Strategic capability development within product innovation:  
A critical analysis of literature

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ABSTRACT

Strategic capability development basically discusses renewal of organisational capabilities into the capabilities which are sources of competitive advantage. This process helps to renew firm’s sources of competitive advantage in dynamic business environment as main concern in the field of strategic management. Strategic fit theory can be extended through strategy-as-practice perspective to better understanding of strategic capability development. Literature points to the roles of knowledge integration within product innovation in evolving organisational capabilities toward a fit with environmental requirements. Accordingly, this paper develops conceptual propositions for strategic capability development through knowledge integration within product innovation. The outcome propositions contribute to development of a strategic framework for effective capability development based on the internal and external contingents to sustain firms’ competitive advantage.

Key words: dynamic capability, competitive dynamics, strategy process, knowledge management, new product development and integration

INTRODUCTION

The field of strategic management is basically concerned with firm’s sources of competitive advantage which is a vital factor for firms’ survival. However, in today’s rapidly changing business environment, the sources of competitive advantage change faster and faster. Scholars within the field of strategic renewal argue that firms should renew themselves in order to adapt to environmental changes (Danneels, 2002; Floyd & Lane, 2000). Within resource-based view, it has been generally accepted that organisational capabilities are sources of competitive advantage but for a limited time and if not be renewed the firms’ competitive advantage will be eroded over time (Leonard-Barton, 1992; Tripsas & Gavetti, 2000). Accordingly, strategic renewal refers to renewing the resources and capabilities of the firm (Grant, 1996b; Helfat & Peteraf, 2003; Spender, 1996).

On the other hand, strategy has been defined in different schools of thought with emphasis on either content or processes (Mintzberg 1999). However, strategic fit theory discusses that firms’ strategy is to match and align their resources and capabilities and, hence, contains both content and processes of strategy. In fact, strategy is formulated based on internal and external factors and is
implemented based on fitting organisational resources and capabilities with environment. Consequently, the concept of strategy can be enhanced through strategic fit paradigm. While studies about strategic fit are occupied by quantitative studies to test the impact of match between strategy and environment on performance, it has been less subject of research that how the match between strategy and environment is actually achieved. This problem has been pursued generally under the area of strategy dynamic specifically dynamic capability. Dynamic capability theory argues that this match is achieved through integration of internal and external capabilities.

However, the focus of this theory has been only at organisational level and paid less attention to the organisational processes which are underlying mechanisms for integration and development of capabilities at organisational level. This argument is aligned with recent movement of strategy-as-practice approach which emphasises the importance of the interaction between process and organisational level factors. It is also aligned with argument of one of the most cited articles by Eisenhardt and Martin (2000) that some organisational processes like product innovation are actual dynamic capabilities which integrate and develop organisational capabilities. However, within the studies of strategy-as-practice it has not yet been argued that how organisational processes can renew organisational capabilities to what is required by environment. This notion has been called within this paper as strategic capability development. In this regard, literature points to the role of knowledge integration within product innovation in capability development based on environmental requirements.

This paper is aimed at analysing the role of knowledge integration within product innovation in competitive capability development in order for building a better understanding of strategic capability development considering based on the impact of internal and external factors. Four areas of literature have been identified being related to strategic capability development based on knowledge integration within product innovation. These areas includes dynamic capability, ambidexterity, knowledge integration and product innovation. Accordingly, this paper critically analyses the relevant literature of strategic capability development and synthesises them to develop conceptual propositions which would have a strong intuitive and conceptual appeal, and are amenable to quantitative verification.
LITERATURE ANALYSIS

This section reviews the areas in the literature which is related to strategic capability development and clarifies the role of each field in understanding strategic capability development. Then these areas will be synthesised based on contingency theory to develop conceptual propositions regarding strategic capability development through knowledge integration within product innovation.

Dynamic capability

The resource-based view argues that firms which have resources that are valuable, rare, inimitable, and non-substitutable (VIRN attributes) can achieve sustainable advantage (Barney, Wright, & Ketchen, 2001). However, competitive advantage of firm is continuously eroded by competitors and the distribution of resources within an industry is changing (Jacobides & Winter, 2005). Hence, sustaining competitive advantage overtime is a different problem than gaining it. Some scholars believe that knowledge is the most strategic significant resource of a company and heterogeneous knowledge bases among firms are the main determinants of sustained competitive advantage and superior performance (Grant, 1996c; Spender, 1996; Zack, 2002). From knowledge-based view, firms evolve their knowledge base in order to update their competitive advantage with the changing requirements of the environment.

On the other hand, according to evolutionary theory (Nelson & Winter, 1982) the resource and capabilities which are sources of competitive advantage are path dependent. In this view, the distinctive competence is result of evolution of past capabilities of the organisation (Dosi, Nelson & Winter, 2000). Based on evolutionary theory, dynamic capability is the ability of the firm to change its capabilities to what environment requires based on combination and recombination of firm’s existing capabilities and new capabilities. Based on this line of argument, zollo and Winter (2002) also defined capability development as evolution of organisational routines through cyclical evolution of organisational knowledge. Some scholars argued that capability evolution is in form of exploration (Rosenkopf & Nerkar, 2001) while others proposed that capability development is in the form of
exploitation (Danneels, 2007). In line with Gupta et al. (2006), this study will be based on the assumption that the learning process of capability exploration is different from learning process of capability exploitation.

**Ambidexterity**

March (1991) argued that balancing exploration and exploitation is a primary factor for the survival of the firm. Gupta et al. (2006) argued that there are two possible assumptions for balancing exploration and exploitation. One assumption is “continuity” which refers to the situation where exploration and exploitation are balanced independent to each other. In this situation, firm can employ high levels of both exploration and exploitation simultaneously. However, orthogonality balancing considers exploration and exploitation as two ends of a continuum where increasing one means decreasing another one. In fact, the balance between exploration and exploitation can be achieved either simultaneously or sequentially.

In fact, achieving balance across both dimensions is based on another type of balance which is between environment and organisational processes. Gibson & Birkinshaw (2004) referred to this later balance as a balance between “adaptation” and “alignment” and argued that ambidexterity is achieved through establishing this type of balance. Based on strategic fit, these two balances refer to “fit as moderator” and “fit as match” (He & Wong, 2004). This idea matches with contingency theory where effectiveness is based on balancing differentiation and integration (Lawrence & Lorsch, 1967). While fit as moderator is achieved through differentiation, fit as match is achieved through integration.

**Product innovation**

Within product innovation literature there is a stream of research focuses on studying product innovation through resource-based view. Leonard- Barton (1992) argued that organisational capabilities both enable and impede product innovation. In fact, while organisational capabilities can
be source of firms’ evolution, but sometimes organisational core capabilities turn to core rigidities. She argued that firms are faced with the dilemma of both benefiting from potentials through exploitation and harms from dysfunctional performance associated with exploitation. In this regard, Danneels (2002) argued that capability development via product innovation can be explorative and exploitative. In other word, following the innovation strategy, product innovation can be used for exploitation of existing capabilities and exploration of new capabilities (Floyd & Lane, 2000). Hence, capability development can be aligned with different innovation strategies exploration or exploitation within product innovation. Therefore, it seems that product innovation is under influence of some other factors such as innovation strategy. In brief, product innovation which affects capability development through different innovation strategies is affected by industry architecture (Fixson & Park, 2008; Jacobides, Knudsen, & Augier, 2006) and absorptive capacity (Stock, Greis, & Fischer, 2001; Tsai, 2001) through their impacts on innovation strategy. This will be discussed further in below.

**Industry architecture**

The concept of industry architecture recently emerged in the literature from the notion of division of labour and the theories explaining scope of the firms (Brusoni, Jacobides, & Prencipe, 2009; Jacobides, 2006). Williamson (1999) argued that firm’s competences affect its decision on performing an activity in-house or out-house. Teece (1986) established a framework for investigating this issue in context of product innovation. He founded his argument based on appropriability regimes and the concept of co-specialisation to investigate who stands to benefit from innovation. Jacobides et al. (2006) mixed these two ideas of Teece (1986) and Williamson (1999) into a more comprehensive framework. They argued that the pre existing capabilities of a firm determine which approach in product innovation is more beneficial for the firm. In fact, they defined two dimensions of co-specialisation as factor complementarity and factor mobility. Complementarity refers to the superior return to combinations of two or more assets and mobility refers to the number of assets and substitutes that potentially can enter into a combination. They stated that while complementarity in
innovative assets influences the size of the value be bargained over (a bigger share of the cake), mobility influences the bargaining power of the asset holder and thus the division of value (a share of a bigger cake). Changes in these two factors lead to change in industry architecture.

Hence, as a result of co-specialisation and innovation, a new specialised knowledge will be created. Based on the concept of “near decomposability” (Simon, 1981), the knowledge base of an industry can be conceptualised as a collection of specialised clusters of knowledge with a level of interdependencies among them. The level of interdependencies among them indicates the tacitness and the complementarity between knowledge clusters. When new specialised knowledge is established as a result of innovation, the interdependencies and degree of complementarity among knowledge clusters will differ because of change in factor mobility and factor complementarity (Jacobides, Knudsen, & Augier, 2006). Hence, integration and specialisation which change the distribution of capabilities across the industry changes transaction cost and a new round of knowledge and capability development will start (Jacobides & Winter, 2005).

In brief, following the argument that division of task labour is different from division of knowledge labour (Brusoni, Prencipe, & Pavitt, 2001; Dibiaggio, 2007), it has been argued that change in division of labour affects capability development and as a result division of knowledge among industry participants (Takeishi, 2001; Cacciatori & Jacobides, 2005; Jacobides & Winter, 2005).

Absorptive capacity

Cohen and Levinthal (1990) defined absorptive capacity as “the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends”. They argued that the basic antecedents of absorptive capacity is prior knowledge and explained it as the related knowledge domains, basic skills and problem solving methods, prior learning experience and learning skills and a shared language. Based on this definition, antecedents of absorptive capacity can be divided into prior related knowledge and internal mechanisms influencing company’s absorptive capacity (Van den Bosch, Volberda, & De Boer, 1999).
The above definition, in fact, refers to the ability of a firm to integrate and utilise knowledge or in other word absorbing the competitive knowledge. Van den Bosch et al. (1999) defined absorptive capacity in form of a knowledge integration capability as comprising evaluation, acquisition, integration, and commercial utilisation of new outside knowledge. Similarly, Zahra and George (2002) argued that absorptive capacity is a dynamic capability of firm to integrate and utilise a competence. On the other hand, Tsai (2001) argued that absorptive capacity is not just a matter of sensing an opportunity because of last R&D experience, but it is more about the ability of a firm to integrate the competitive knowledge into firms’ existing competences. In fact, they argued that some factors like knowledge ambiguity will decrease absorptive capacity of companies. Szulanski (1996) argued that organisational stickiness prevents companies from integrating a competitive knowledge (once it was sensed) across different organisational units.

Lane & Lubatkin (1998) explained that absorptive capacity of a firm in a learning project depends on the similarity and relevance of, first, knowledge base, second, organisational structure and, compensation policies and, third, dominant logic. In fact, they argued that tacitness of the required knowledge is associated with absorptive capacity of a company with regards to that specific knowledge.

_Innovation strategy_

Different types of innovation strategies have been discussed within product innovation literature. These studies cover incremental and radical innovation, component and architectural innovation and product and process innovation. All of these classifications constitute explorative and exploitative intents and can be classified into explorative and exploitative innovation strategies. On the other hand, explorative and exploitative innovations are one of the bases for capability exploration and exploitation within organisations (Katila & Ahuja, 2002; Tushman & Smith, 2002). In fact, at the core of organizational adaptation is a firm’s ability to continue to exploit its current capabilities as well as to explore into future opportunities (March, 1991; Levinthal & March, 1993). While exploitative innovations are based on incremental innovation in firms’ current products, exploratory
innovations are based on the radical innovation and extending firms’ current products into new markets (Abernathy & Clark, 1985; Eisenhardt & Tabrizi, 1995; Venkatraman & Lee, 2004).

Basically, exploitative innovation strategy is based on departing from existing products but explorative innovation strategy is based on departing from existing market (Abernathy & Clark, 1985; Henderson & Clark 1990; Christensen, 1997). Incremental innovation enhances price or performance of current products by local search of an existing technological approach (Benner & Tushman, 2002; Rosenkopf & Nerkar, 2001). However, architectural innovations change the way that components connect together to form a product (Henderson & Clark, 1990; Baldwin & Clark, 2000).

The sustainability of success in a product is based on the capacity of the firm to compete at multiple points of innovation space including exploitative innovation in some points and explorative innovation in other points (March, 1991; McGrath, 1999). However, exploitative and exploratory innovation are associated with fundamentally different tasks and environmental contingencies, different timeframes and search routines (Katila & Ahuja, 2002), and, as such, each requires their own distinct set of roles, incentives, culture and competencies (Bradach, 1997; Siggelkow and Levinthal, 2003; Sutcliffe, Sitkin, & Browning, 2000; Bagahi, Coley, & White, 1999).

Knowledge integration

Grant (1996:37) defined knowledge integration as “integration of specialist knowledge to perform a discrete productive task”. He argued that transferring knowledge is not an efficient way for knowledge integration. From the perspective of the knowledge-based theory of the firm, the main problem lies in assuring the most effective integration of individuals’ specialized knowledge at the lowest attainable cost (Grandori, 2001; Grant, 1996).

Different mechanisms for knowledge integration have been identified so far (Grandori, 2001; Grant, 1996; Zollo & Winter, 2002; Hansen, Nohria & Tierney, 1999). Hence, it is needed to know when each mechanism of knowledge integration is effective. Based on contingency theory, information processing view has highlighted the role of environment on integration mechanisms (Galbraith, 1974). This view can provide a contingency framework for effective knowledge...
integration. For example, Daft and Lengel (1986) extended this idea and argued that in situations of uncertainty coordination requires volume of information which is achieved through reports, plans, etc (codified knowledge). While in situations of equivocal, coordination requires richness of information which is gained through face to face and personal arrangements.

As a contingency framework for knowledge integration, Zollo and Winter (2002) suggested that economizing on knowledge integration rests on task features; that is, the problems to be solved. Their framework provided offers a range of combinations with regard to frequency, homogeneity and causal ambiguity of the task. On the other hand, the approaches of Grant (1996) and Grandori (2001) focus on how different situational characteristics affect the suitability and comparative costs of various mechanisms for knowledge integration.

Rooted in contingency framework and information processing view, Grant (1996) based his arguments on a fit between knowledge integration characteristics with environmental requirements in terms of exploration or exploitation. He undertook knowledge integration as organisational capability and identified three sources of contribution to competitive advantage of the firm including efficiency, scope and flexibility of knowledge integration.

CONTINGENCY THEORY AND SYNTHESIS OF THE LITERATURE

Since organisations differentiate differently based on different situations, accordingly, they will have to integrate differently. Based on the combination of two ideas of balance including balance between “adaptation” and “alignment” (Gibson & Birkinshaw, 2004) and balance between “fit as moderator” and “fit as match” (He & Wong 2004), the mode of integration should fit the type of differentiation. Tushman and Nadler (1978) extended this argument and argued that fit between differentiation and integration is based on a fit between organisational capacities with required capacities based on environmental uncertainty. While within differentiation organisations determine the required capacities, within integration organisations create the required capabilities and capacities. Based on the arguments by Grant (1996), the fit between these two phases can be achieved through fit between characteristics of knowledge integration and requirements of environment in terms of exploration and
exploitation. However, different characteristics of knowledge integration leads to development of organisational capabilities at different levels of organisation (Grant, 1996a; Sanchez & Mahoney, 1996). This argument has been reflected in Figure 1 where the fit between differentiation and integration is conceptualised as a fit between knowledge integration and innovation strategy of product innovation which leads to capability development at different levels.

Furthermore, environmental requirements can be determined based on internal and external factors and in terms of different mixes of exploration and exploitation including exploration/exploitation of internal/external knowledge (Rosenkopf & Nerkar, 2001a; Rothaermel & Alexandre, 2009). On the other hand, exploitation of internal knowledge is more based on organisational boundary spanning and exploration of external knowledge is based on technology boundary spanning (Rosenkopf & Nerkar, 2001). In fact, while it can be predicted that the existence of potential absorptive capacity enhances exploitative innovation strategy and organisational boundary spanning, the existence of realised absorptive capacity enhances the explorative innovation strategy and technology boundary spanning (Zahra & George 2002). Moreover, depth of industry knowledge base enhances technological boundary spanning whereas the breadth of industry knowledge base enhances the organisational boundary spanning (Prencipe, 2000). In addition, while knowledge integration associated with explorative innovation strategy is based on knowledge personalisation, the knowledge integration associated with exploitative innovation strategy is based on knowledge codification (Hansen et al., 1999). In brief, as a result of different knowledge integration associated with different innovation strategies formulated based on internal and external factors, organisational capabilities will be developed at different levels of organisations.

Consequently, the following propositions can be developed based these discussions reflected at Figure 2:

Proposition 1. The relationship between technology boundary spanning strategy and capability development is moderated by depth of industry architecture.

Proposition 2. The relationship between organisational boundary spanning strategy and capability development is moderated by breadth of industry architecture.
Proposition 3. The relationships between different exploration/exploitation innovation strategies of internal/external knowledge and capability development are mediated by knowledge integration mechanisms.

Proposition 4. Different types of knowledge integration mechanisms based on internal and external factors leads to development of capabilities at different levels of organisation.

These hypotheses are amenable for quantitative verification. Testing these prepositions in a large sample from a particular population will create a model for strategic capability development which leads to better understanding of how organisations within that specific population can achieve fit between organisational resources and capabilities with environment through knowledge integration within product innovation.

CONCLUSION

This paper critically analysed sustainability of firms through strategic capability development to better understand how organisational capabilities are developed aiming through renewal of competitive advantage. As argued expanding strategic fit theory contributes to better understanding of how organisational capabilities evolve toward a fit with environmental requirements. It has been found that, industry architecture and absorptive capacity influence capability development at different levels of organisation. In fact, these internal and external factors affect the formulation of innovation strategies within product innovation process which in turn are implemented through different knowledge integration mechanisms which ultimately result in capability development at different levels of organisation. In brief, the analysis of literature regarding strategic capability development reveals the moderating role of industry architecture and absorptive capacity and mediating role of knowledge integration mechanisms at effectiveness of capability development at organisations.
ACADEMIC AND PRACTICAL IMPLICATIONS

Academically, this paper adds to recent attempt for combining dynamic capability theory and ambidexterity theory (Jansen, Tempelaar, Van den Bosch, & Volberda, 2009; O'Reilly & Tushman, 2008; Venkatraman, Lee, & Iyer, 2007) by conceptualising knowledge integration within product innovation process. The conceptual framework developed visualise context specificity of dynamic capabilities and adds to dynamic capability literature by offering a contingency framework for managing dynamic capabilities at micro process level. Similarly, this article advances the extant manufacturing practice-performance research by offering a sound theoretical foundation for the proposition that manufacturing practices have competitive value (Ketokivi & Schroeder, 2004). In addition, it shows how firms can balance exploration and exploitation of their organisational capabilities based on internal and external factors and, hence, contributes to ambidexterity theory. On other hand, it demonstrates how firms can manage two previously identified types of product innovation (component and architectural innovation (Henderson & Clark, 1990)) to create and sustain competitive advantage. It also conceptualises effective knowledge integration based on capability development at different levels of organisation. The contribution of this paper to strategic fit theory is through revealing the impact of internal and external factors on capability development to improve the performance.

Practically, applying a strategy-as-practice approach (Jarzabkowski & Paul Spee, 2009), this paper develops a framework for strategic capability development based on internal and external factors. This framework will guide managers for effective formulation of innovation strategy based on internal and external contingents. Besides, it will also give managers insight on effective implementation of those innovation strategies through employing and selecting the right type of product innovation project and knowledge integration approach. This framework further helps managers to assess the capabilities required at different organisational levels based on evaluation of industry architecture and absorptive capacity of the firm. Hence, it can be a strategic tool and a vital guideline for managers to develop certain types of capabilities as needed for sustaining competitive advantage. Managers can
also assess the type of knowledge and technology that might require including internal/external and new/existing knowledge.

References


Foss, N. Capabilities and the Theory of the Firm.


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**Figure 1**

Linkages among related theories
Figure 2

Strategic capability development based on internal and external factors