
Innovation capabilities: What are their characteristics and how can they be conceptualized?

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Structured Abstract

Purpose – It has been argued that firms may utilize their resources and capabilities through the development of innovations in the form of new products, services or processes, and empirical research has confirmed that there is a positive relationship between the implementation of innovation activities and future performance of firms. Some firms prove to be better at reproducing innovation success than other firms, and the capacity to do so can be framed as an innovation capability. However, the term innovation capability is ambiguously treated in extant literature. There exist several different definitions of the concept and the distinction between innovation capabilities and other types of capabilities, such as dynamic capabilities, is neither explicitly explained, nor is the relationship between the concept and other resource- and capability-based concepts within strategy theory established. Even though innovation increasingly is being pointed to as crucial for firms sustainable competitiveness in contemporary volatile and complex markets, the strategy-innovation link is underdeveloped in extant research. To overcome this divide this paper contributes with a conceptual framework to discuss innovation capability.

Design/methodology/approach – Due to the status of the extant research, we chose a conceptual research design to answer our research question. Based on careful examination of current literature on innovation capability specifically and the strategy-innovation link in general, we suggest to analyse innovation capability along two dimensions - innovation novelty and market characteristics. This enable us to identify four different contexts for innovation capabilities in a two-by-two matrix. Subsequently, we discuss what types of innovation capabilities that are expected to be required in the four different contexts.

Originality/value – We report on, and synthesize, current understanding of innovation capability and provide a framework to discuss different contexts for innovation capability. The provision of this framework contributes with new knowledge on the strategy-innovation link as well as clarifying the conceptual understanding of capabilities within the strategy literature and establishing the relationship between these underpinnings and innovation management theory. In particular, we present a contingency perspective on variation in innovation capability related to the four identified contexts.

Practical implications – The conclusions reported in the paper provide assistance to managers searching for better ways to manage their innovation capabilities, by providing a framework for discussing how innovation novelty and market characteristics affect the innovation capabilities required in different contexts.

Keywords – Conceptual framework, Innovation capability, Innovation novelty, Market characteristics, Strategy-Innovation link.

Paper type: Academic Research Paper

1 Introduction

Extant research suggest that that firms utilize their resources and capabilities in the development of innovations, such as new products, services or processes (Hill et al. 2015). In fact, empirical studies has confirmed that there is a positive relationship between the implementation of innovation activities and future performance of firms (Bowen et al. 2010, Rubera and Kirca 2012). The resources and capabilities needed by firms to succeed in their innovation activities are heterogeneously distributed between firms. Therefore, some firms prove to be better at reproducing innovation success than other firms, and the capacity to do so can be framed as an innovation capability.

However, this capacity paradoxically involves both elements of stability and change. 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.

Moreover, current descriptions of innovation capabilities overlap with the notion of dynamic capabilities (Teece, 1997) making these concepts difficult to distinguish from each other. Dynamic capabilities refers to a pervasive concept within the field of strategic management. The term 'dynamic capability' as a was coined by Teece et al. (1997) who defined it 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 article by Barreto (2010) identifies several other definitions of the concept frequently cited, and thus conclude that the conceptual underpinnings dynamic capabilities are underdeveloped. Despite the identified conceptual ambiguities, it has been claimed that dynamic capabilities are central to innovation strategy (Tidd 2012). However, current research also calls for an improved understanding of the link between strategy and innovation (Lightfoot and Gebauer 2011).

Conceptualizing innovation capabilities is therefore a complex field of study that is currently emerging. The topic has already attracted interest from a number of scholars (e.g. Hertog et al. 2010, Guan and Ma 2003, Forsman 2011), but in spite of these important advances there is still a lack of consensus in the literature and a pressing need to clarify what type of capabilities that drive innovation in different contexts (Lidija and Robert 2014), and how these capabilities are developed and utilized (Helfat and Peteraf 2003).

This conceptual paper therefore aims to synthesize current understanding of innovation capability and provide a framework to discuss how innovation capabilities are contingent on innovation novelty and market characteristics. The following research question is raised: *How do innovation novelty and market characteristics affect what innovation capabilities that are required to carry out successful innovation processes?*

2 Theoretical background

To succeed in the contemporary globalized and hyper-velocity business environment (Crossan and Apaydin, 2010; Francis and Bessant, 2005) it has been claimed that organizations need to be able to manage change in increasingly volatile and complex service eco-systems (Yoo and Kim 2015), and as an extension dynamic capabilities possessed by firms have been linked to the sustained competitiveness by firms under these conditions (Eisenhardt 2004). In this respect dynamic capabilities have been claimed to be central to innovation (Tidd 2012). However, the link between strategic management perspectives on resources and capabilities heterogeneously distributed among firms and the ability to replicate innovation success over time has not been established in extant research. Therefore, we need to assess the theoretical underpinnings of the resource- and capabilities perspective within strategic management, before we can establish the strategy-innovation link and inform our understanding of the concept of ‘innovation capability’.

2.1 The theoretical underpinnings of resource- and capability perspectives

The relationship between firms’ resources and capabilities and their performance has been discussed in the literature of strategic management since Edith Penrose addressed the mechanisms behind the growth of the firm (Penrose 1959). Early contributions in this area suggest that valuable and inimitable resources and capabilities are sources of superior performance and sustained competitive advantage (Wernerfelt 1984, Barney 1991), while more recent contributions suggest that it is the firm’s ability to change and re-configure its resources and capabilities, often referred to as dynamic capabilities, that sustains firms’ performance, especially when the market is unstable (Teece et al. 1997, Teece 2014).

Penrose’s initial theory was revived by the resource-based view of the firm (RBV), which is a popular strategic management perspective that suggests that the actions that sustain a firm’s competitive position require it to possess very specific bundles of resources, competencies and capabilities (Penrose 1959, Wernerfelt 1984, Spender 1996, Barney

1991, Petraf 1993). 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). According to the RBV it is the creation, ownership, management and deployment of intangibles, especially knowledge and relationships, that explain variations in the performance of firms, especially those that are heterogeneously distributed by being valuable, rare, inimitable and non-substitutable (or VRIN as defined by Barney, 1991). The challenge however is that the VRIN criteria do not explain the dynamics of how the resource base is created, extended or modified for the firm to be innovative and responsive to external changes.

The RBV is thus underpinned by a *stability assumption*. For resources to yield value for the firm exploitation of the resource base implies that the firm can successfully deploy their resources over time without competitors being able to copy the causally ambiguous relations between the resources that constitute their offerings. Barney (1991) states that “*...firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness*”. According to this view resources persist over time (Amit and Schoemaker 1993, Mahoney and Pandian 1992, Penrose 1959, Wernerfelt 1984). The RBV is thus concerned with the internal organization of firms, and acts as a corollary to the external industry structure and positioning view of strategy as a key determinant of competitive advantage (Porter 1980, Porter 1985).

To compensate for the inherent rigidity of the RBV and in order to extend the theory to incorporate external market variations Teece et al. (1997) coined the term dynamic capabilities. Teece et al. (1997, 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 simply inward-looking in relation to the organization and its strategy. The central aim of this perspective is to explain how organizations achieve evolutionary fitness. Evolutionary fitness is 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). The resource-base of the firm consists of “*tangible, intangible and human assets as well as capabilities which the organization owns, controls or has access to on a preferential basis.*” (Helfat et al. 2007). The central idea of the dynamic capabilities perspective is thus the explanation of how sustained

performance is achieved by aligning the organization with shifting external environmental demands. Consequently the dynamic capability research agenda set in motion by Teece et al. (1997) includes the question of how firms also demonstrate *flexibility*. Hatum and Pettigrew (2006) suggest that organizational flexibility is a determinant for capability building, and that the degree of formalization and centralization will negatively affect flexibility (Volberda 1999). Flexibility is essential because successful firms need to display timely responsiveness to effectively coordinate and redeploy internal and external competences to address environmental changes (Teece and Pisano 1994).

It is widely acknowledged that dynamic capabilities are closely linked to learning processes, but how individual experience and tacit knowledge fit in with the organizational ability to create, extend and modify its resource base has not been taken into consideration. By definition, dynamic capabilities involve adaptation and change because they build, integrate or reconfigure other resources and ordinary capabilities. However, it is difficult for researchers to fully explain how firms use resources and capabilities to create competitive advantage (Helfat and Peteraf 2003). Helfat (2003) elaborates and suggests how the terms resources and capabilities can be distinguished from each other. She describes a resource as an asset or input to production (tangible or intangible), and a capability as the utilization of resources in a coordinated manner to achieve a goal. This distinction underlines that value creation does not come from the possession of the resources alone. Rather, it arises from their use, and the amount of value generated is linked to how resources are deployed, i.e. how they are combined within the firm. In this way, firms must continually develop their expertise and innovate, and managers need to have entrepreneurial rather than managerial skills (Penrose, 1959). Thus there seems to be a consensus that a capability does not represent a single resource in the concert of other resources (e.g. financial assets, technology, manpower), but a distinctive and superior way of allocating resources. Grant (1991) explains that resources are “*inputs into the production process*” whereas capabilities are “*the capacity for a team of resources to perform a task or activity*”.

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 capability lifecycles flows naturally from Wernerfelt’s (1984) observation that products and resources are two sides of the same coin – products go through product lifecycles – so to with capability-lifecycles. Accordingly,

Helfat and Peteraf (2003) suggest that capabilities, much like products, are developed, mature and decline through distinct phases. The authors suggest that both ordinary and dynamic capabilities are subject to these types of lifecycles.

Eisenhardt and Martin (2000) note that the dynamic capabilities approach has extended the applicability of the RBV to a dynamic market environment. Faced with dynamic market environments and uncertain market opportunities, it is a firm's ability to build new skills and create new knowledge that enhances their innovativeness and competitiveness (Cohen and Levinthal 1990, Kogut and Zander 1993). A dynamic aspect to capability adaptation is essential if capabilities are to play a role in long-term competitive advantage (Tallman 2003), and according to Ambrosini and Bowman (2009) dynamic capabilities are supposed to give firms a sustained competitive advantage and in so doing may help them to avoid developing 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 change – and the changes required are often related to create 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. However, the term 'innovation capability' is also ambiguously treated in extant research.

2.2 Innovation capability

A firm's 'innovation capability' can be understood as its potential to innovate (Saunila and Ukko, 2012), or more specifically its "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). It has been suggested that innovation capabilities are so-called higher-order capabilities, or "the ability to mould and manage multiple capabilities" (Lawson and Samson, 2001, p. 380), and that firms that possess these capabilities "have the ability to integrate key capabilities and resources of their firm to successfully stimulate innovation" (Lawson and Samson, 2001, p. 380).

A recent bibliometric study presented by Narcizo et al., (forthcoming) reveal a total of number of 19 different definitions of 'innovation capability' that are frequently cited, and conclude that the current understanding of innovation capability is s fragmented that it is

difficult to suggest a unified definition based on the 19 current definitions. Moreover, different categories of innovation capabilities have been suggested in the literature. Lawson and Samson (2001), for example, suggest that innovation capabilities consist of seven elements (vision, competence base, organizational intelligence, creativity, idea management, organizational structures, culture and climate, and management of technology), while Terziovski (2007) suggest that the main elements of innovation capabilities are collaboration and knowledge transfer. In addition, den Hertog et al. (2010) identify six dynamic service innovation capabilities (signaling used needs and technological options, conceptualizing, (un-)bundling, (co-) producing and orchestrating, scaling and stretching, and learning and adapting). Consequently, different approaches to innovation capability emphasize different dimensions in the definitions of the concept. This variation 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.

3 A contingency perspective on innovation capability

Several authors have suggested that innovation capabilities are dependent upon context. Francis (2000), for example, 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, we may expect that a number of contingency variables affect the type of innovation capabilities that are required. Contingency variables that has received particular attention in recent innovation capability literature include industry (e.g., Forsman, 2011), geographical area or region (e.g., Guan and Ma, 2003), firm size (e.g., Keskin, 2006) and innovation type (e.g., den Hertog et al., 2010).

However, as indicated by Lidiija and Robert (2014) there is still a pressing need to clarify what type of capabilities that are required in different contexts. We particularly miss an explicit discussion of how different combinations of two contingency variables that has been found to be rather fundamental in innovation management as well as strategic management studies, i.e. the degree of novelty and the market characteristics, affect what innovation capabilities that are required.

An established way to classify innovation is to distinguish between different degrees of novelty (Dewar and Dutton 1986). On one side of the continuum we find incremental

innovations in the form of minor improvements of existing products, services or processes (Ettlie 1983). On the other side of the continuum we find radical innovations in the form of considerable transformations of existing products, services or processes (Chandy and Tellis 2000). Results of empirical studies indicate that the radical innovation processes are different from more incremental innovation processes (e.g., Sandberg & Aarikka-Stenroos, 2014). These differences also affect the innovation capabilities required. In other words; we can expect that the 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. Subramaniam and Youndt 2005, Forés and Camisón 2016).

Several studies have also suggested that innovation processes are affected by the market characteristics (Carbonell and Rodriguez, 2006). The idea that the market characteristics affect what a firm should focus on is also very present in the strategic management literature. In fact, this idea is at the very core of the DCV since Teece et al. (1997) wanted to build a theory explaining how firms can achieve sustained competitive advantage in dynamic and rapidly changing market environments, as opposed to RBV that, according to Teece et al. (1997), was only able to explain how firms can achieve sustained competitive advantage in static market environments. 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. The findings of Carbonell and Rodriguez (2006) for example indicate that innovation speed is contingent on the level of market uncertainty. The empirical research literature in this area is however fragmented, and it is not easy to perceive an overview of how the required innovation capabilities vary between different market characteristics.

Moreover, an explicit discussion on how different *combinations* of the two contingency variables affect what innovation capabilities that are needed is, to our knowledge, not readily available in the extant research literature, and we aim to address this knowledge gap conceptually in the current paper.

If we cross the two contingency variables (innovation novelty and market characteristics) four different contexts emerge as illustrated in figure 1.

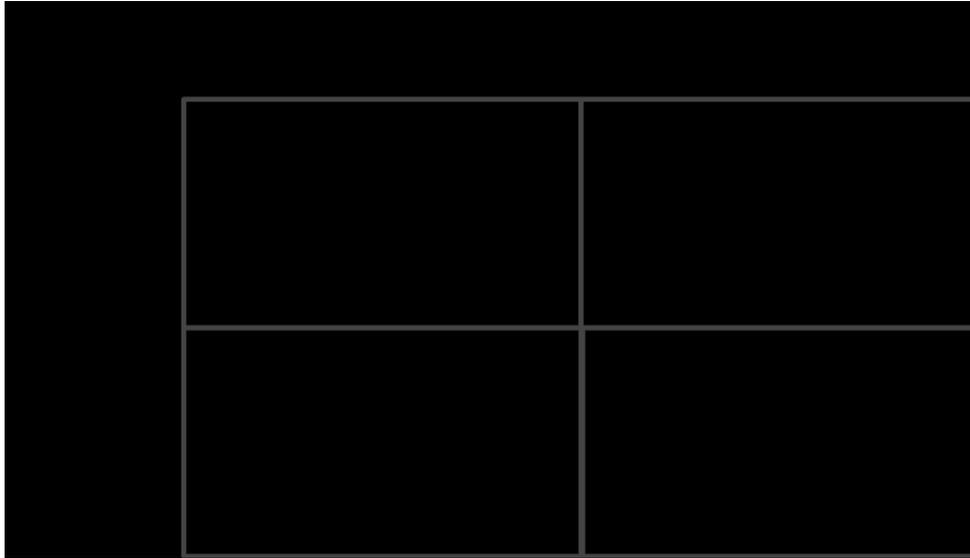


Figure 1: Four contexts for innovation capability based on the degree of innovation newness and the market situation

The four contexts emerging are: 1) In the first context, the market is static and the firm is aiming to carry out incremental innovations. 2) In the second context, the market is static and the firm is aiming to carry out radical innovations. 3) In the third context, the market is changing and fast moving and the firm is aiming to carry out incremental innovations, and 4) in the final context, the market is changing and fast moving and the firm is aiming to carry out radical innovations. We now discuss what types of innovation capabilities that may be required in the four different contexts.

3.1 Context 1 – Static market and incremental innovations

The market environment in this context is static and consequently the firm does not need to search for opportunities outside its existing market. Innovation in this context is all about improving the products and services the firm already delivers to its customers, as well as improving the production process associated with these products and services. To be able to do this the firm needs to understand how existing customers perceive the services and products and to what degree existing production processes are efficient. Knowledge both in the form of organizational capital and in the form of social capital are needed in these processes (Subramanian and Youndt, 2005).

Here organizational capital refers to “institutionalized knowledge and codified experiences residing within and utilized through databases, patents, manuals, structures, systems and processes” (Subramanian and Youndt, 2005, p. 451). This type of knowledge is perhaps in particular needed to improve the production processes, but may also be relevant when existing products and services are improved.

3.2. Context 2- Static market and radical innovations

The market environment in this stable and the firm is aiming to carry out radical innovations. Innovation in this context is all about radical innovations, being able to offer entirely new services and products or identify entirely new market opportunities. To be able to do this the firm needs to rely on R&D to develop an entirely new offer to the market. Traditional marketing research might not suffice since the potential customers have no experience with the planned offer, however the firm might rely on design thinking (Lockwood 2010, Kimbell 2011, Brown 2009) principles and encourage customer-centricity in the innovation and development project to allow for early feedback and experiences from the market. The core innovation capabilities in the second context are associated with the firm’s ability to build, buy or source ‘advanced’ resources and exploit them.

3.3 Context 3 – Fast moving market and incremental innovations

The market environment in this context is unstable and fast moving fast moving and the firm is aiming to carry out incremental innovations. Consequently, the firm needs to align its products and services to the rapidly changing external market conditions. However, innovation in this context aims at incremental changes to offer improvements to existing products and services and to maintain the current market. The core innovation capabilities in the third context are associated with the firm’s ability to combine learning from experiences with an ability to reconfigure and change existing resources (which may be referred to as dynamic capabilities according to Teece, 1997, 2014).

3.4 Context 4 – Fast moving market and radical radical innovations.

The market environment in this context is fast moving and consequently the firm needs to align its products and services to the rapidly changing external market conditions. Innovation in this context is all about radical innovations, being able to offer entirely new services and products or identify entirely new market opportunities. To be able to do this

the firm needs to adapt is technical fitness to what competitors do and to changing preferences of customers (Helfat et al. 2007). This is the context that closest resemble the notion about high velocity markets (Eisenhardt and Martin 2000) and rapidly changing markets as recorded in extant dynamic capability literature. The core innovation capabilities in the fourth context are associated with the firm's ability to combine building, buying or sourcing of advanced resources with an ability to reconfigure and change existing resources.

5 Concluding discussion

This conceptual paper set out to discuss how innovation capabilities are contingent on innovation novelty and market characteristics, by addressing the following research question: *How do innovation novelty and market characteristics affect what innovation capabilities that are required to carry out successful innovation processes?*

By discussing how innovation novelty and market characteristics affect the innovation capabilities required, the paper contributes considerably to our knowledge on what innovation capabilities that are required in different contexts. In addition we contribute with increased understanding of how innovation capabilities are related to dynamic capabilities. Nevertheless, the conceptual nature of the study has limitations and further empirical research is needed to verify if the conclusions of the discussion may be observed a real business environment.

The conclusions reported in the paper also provide considerable assistance to managers searching for better ways to manage their innovation capabilities. They should, however, be used with some caution due to the conceptual nature of the study.

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