted and identified as such. In addition, the potential value that they offer has to be actively seized and developed.

Emphasizing this to new RINO firms may help them to more realistically scale their expectations regarding what benefits they might achieve, and what they need to do themselves in order to achieve them. This may both prevent disappointment and criticism at a later stage and, it may help the firms act more strategically in their interaction within the RINO. The latter point also relates to the question of whether a firm may take deliberate action to develop or enhance their DC, and if so, how this may be done. The present study

does not explicitly address this point; however, in distinguishing between DC and their underlying micro-foundations, our theory implies that the DC of firms may be enhanced by strategically addressing their micro-foundations, especially in the form of cognitive, pragmatic and communicative skills. Our advice, thus, is that RINOs would do well in putting such strategic development on their agendas, and help and support member firms to develop their DC.

The study has some limitations, the main one being the low number of firms included in the data set, and also that the firms were included on the basis of their RINO membership in five specific RINOs, each representing specific technologies and value chains, which may have produced a bias in the analysis that is hard to detect from the cross-sectional analysis. It should also be noted that the fit of the regression models represented by the adjusted R square is moderate or small. The small sample size, moreover, may have led to an under-identification of potential significant relationships between variables, especially in the models involving the five variables underlying the merged DC variable. Also, cross-sectional data should not uncritically be used to give evidence of causal relationships. This is why we emphasise that we only purport to explore systematic variation within our sample, representing firms who are already RINO-members. We do think, however, that the systematic variation that we find, may be used to support more general claims related to how dynamic capabilites influence firms in such RINOs, as we have argued above.

CONCLUSION

In this study, the following hypotheses were tested:

H1. Higher DC RINO firms take a more active part in RINO meetings and events.

H2. Higher DC RINO firms harvest more benefits from their RINO participation.

H3. Higher DC RINO firms benefit from their RINO participation by becoming more actively involved in innovation.

H4. Higher DC RINO firms collaborate more across different RINO member categories for innovation.

Whereas H2 and H3 were confirmed, H1 and H4 were not. This study, thus, concludes that firms with higher DC are more successful in harvesting the potential benefits of being members of a network. They are better at seeking out potentially useful resources made available through their RINO,

and at transforming them into actual benefits. While the majority of previous studies have had a main emphasis on larger firms, we found DC to be of relevance also to smaller firms.

Exploring the five individual variables underlying the merged DC variable used in this study, we found that employees "seeking knowledge and ideas" and the cognitive, pragmatic and communicative capacities associated with successful *reconfiguring* of an enterprise to better accommodate future innovation, may be seen as dynamical capabilities with a positive influence on the success of a firm within a RINO. This relates both to the two forms of benefits measured in the study, and collaboration bridging various types of RINO members. Reconfiguring, also, lies close to the dynamic core of how the DC discourse originally conceptualized dynamical capabilities as a higher-level capability: as reconfiguring is about the firm's ability to change appropriately relative to a changing environment. A pragmatic implication of these findings is that firms entering RINOs may become more aware of how their own skills and capabilities are likely to influence what they will get out of their membership. This is also a point that the RINO management should address.

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Abstract (in Polish)

Istnieje coraz większa jest liczba inicjatyw finansowanych ze środków publicznych w celu ustanowienia lub wzmocnienia sieci i klastrów dla zwiększenia innowacyjności. Zwroty dotyczące takich inwestycji różnią się, a celem tego artykułu jest zbadanie, w jakim stopniu różnice w korzyściach dla firm uczestniczących w sieciach lub klastrach mogą być wyjaśnione przez ich dynamiczne zdolności (DC). Na podstawie danych z pięciu sieci norweskich wynika, że firmy z wyższym DC są bardziej skuteczne w zbieraniu potencjalnych korzyści płynących z członkostwa w sieci.

***Słowa kluczowe**: sieci innowacji; regionalne organizacje innowacji (RINO); korzyści sieciowe; wydarzenie sieciowe; innowacje; dynamiczne możliwości.*

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A Conceptual Framework to Represent the Theoretical Domain of "Innovation Capability" in Organizations

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Abstract

The term 'innovation capability' has been used recurrently in the innovation literature, but there is still considerable divergence about its meaning and implication to organizations. A consensus exists that, to innovate, organizations must possess innovation capability, and that the ownership of this feature is not a binary process, but rather an evolutionary level process. This evolutionary logic is analogous to the basic structure of organizational maturity models. However, the literature integrating innovation capability into a maturity perspective is still limited. Considering these premises, from a broad bibliographical research, this article presents a framework of reference to represent the entire theoretical domain of innovation capability. Its purpose is to classify the main types of models about this construct available in the reference literature. It is organized at increasing levels of complexity, so that each level creates the conceptual conditions for the construction of more comprehensive models. Similar to the main use cases for maturity models, there are three basic levels for the framework: descriptive; comparative; and, finally, prescriptive models of innovation capability. Considering this cumulative framework, the authors argue that, to be fully understood, innovation capability should be studied using the perspective of maturity models.

Keywords: *innovation capability; conceptual framework; theoretical domain; reference model; maturity.*

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INTRODUCTION

Innovation is widely recognized as an important mechanism for the competitiveness of companies and countries in today's globalized world (Crossan & Apaydin, 2010; Francis & Bessant, 2005). Included in this perspective is a recent field of knowledge related to the so-called 'innovation capability'. This organizational characteristic has gained increasing relevance as competitive environments become more challenging. Peng, Schroeder, and Shah (2008, p. 732) described the capabilities "as high-level routines or bundles of routines"; however, there is still confusion about the definition of this term. Cusumano (2010, p. 114), for example, states that there is a problem with the concept of 'capabilities', because it "is another common yet vague term, like platforms, used in a myriad of ways". This situation has created difficulties in understanding the meaning and underlying characteristics of innovation capability.

As innovation is "the multi-stage process whereby organizations transform ideas into new or improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace" (Baregheh, Rowley & Sambrook, 2009, p. 1334), it is presumable that innovation can only occur if an organization possesses some level of innovation capability. In this sense, 'innovation capability' can be understood as the organization's potential to innovate (Saunila & Ukko, 2012). However, Francis (2000, p. 106) explains that understanding innovation capability can be difficult, since it: "(…) is an enabling set of attributes and is detectable only when exploited; (…) possibly requires a combination of factors, both hard and soft, interacting in a complex gestalt; (and) may not be unitary and may vary between organizational levels, configurations, national or firm-specific cultures, distinctive strategies, different threat levels, technological complexity or other factors".

Lin, McDonough, Lin, and Lin (2013, p. 264) argue that it is not the capabilities themselves, but its application and use that enables the execution of activities that produce a competitive advantage. Given that capabilities are different than resources, better understanding the structure of innovation capability becomes a key issue for businesses that aspire to expand their potential to produce innovative outputs (Forsman, 2011; Lawson & Samson, 2001; Romijn & Albaladejo, 2002; Saunila & Ukko, 2012). This implies the need to understand the nature of this organizational characteristic, as well as its configuration of evolution and maturation, according to the increase of organizational proficiency in relation to a set of routines and practices (Rosemann & De Bruin, 2005). In this sense, a maturity structure can provide a useful conceptual framework to understand innovation capability, since,

according to Röglinger, Pöppelbuß, and Becker (2012, p. 4), "maturity models typically represent theories about how an organization's capabilities evolve in a stage-by-stage manner along an anticipated, desired, or logical path".

This paper proposes a framework for the entire theoretical domain of innovation capability. This framework consists of a hierarchical structure that classifies and integrates different theoretical models for innovation capability in organizations. This is an intermediate result from a broader research project on innovation capability, whose primary objective was the construction of a universal maturity model for this construct adherent to any company, regardless of its size or sector. The framework is proposed from an extensive study of the literature about this whole domain, indicating its increasing levels of complexity and classes that comprise it. It is divided into three main levels of conceptual granularity that emulate the use perspectives for maturity models. Thus, the paper presents two main contributions. The first is that the proposed framework can be used to understand and classify how a study about innovation capability fits into a larger theoretical domain. The second, and more important, is that innovation capability, being a potential for the development of innovations in an organization, must be studied from a maturity point of view.

LITERATURE REVIEW

Innovation capability

The term 'innovation capability' is understood in varied and diffuse forms in the literature. Narcizo, Canen, and Tammela (2013) stated that there are many definitions for it, which has generated divergence both about its proper conceptualization and the contexts in which it should be employed. Lawson and Samson (2001) argued that innovation capability is a conceptual framework that aims to describe actions that can be taken to improve the success of activities and innovation efforts. This implies an essentially intangible nature, making its study challenging and complex. As a result, generally separating it from the main organizational practices is not possible, since innovation capability is exactly the potential to make these practices, with an orientation towards innovation (Saunila & Ukko, 2013).

There is a diversity of approaches, theories and models available in the literature to represent innovation capability. Table 1 shows different definitions for this construct. However, the Resource-Based View Theory specifies important aspects to understand this organizational construct, since it assumes that innovation is based on specific routines and heuristics of organizations, not homogeneous strategies based on research and development (Som,

Dreher & Maloca, 2010, p. 2). Similarly, the Evolutionary Theory suggests that innovation, "far from being an isolated and defined act, is a complex process of organizational learning in all functional areas, subject to specific decisions within the system of production and dependent on various contextual factors" (Martínez-Román, Gamero & Tamayo, 2011, p. 459).

Table 1. Definitions of innovation capability

Reference	Definition
Akman and Yilmaz (2008, p. 79)	(…) "is defined as an important factor that facilitates an innovative organizational culture, characteristics of internal promoting activities and capabilities of understanding and responding appropriately to the external environment."
Assink (2006, p. 219)	''The internal driving energy to generate and explore radical new ideas and concepts, to experiment with solutions for potential opportunity patterns detected in the market's white space and to develop them into marketable and effective innovations, leveraging internal and external resources and competencies''
Essman (2009, p. 73)	(…) "is the organizational means with which innovative outputs may be facilitated."
Esterhuizen, Schutte, and Du Toit (2012, p. 2)	(…) "is the way enterprises can generate innovative outputs."
Francis (2000, p. 224)	(is) "an organizational property that underpins an ample flow of multiple, value-creating and novel initiatives"
Guan and Ma (2003, p. 740)	"is a special asset of a firm. It is tacit and non-modifiable, and it is correlated closely with interior experiences and experimental acquirement."
Lawson and Samson (2001, p. 384)	"the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders."
Lerro, Linzalone, and Schiuma (2009, p. 11)	"the company's ability to combine, integrate and exploit its tangible and intangible resources, to create and deliver products and services."
Lin, Chen, and Chiu (2010, p. 113)	"the implementation or creation of technology as applied to systems, policies, programs, products, processes, devices, or services that are new to an organization."

Reference	Definition
O'Cass and Sok (2014, p. 4)	"Product innovation capability is defined as bundles of interrelated routines used to undertake specified product innovation-related activities in areas such as developing new products and improving existing product quality."
Olsson, Wadell, Odenrick, and Bergendahl (2010, p. 168)	"A company's innovation capability is frequently described as its ability to continuously develop innovations as a response to a changing environment."
Ottaviano (2004, p. 16)	"the ability of an organization to successfully innovate on a sustained basis."
Romijn and Albaladejo (2002, p. 1054)	(…) "is defined as the skills and knowledge needed to effectively absorb, master, and improve existing technologies, and to create new ones."
Rangone (1999, p. 235)	"that is a company' ability to develop new products and processes, and achieve superior technological and/or management performance (e.g., development cost, time-to-market, etc.)"
Saunila and Ukko (2012, p. 358)	"The concept of innovation capability includes three elements: (1) Innovation potential consists of factors that affect the present state of innovation capability. The factors reflect the potential that organizations have to produce innovations. (2) Innovation processes are systems and activities that assist organizations to utilize their innovation potential and therefore enable innovations. They are the way systems and activities are carried out. (3) The results of innovation activities are, e.g. product/service innovations, and process innovations."
Santos-Vijande (2013, p. 87)	(the) "ability to regularly adopt or implement more innovations in the administrative and technical domains relative to competition."
Wonglimpiyarat (2010, p. 247)	(…) "refers to the ability to make major improvements and modifications to existing technologies, and to create new technologies."
Zhao, Tong, Wong, and Zhu (2005, p. 212)	(…) "is the application of relevant knowledge to the attainment of market value" (…)
Tang, Wang, and Tang (2015, p. 139)	"is the capability where an enterprise utilizes its own resources to develop new products or services."

Some relevant aspects in the propositions in Table 1 should be highlighted. The first is the idea that innovation capability is an asset or organizational property, as shown in Akman and Yilmaz (2008), Francis (2000) and Guan and Ma (2003). Complementary to this idea is the suggestion that innovation capability is some type of organizational ability (Lawson & Samson, 2001; Lerro et al. 2009; Olsson et al., 2010; Ottaviano, 2004; Romijn & Albaladejo, 2002; Rangone, 1999; Santos-Vijande, 2013; and Wonglimpiyarat, 2010). Both these perspectives are relevant and imply that innovation capability is related to the internal organizational environment in terms of experimentation, learning, adaptation, heuristics, and know-how (Forsman, 2011), reinforcing an alignment with the Resource-Based View and Evolutionary Theories (Martínez-Román et al., 2011; Som et al., 2010).

The second aspect is the idea that innovation capability is an organizational process, practice or high-level organizational routine, as observed in Essman (2009), Esterhuizen et al. (2012), O'Cass and Sok (2014), Tang et al. (2015), Saunila and Ukko (2012) and Zhao et al. (2005). At the same time, there are definitions that value the innovative outputs or successful results of these same processes or practices. In this sense, innovation capability can be understood not only as a process, but also as the innovative results from it (Lin et al., 2010; Saunila & Ukko, 2012).

Finally, the third aspect is the idea of 'potential', as proposed by Saunila and Ukko (2012). Although present in only one definition, this term carries a central aspect for the understanding of innovation capability, as it indicates that it is present in most organizations, not only in those that innovate recurrently or systematically (Som, 2015). In other words, it is the potential for the development of innovations, and, as such, it can range from a very low level (or absent) to a very high level (or mature) (Corsi & Neau, 2015; Essman, 2009). The definition proposed by Saunila and Ukko (2012) integrates all of the relevant aspects present in other definitions, with the inclusion of the potentiality perspective, suggesting a connection with organizational maturity models.

Maturity models and innovation capability

Assuming that in the real world there are predictable and systematic patterns for the process of organizational change and evolution, according to Röglinger et al. (2012, p. 4), "maturity models typically represent theories about how an organization's capabilities evolve in a stage-by-stage manner along an anticipated, desired, or logical path". Maturity models are useful because they can be used in three perspectives: descriptive, comparative and prescriptive. It serves a descriptive purpose when it is applied on an 'as-is'

assessment. It is comparative when used as an internal or external benchmark mechanism, comparing performances between companies, industries, and sectors. Finally, it is prescriptive when it identifies future desirable levels of maturity, providing guidance to the implementation of the improvement actions needed to achieve them (Pöppelbuß & Röglinger, 2011; Röglinger et al., 2012). These characteristics are particularly relevant in the context of Business Process Management.

There are several models for Business Process Management Maturity, but most are derived, to some degree, from the Capability Maturity Model (CMM) (Paulk, Curtis, Chrissis, & Weber, 1993; Rosemann & De Bruin, 2005). Overall, CMM is based on the proposition of five levels of maturity, defined by special requirements that are cumulative, as well as process capabilities that are expected for each level. One of the consequences of CMM was the CMM Integration (CMMI), which primarily comprises of sets of best practices that help organizations improve their processes (Röglinger *et al.*, 2012; Stentzel, Niknam, & Ovtcharova, 2013). CMM, and later CMMI, created a seminal conceptual framework that has served as a guideline for most organizational maturity models developed over the last two decades.

CMMI supports two paths to improve processes in organizations: continuous and stages representation. These paths are associated with two levels: capability and maturity. The path of improvement linked to capability levels, also called 'continuous representation', enables organizations to incrementally improve processes corresponding to an individual process area (or group of process areas) selected by the organization. On the other hand, the improvement path linked to maturity levels, called 'stages representation', allows organizations to improve a collection of related processes, incrementally addressing successive sets of processes. Each maturity level provides a layer in the foundation for continuous process improvement. Each level of maturity develops an important subset of the organization's processes, preparing to go to the next level, where maturity levels are measured through the achievement of objectives, both specific and general, associated with each predefined set of process areas (Chrissis et al., 2006; Paulk et al., 1993).

Particularly in the literature about innovation capability, three maturity models stand out: Bessant (2003), Corsi and Neau (2015), and Essmann (2009). Bessant (2003) proposes a maturity model based on the premise that continuous learning is a dynamic capability of the organization and can be understood as a systemic process focused on the support of incremental innovations. In terms of practices, it is structured from a maximum target, i.e. 'intense innovation capability', unfolding a set of eight skills necessary to the achievement of this target, which in turn are split, each, in three key behaviors,

generating a total of twenty-four key behaviors. Corsi & Neau (2015) offers the latest model available in the literature. Like CMMI, it consists of five maturity levels. Its main objective is to track the potential for innovation in each of these levels and describe the specific process that signals a greater or lesser capacity to innovate. Essmann (2009) also proposed a maturity model based on CMMI that aims to identify the organizational components of innovation capability. The model essentially encompasses three key perspectives: a conceptual framework, which supports its structure; a set of core requirements that assist in the evaluation and measurement; and a set of organizational roles, referring to the attitudes and actions of individuals in relation to innovation.

RESEARCH METHODS

As previously mentioned, the primary aim of this article is to present the first set of results of a more comprehensive research investigation on innovation capability, whose main objective is to represent this construct in a maturity structure that is adherent to companies of any size or sector. For this, it was necessary to construct a reference model based on an ontological structure that adequately represented the fundamental classes associated with this organizational characteristic. The model is based on a conceptual framework that was developed using a methodology for the construction of reference models, as proposed by Ahlemann and Gastl (2007).

The conceptual framework is a high-level perspective on the domain and it can be used to navigate it from its decomposition into smaller subunits. It aims to guarantee the fulfillment of two fundamental aspects regarding the available knowledge about the domain: (1) the certification that the modeling makes sense, and that such reference model does not yet exist; and (2) that the existing research can be incorporated into the construction of the model in question. The quality of a reference framework is usually analyzed considering its completeness, level of articulation between elements, and comprehensibility (Ahlemann & Gastl, 2007).

For conceptual purposes, the premise adopted is that a maturity model is always a reference model, whereas the inverse is not true. This assumption is considered valid when we compare the proposals of Ahlemann and Gastl (2006) and De Bruin, Freeze, Kaulkarni, and Rosemann (2005) for the construction of reference and maturity models, respectively. The adoption of this premise is justified, because it makes possible the construction of a conceptual framework on the domain of innovation capability, which

incorporates a maturity structure without the risk of conceptual overlaps or contradictions.

The research began by analyzing 1,672 documents available in the Scopus database containing the exact term 'innovation capability' in its titles, abstracts or keywords. From these documents, citation information, bibliographical information, abstracts, keywords and references were captured and exported. The data were then analyzed using VOSViewer and CitNetExplorer software. VOSViewer was used to construct and visualize bibliometric networks based on co-citations, bibliographic coupling or co-authorship relations, while CitNetExplorer was used to view and analyze citation networks in this domain over the last twenty decades. For a better understanding of the operation of these tools, we suggest consulting Van Eck and Waltman (2014).

From the analysis performed by the software, approximately 300 key documents were selected for a more comprehensive analysis. A detailed study of these documents revealed that it was possible to identify three main types of models that structure the theoretical domain of innovation capability. These models were placed in an ontological hierarchy, emulating, in increasing order of complexity, the use principles for maturity models. For each level of complexity in the framework, two sub-classes of models were identified. The way all entities of the framework relate to each other and contribute to the construction of the new levels of greater conceptual complexity on the domain was then explained. Finally, it was possible to construct a complete conceptual framework for the theoretical domain of innovation capability, which is illustrated in Figure 2.

ANALYSIS

Starting from the scanning and analysis of the literature on the theoretical domain of innovation capability, it was possible to identify a fundamental framework of constructs that comprise it. The domain is fundamentally structured by a typology of models analogous to the predicted use cases for maturity models. There are three main classes: (1) descriptive, (2) comparative, and (3) prescriptive models. These models represent a structure of increasing complexity, where each one has two subclasses of models. For the descriptive models, there are the subclasses of 'definitions' and 'organizational dimensions and (or) organizational results'. For the comparative models, there are the subclasses of 'conceptual diagrams' and 'assessment instruments'. Finally, for the prescriptive models, there are 'reference (or maturity) models' and 'standards'. Subclasses are cumulative

in complexity, so each level of the framework depends on a set of subclasses of the previous one. Thus, prescriptive models (Level 3) are enabled from the subclasses of the comparative models (Level 2), which, in turn, are enabled from the subclasses of the descriptive models (Level 1). Figure 2 illustrates this conceptual framework.

Descriptive models are characterized by employing one or more entities that, *per se*, are insufficient to adequately represent all characteristics of innovation capability in an organization. These models are generally used to describe or define innovation capability without a comparative or prescriptive purpose, although this is not a universal rule. In short, these models are focused on 'what', without paying much attention to 'how'. Consequently, models in this class may differ significantly from each other in terms of scope and completeness. Therefore, this is the most heterogeneous and highly granular class of models, in which conceptual overlapping or even theoretical contradictions can occur. The main subclasses of the descriptive models are:

Definitions: These models fundamentally aim to characterize, define or conceptualize innovation capability in organizations. A definition is the simplest model available in the literature, and can be understood as the 'smallest possible entity' in this domain. Usually, all other subclasses of models are deployed from a definition for innovation capability. Examples of definitions for innovation capability can be found in: Akman and Yilmaz (2008), Assink (2006), Guan and Ma (2003), Hu (2008), Rangone (1999), Wonglimpiyarat (2010) and Zhao *et al.* (2005).

Organizational dimensions: These models describe sets of organizational dimensions that directly influence an organization's innovation capability. In some cases, authors also present sets of management processes related to these dimensions. Thus, these models are generally targeted at the internal organizational environment. Generally, organizational dimensions are proposed from a supporting definition. Some of the most common organizational dimensions are: leadership, strategy, organizational structure, culture, processes, and human resources. Examples of organizational dimensions related to innovation capability can be found in Branzei and Vertinsky (2006), Laforet and Tann (2006), Martínez-Román et al. (2011), Narcizo et al. (2013) and Perdomo-Ortiz, González-Benito, and Galende (2006).

Organizational results: These models are usually focused on the organization's innovation performance, with a primary perspective on the market, customers, and competitors. In this way, these models are more oriented to the impact that innovations produce in the external environment, in terms of the competitiveness, efficiency and performance. Generally, organizational results are also proposed from a supporting definition for

innovation capability. Examples of organizational results related to innovation capability can be found in Hervas-Oliver, Sempere-Ripoll, and Arribas (2015), Laforet (2011), Simpson, Siguaw, and Enz (2006) and Saunila, Pekkola, and Ukko (2014).

Comparative models aim to represent the dynamics of innovation capability in an organization, usually with the intention of evaluating, measuring or comparing the dynamics between organizations. Comparative models are divided into two subclasses. The first concerns conceptual diagrams. These models are often based on a definition of innovation capability and dimensions and (or) organizational results, making it possible to construct assessment instruments. The latter, in turn, enables diagnostics, benchmarks and comparative studies of innovation capability across organizations. The main subclasses identified for comparative models are:

Conceptual diagrams: These models aim to build a diagram that supposedly represents the dynamics of innovation capability, commonly representing the organization as a system, consisting of internal and external entities, inter-related, and operating from inputs, transformations and outputs. In general, these models employ a definition, organizational dimensions and (or) organizational results to construct the diagram. Examples of conceptual diagrams for innovation capability can be found in Lawson and Samson (2001), Smith, Busi, Ball, and Van Der Meer (2008), Crossan and Apaydin (2010) and White and Bruton (2011).

Assessment instruments: These models aim to build assessment instruments to measure innovation capability in organizations. These models can also be used as comparative tools, giving them the ability to produce a diagnosis of this feature among organizations. Generally, assessment instruments are constructed from a supporting conceptual diagram. Examples of innovation capability assessment instruments can be found in Ottaviano (2004), Aiman-Smith (2005), Martínez-Román et al. (2011), Saunila and Ukko (2012).

Prescriptive models aim to represent innovation capability in its entirety, usually through the use of reference or maturity structures. These models usually have, in addition to a supporting conceptual framework and definition, an assessment tool, as well as proposals of good practices resulting from the assessment. These models tend to have greater conceptual density, usually derived from extensive applied studies in several organizations. However, they are rarer and appear in smaller numbers in the literature. The main subclasses include:

Reference models: These models aim to develop innovation capability in organizations through a frame of reference. With the exception of Francis (2000), all models in this subclass are based on a maturity structure, with

defined evolutionary levels and good practices associated with each level. The most relevant models in this subclass are in Bessant (2003), Corsi and Neau (2015), Essmann (2009) and Francis (2000).

Standards: These are the most recent and complex class of models in the entire domain. Models in this subclass consist of propositions of universal patterns related to innovation capability and its management, presuming the existence of universal standards that, if respected, would turn innovation into another organizational process, as happened with the other fields of knowledge in the past. The most relevant models in this subclass are still under development. They include the European Committee for Standardization Technical Committee CEN/TC 389 – Innovation Management (CEN, 2016) and the International Organization for Standardization Technical Committee ISO/TC 279 – Innovation management (ISO, 2016).

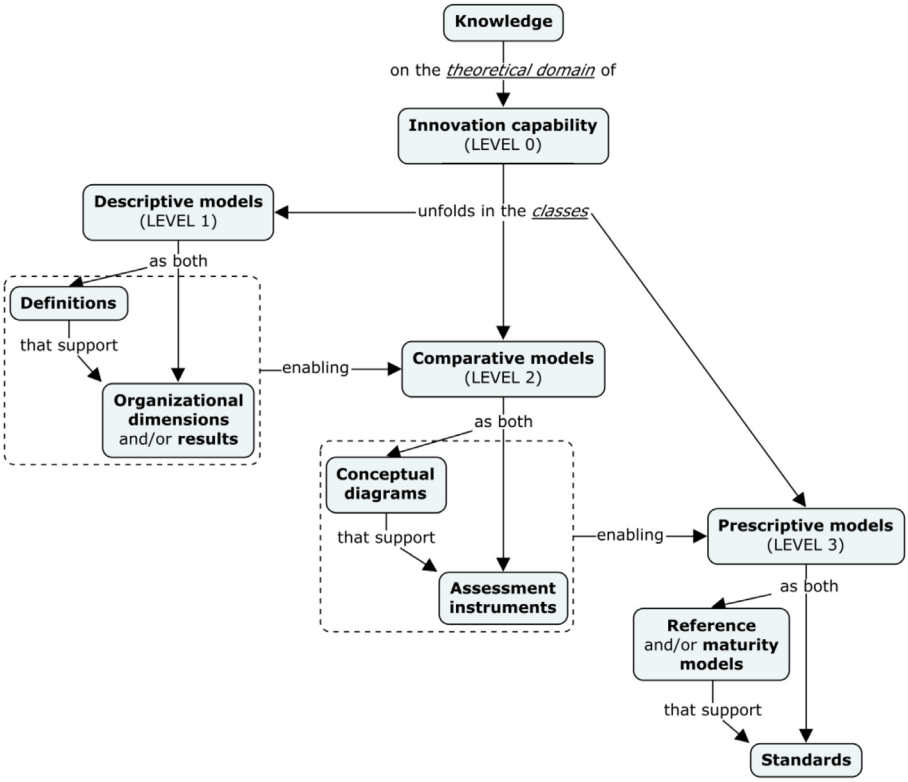

Figure 2. Proposed framework for the theoretical domain of innovation capability

DISCUSSION

The main contribution of this article is the proposal of a framework, in the form of a hierarchical structure that classifies and integrates different theoretical models for innovation capability, presented in Figure 2. This structure is an 'embryonic' model of an ontological representation for this theoretical domain, denoting a seminal proposition for a potential new field of knowledge still underexplored in the literature. This representation can also be useful as an instrument of compatibility between models, from its frames in the classes defined by the hierarchy. Therefore, distinct models can be combined and integrated into more complex and comprehensive theoretical models, from their classification in the framework. Therefore, the framework has significant potential for theoretical and practical developments and can be useful, for example, as an artifact to support the construction of information systems or modeling organizational processes related to organizational innovation capability.

The framework offers an expansion of the theory about fundamental characteristics of "innovation capability" as a construct. It has particular adherence to the perspective proposed by Saunila & Ukko (2014) regarding the idea that innovation capability represents a potential for innovation. At the same time, it is also aligned with the propositions of Corsi and Neau (2015) and Essmann (2009), stating that, based on the structure of available literature on this construct, the theoretical knowledge about innovation capability emulates the structure of a maturity model.

However, although the proposed framework represented by Figure 2 has a defined hierarchical structure, it should not be considered entirely rigid. Therefore, it is prudent to analyze it with some flexibility in mind. There are some issues that still merit further study. For example, in relation to the first level of the framework, although there is no doubt that descriptive models constitute the most elementary level of the domain there are still concerns about its constituent subclasses. In some cases, it was observed that conceptual diagrams could be qualified as descriptive, rather than comparative, models. Similarly, it was observed that, in some cases, organizational dimensions and results could be classified as comparative, rather than descriptive, models. The configuration presented in Figure 2 was chosen by adopting the premise that dimensions and organizational results help in the description of the fundamental structure of innovation capability, while conceptual diagrams help in the construction of instruments for its evaluation. However, as explained, this configuration should not be understood as a universal rule for all existing theoretical models.

There are also opportunities for discussion about the hierarchical relationship between comparative and prescriptive models. Generally, in the literature on maturity models, prescriptive uses of these models tend to occur before its use for comparative purposes. That is, the comparative use tends to be a natural unfolding or an evolution from the prescriptive use. For the case of the theoretical domain of innovation capability, the inverse is suggested. The discussion of prescriptive models for innovation capability, especially in the form of rules or universal standards, is still in its early stages of development, e.g. the Innovation Management guidelines, by the ISO Technical Committee 279. And yet there is no consistent indication that these standards will be accepted, used and disseminated by stakeholders and related communities. On the other hand, the evaluation and comparison models of innovation capability have been developed for a long time. Furthermore, most of the identified maturity models were initially developed from studies about evaluating the innovation capability of organizations, to then construct maturity levels, and not the inverse. Thus, particularly in the literature on innovation capability, prescriptive models tend to be dependent on comparative models.

The standards also merit particular reflection. These types of models are characterized by being the most recent and immature class of the domain, since there is no innovation standard that is *currently* widely adopted, accepted or recognized, either by the Academy or by the market. Thus, although designed to assume a normative role, they are not yet widely recognized as such by their potential users. This is because they are derived, for the most part, from propositions designed with the intention of constructing frames of reference, varying in terms of customization and flexibility, to guide – and eventually certify – innovation processes in organizations. These models must be understood differently from all other prescriptive models found in the literature, since their conceptual support and construction processes tend to be closed (not explicit) and can vary significantly in terms of conceptual adherence, indication of best practices, universality, usability, intelligibility, flexibility and completeness, particularly in the case of small or low-tech companies. However, as occurred with other normative propositions, one or more of these prescriptive models can evolve in a similar trajectory, eventually becoming accepted by a community of users and becoming a widely recognized and adopted standard. This implies that systems, methods and tools for the certification of innovation capability or innovation management processes can become a routine situation in the near future.

Considering these aspects about the framework, two main implications arise. The first implication is that the conceptual framework proposed in

Figure 2 can provide a structure for the understanding of how a study about innovation capability fits into a larger theoretical domain. It also helps to explain the different degrees of complexity that these models can assume. In a synthesized way, the framework determines how most studies, even with different scopes and objectives can be complementary to the construction of this field of knowledge. It also proposes that the theoretical domain about innovation capability is structured in an analogous way to the cases of the use of maturity models, suggesting that this construct itself can also be represented using a maturity structure.

As a consequence, a second implication is suggested: that innovation capability, being the innovation potential, process, and results (Saunila & Ukko (2014) must be analyzed from a maturity point of view. This is fundamentally due to the fact that a 'potentiality' represents a plausible, but not necessarily concretized, situation. In other words, it expresses a likely possibility to exist or happen. This view is adhered to the logic of maturity, since the susceptibility of an organizational performance level will vary (increase or decrease) due to the organization's degree of proficiency in a bundle of routines (Chrissis et al., 2006). This is the same premise underlying a maturity model because, as it is structured in levels, maturity will increase as the organization complies with certain requirements and achieves a degree of evolution in its business processes (De Bruin et al., 2005). Bessant (2003, p. 56) summed up this discussion by stating that dealing with innovation is "not dealing with a binary state, a simple 'on/off' switch", that is, there is a whole spectrum of possibilities for innovation capability, which grow from a very low or nonexistent level, to a very high or mature level.

CONCLUSIONS

This article proposes that the entire theoretical domain on the innovation capability of organizations can be condensed into a framework. This framework is proposed and deployed in three main classes, which emulate the principles of use for maturity models. However, it is relevant to point out that this proposal is an intermediate result of a broader research investigation that is still under development. Despite this, some conclusions are already possible. Firstly, the authors consider that the framework can be an important tool for the classification of theoretical models, both existing and future, regarding innovation capability. Thus, it can be used as a classification and ordering mechanism of available knowledge, resembling an ontology for the domain. It may also be useful to help understand how different models can be related in a complementary way, without there being theoretical contradictions in

its combined uses. Finally, it can be used for the construction of maturity models about innovation capability, as the framework describes increasing and cumulative levels of conceptual complexity.

The authors believe that there are still opportunities for improvements and adjustments to the framework, but also understand that this is already an important step in better understanding the entire theoretical domain about innovation capability. As proposals to expand this research, two developments are suggested. The first is a more comprehensive empirical validation of the framework, in order to guarantee that it is a faithful representation of reality. This validation process could be carried out through questionnaires and interviews with recognized experts in this field of knowledge, assuring the construction of a reference framework based on the empirical evidence. The second is the development of a method oriented to the construction of a maturity model for innovation capability in organizations. This method could use the relationship between subclasses proposed in this framework to build a more integrated and comprehensive theory about this construct. Thus, instead of developing new models, researchers can use this framework to take advantage of models already available in the literature, gaining time, quality and efficiency in the study and modeling the innovation capability in organizations.

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Abstract (in Polish)

Termin „zdolność do innowacji" był wielokrotnie stosowany w literaturze z zakresu innowacyjności, ale nadal istnieje znaczna rozbieżność co do jego znaczenia i implikacji dla organizacji. Zgoda istnieje co do tego, że być innowacyjnym organizacje musiały posiadać zdolność innowacyjną, a własność tej funkcji nie jest procesem binarnym, a raczej procesem ewolucyjnym. Logika ewolucyjna jest analogiczna do podstawowej struktury modeli dojrzałości organizacyjnej. Jednakże literatura włączająca zdolności innowacyjne do perspektywy dojrzałości jest wciąż ograniczona. Biorąc pod uwagę te przesłanki, z szerokiego badania bibliograficznego, niniejszy artykuł przedstawia ramy odniesienia do reprezentowania całej teoretycznej dziedziny zdolności innowacyjnych. Jego celem jest klasyfikacja głównych typów modeli dotyczących tego konstruktu dostępnych w literaturze referencyjnej. Jest on zorganizowany na coraz większym poziomie złożoności, dzięki czemu każdy poziom tworzy konceptualne warunki budowy bardziej wszechstronnych modeli. Podobnie jak w przypadku zastosowań głównych dla modeli dojrzałości, istnieją trzy podstawowe poziomy: opisowy, porównawczy oraz normatywny model zdolności innowacyjnych. Biorąc pod uwagę te skumulowane ramy, autorzy twierdzą, że należy w pełni zrozumieć zdolność innowacyjną do badania, biorąc pod uwagę modele dojrzałości.

***Słowa kluczowe**: zdolność do innowacji; ramy koncepcyjne; dziedzina teoretyczna; model referencyjny; dojrzałość.*

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