Olli-Pekka Kauppila

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HELSINKI SCHOOL OF ECONOMICS
WORKING PAPERS
W-429

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Marketing

May
2007

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WORKING PAPERS
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HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS
PL 1210
FI-00101 HELSINKI
FINLAND

ISSN 1235-5674
(Electronic working paper)
ISBN 978-952-488-148-7

Helsinki School of Economics -
HSE Print 2007

Towards a Network Model of Ambidexterity

ABSTRACT

This paper presents a model of organizational ambidexterity in the context of a network. We create a preliminary model of network ambidexterity by examining its basis at three specific levels. On the most general level, we methodically compare creating ambidexterity within a network to its incorporation into a company by utilizing a network and conclude that incorporation is more feasible. At the second level, we examine innovation processes and conclude that it is more advantageous to run separate explorative and exploitative processes rather than amalgamating the two. At the level of the individual employee, we briefly contemplate how knowledge and learning are linked to different innovation processes within the context of a network. We conclude that the type of knowledge and network partners who hold it vary between different innovation processes.

KEY WORDS: Ambidextrous organizations, competitive strategy, innovation management, networks, organizational learning

INTRODUCTION

Scholars have argued that organizations have two hands; one for conducting the present business efficiently and the other for innovation and creating future businesses. As is well-known, the ability to use both hands to an equal extent is unusual. Most of us work better with the right hand, whereas some cope better with the left one. Applying the concept of handedness metaphorically, an industrial ecosystem that is able to use both hands – efficiency today and renewal for the future – is called ambidextrous (e.g. Tushman and O'Reilly, 1996; O'Reilly and Tushman, 2004; Gupta et al., 2006; Lubatkin et al., 2006). However, even though companies are not constrained biologically, they still experience problems when using both hands. In the business literature, these hands have typically been categorized as falling under the concepts of exploitation and exploration (e.g. March, 1991; Levinthal and March, 1993; He and Wong, 2004; Lavie and Rosenkopf, 2006); exploiting the present and exploring the future (O'Reilly and Tushman, 2004).

Although there may be many possible means by which ambidexterity may be achieved in an organizational setting, only a few viable resolutions to this problem have been introduced. The term 'ambidexterity' was first coined in the business research community by Duncan (1976) as a way of introducing the idea of dual structures into organizations; one arm of the organization focusing on exploitation and the other on exploration. Later, other authors, especially Tushman and O'Reilly (1996; 2004), further developed the idea of an organization that achieves ambidexterity through a specific kind of organizational structure. Moreover, Gibson and Birkinshaw (2004) developed an alternative view of ambidexterity, called contextual ambidexterity. They defined

contextual ambidexterity as the behavioral capacity to simultaneously fulfill both of the conflicting demands in the context of a business unit (Gibson and Birkinshaw, 2004)

In this paper, we will argue that previous models of ambidexterity failed to consider the real environment of innovation, which is networked and may involve several actors beyond the boundaries of the organization (Powell et al., 1996; Möller et al., 2005; Faems et al., 2005). Having established this failure, we construct a contextual model of ambidexterity that acknowledges the role of an innovation network and demonstrates how a company can strengthen its ambidexterity by involving a diverse body of collaborators in its innovation processes.

The primary purpose of this paper is to introduce the concept of network ambidexterity and present the seven propositions that define its basic import. Our main conclusion is that although the network is a major driver and facilitator of ambidexterity, it is more advantageous to create ambidexterity in companies, not in the network. By this, we do not mean to imply that companies themselves *must* be ambidextrous; rather, we wish to claim that companies should *be capable* of creating ambidexterity, which can then be enjoyed by company and collaborators alike. If a network tends to lean too much in one direction, a company should be capable of rectifying this imbalance through multiple networks. Furthermore, the optimal level of the two orientations that constitute ambidexterity is formed by creating separate explorative and exploitative innovation processes. Uniting the two orientations within a particular process leads to a suboptimal balance, thereby adversely affecting a company's efficiency. Finally, we claim that the dynamics of knowledge acquisition and learning are dissimilar in the two orientations of

exploration and exploitation, and that this dissimilarity greatly influences the types of partnership in which the company should engage itself.

The remainder of this paper is organized as follows. In the next section, we review the literature on ambidexterity. Thereafter, we investigate ambidexterity in a network context at three levels of action. This will enable us to present seven propositions for defining a preliminary model for network ambidexterity. We conclude by suggesting avenues for empirical research.

ESSENTIALS OF AMBIDEXTERITY

In 1954, Drucker (p. 37–38) wrote that there is only one valid definition of the purpose of business: to create a customer who determines the type of business and to keep that customer. Since then, business scholars have focused on resolving the actual content of this definition. Drucker himself stated that marketing and innovation are the only basic functions of an enterprise, where he refers, not to functional *departments*, but to the *dimensions* of a business. Berthon et al. (1999) extended Drucker's writings, stating that the creation of the customer is concerned with innovation and creating attractive products and services. The underlying logic of this notion is that customer needs and wants arise when existing and potential customers become familiar with the offerings of innovative creators, sometimes called forerunner companies (Christensen, 1997). Besides creating a customer, companies want to keep them. This desire highlights the needs, wants, and values of the customer, with the company's products and services playing the subsidiary role of satisfying the customer (Berthon et al., 1999, p. 39). Marketing capabilities and being close to the customer are essential for becoming and

staying informed about customer needs and preferences (Vandenbosch and Dawar, 2002; Slater and Narver, 1995, p. 68; Gupta and Rogers, 1991, p. 63–64).

Drucker's (1954) definition of the purpose of business, and the subsequent elaborations of the content of that definition, are closely related to the concepts of exploitation and exploration. March (1991) defined exploration in terms of search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. From this, but a small step is required to conclude that exploration will lead to the creation of a customer. In the same work, March defined exploitation in terms of refinement, choice, production, efficiency, selection, implementation, and execution, all of which are employed in the exploitation of current customer domains.

A similar dichotomy has arisen in market-orientation discussions. Among others, Jaworski et al. (2000) and Kumar et al. (2000) noted the difference between driving the market and being driven by the market. *Driving* the market is associated with innovation and exploration, whereas companies that are market-*driven* exploit their current markets and are close to their current customers. Of course, these comparisons are oversimplifications of entire fields of research and there are, in fact, many differences between, for example, the concepts of exploitation and being market-led. However, generally speaking, we hold that these comparisons are feasible and concern different perceptions of the same basic phenomenon.

We prefer to use the term 'reactive and proactive business logics' instead of 'exploitation' and 'exploration' when referring to the strategies or orientations of companies toward markets. This is because the terms 'exploration' and 'exploitation' usually describe patterns of behavior (Gibson and Birkinshaw, 2004), approaches to

learning (He and Wong, 2004; March, 1991), or capabilities within the firm (Atuahene-Gima, 2005). In the context of the present paper, we use the terms ‘reactive and proactive business logic’ to mean the embracing of more strategy- and marketing-centered activities, such as orientation toward a customer and other organizations, innovation management, and competitive strategy. We use the terms ‘exploration’ and ‘exploitation’ whenever capabilities, learning, behavior, and other organizational issues are discussed.

Several authors (e.g. McDonough and Leifer, 1983; March, 1991) contend that companies need to balance reactive and proactive business logics to achieve long-term prosperity and to remain competitive in their current markets. The results of empirical research support this contention (e.g. Deshpandé et al., 1993; Han et al., 1998; O’Reilly and Tushman, 2004). Nevertheless, several researchers have realized that combining reactive and proactive business logics within an organization is problematic. In fact, Porter (1996) and many others have stated that there is no feasible solution and that companies are better off relying on unique positioning. March (1991, p. 72) wrote that improving one of the business logics hampers the development of the other, whereas actions taken towards orientations tend to be self-reinforcing. O’Reilly and Tushman (2004) actually described ambidexterity as one of the toughest challenges that managers ever have to face.

Floyd and Lane (2000) noted that exploration and exploitation entail contradictory processes regarding the use of knowledge. The intent of exploitation is to respond to current environmental conditions by involving the use of explicit knowledge bases, whereas exploration aims at driving latent needs by means of tacit knowledge bases. These knowledge processes are contradictory because they tap into different

administrative routines and managerial behaviors (Lubatkin et al., 2006). Existing models, including institutional and social practices, affect the ability to see things in new ways (Brown 2004, p. 146). Even core capabilities that once contributed to the prestige or eminence of a firm may stagnate and become rigid, thereby inhibiting innovation and change (Leonard-Barton, 1992). Focusing too much on the current needs of existing customers circumscribes radical innovation, augments inertia, and may eventually cause major firms to fail (Christensen, 1997). For these reasons, companies should not refrain from exploring by simply maintaining their current capabilities and customer base.

On the other hand, innovation without commercialization, and market creation without exploitation, will invariably result in bankruptcy. In this regard, Vandenbosch and Dawar (2002) have pointed out that lowering costs and reducing the risk that customers will experience when buying the product are the only available levers for companies to influence purchasing decisions. To summarize thus far, both exploration and exploitation are essential for companies. Furthermore, by virtue of the differences in their intrinsic characteristics and thus, the requirement of dissimilar orientations toward markets, there is a need for distinct processes for acquiring and using knowledge, distinct managerial practices, and multiple organizational cultures and structures (McDonough and Leifer, 1983; Katila and Ahuja, 2002; O'Reilly and Tushman, 2004).

Since the classical statement of the puzzle, many solutions have been proposed by researchers in various fields of business research. Marketing researchers have emphasized the importance of market orientation and, in particular, interfunctional coordination (Narver and Slater, 1990; Gatignon and Xuereb, 1997; Atuahene-Gima, 2005). Furthermore, Slater and Narver (1995; 2000) proposed that organizations also

needed an orientation towards entrepreneurship to promote adventurism, aggression, and innovation. Narver et al. (2004) argued that market orientation was understood too narrowly, in that encompassed only its reactive side and ignored proactive market orientation. They defined proactive market orientation as satisfying the latent needs of customers by leading them instead of responding to their expressed needs and wants. Some marketing researchers have searched for a solution from studies on market information processing and organizational learning (Baker and Sinkula, 1999; Slater and Narver, 1995). For example, Glazer (1991) suggested that the more information intensive the firm, the better it is able to combine reactive and proactive strategic objectives within its businesses. Darroch and McNaughton (2003) went so far as to introduce the term 'knowledge management orientation' to describe the ability of a business to utilize both reactive and proactive orientations. Moreover, they even proposed that market orientation is a subset of knowledge management orientation.

In addition to researching learning and knowledge management, organization and management researchers have studied organizational structure and strategy (Leonard-Barton, 1992; Katila and Ahuja, 2002). For example, DeSanctis et al. (2002) searched for an ideal research and development (R&D) structure for ambidextrous-like companies. As a result, they suggested a mixed mode of R&D that targets some products but aggressively seeks new opportunities and other areas for business. In the field of strategic management, Berthon et al. (1999; 2004) proposed a particular interact-strategy to resolve the dilemma of combining the two orientations. The idea behind the interact-strategy is to establish dialogue between the market and innovation. It is a similar construct to that of market knowledge competence, which was introduced by Li and

Calantone (1998). In addition, the well-known typology of Miles and Snow (1978) identified four strategies of which one, analyze-strategy, addressed the question of ambidextrous abilities. Finally, the literature on ambidextrous organizations that uses this precise term is possibly the most important source for seeking solutions to the puzzle.

Duncan (1976) noted the paradox that an organization has to be strategically responsive to external events in order to make major changes, yet carry out its activities in the most efficient manner. His solution was that ambidextrous organizations should be created that are able to use different structures for innovations, and phases of innovative processes, as they are required. However, he did not specify what these ambidextrous organizations would actually look like. In 1996 and 2004, Tushman and O'Reilly re-examined the topic and found that the most efficient way the companies can manage their different orientations is through dual structures. The rationale behind their idea was to distinguish between these two totally different business cultures, thereby preventing each from disturbing the other.

Structurally ambidextrous companies, as described by Birkinshaw and Gibson (2004), are independent at the operational level but integrated at the top management level. O'Reilly and Tushman (2004, p. 79) explained that ambidextrous companies *'establish project teams that are structurally independent units, each having its own processes, structures, and cultures, but are integrated into existing management hierarchy.'* They proposed that structural independence ensures that distinctive processes, structures, and cultures of the exploratory units are not overwhelmed by the forces of exploitative culture. At the same time, the established units can continue to focus on serving current customers and running efficient business processes without the distraction

and pressures of launching new businesses. However, distinct from unsupported teams and totally independent new business units, the units of the ambidextrous companies are tightly integrated at the managerial level. Tight coordination and top management integration are as vital for ambidexterity as detachment at the business unit level. This is because top-level coordination allows cross-fertilization and resource sharing across units and is essential for the viability of both hands. While individual employees are protected from the conflicting demands of exploration and exploitation, personal ambidexterity is expected from top managers. Senior management is responsible for supporting a common vision and pushing an entire company towards ambidexterity. (Tushman and O'Reilly, 1996; O'Reilly and Tushman, 2004.)

Different to what has just been discussed, Gibson and Birkinshaw (2004) presented a version of ambidexterity such that it should be present in the mind of each employee rather than in the structure of an organization. The behavioral capacity to respond simultaneously to the two conflicting demands of exploration and exploitation across an entire business unit is called contextual ambidexterity. Gibson and Birkinshaw criticized structural ambidexterity on two grounds: separation can lead to isolation and arrangements based on the structure are top-down by their nature, as managers determine how the employees should spend their time between one set of activities and another (Birkinshaw and Gibson 2004). Lubatkin et al. (2006) agreed with Gibson and Birkinshaw, demonstrating that integrating the behavior of top management teams suffices to create ambidexterity and structural separation of the business units is, at least in small companies, unnecessary.

Furthermore, the Gibson and Birkinshaw (2004) added to the discussion regarding organizational learning by using four behavioral attributes – discipline, stretch, support, and trust – of Ghoshal and Barlett (1994) to create an organizational context. These four attributes shape individual and collective behaviors that, in turn, uphold the creation of contextual ambidexterity. When taking this approach, they advocated that much greater attention should be paid to the human side of the organization (Birkinshaw and Gibson 2004). Their conclusion concurs with that of O'Reilly and Tushman (2004), who stated that senior executives play a critical role in allowing, creating, and nurturing ambidexterity.

A NETWORK MODEL OF AMBIDEXTERITY

The two models of ambidextrous organizations described above have certain limitations. Probably the most striking drawback is that from the perspective of innovation management, models do not take into consideration the real environment in which innovative activity takes place. Hence, the models do not provide an adequate perspective for managers. As Möller et al. (2005, p. 1274) noted, mastering all relevant value-creating activities, from product innovation to customer care, is too heavy a burden even for the major multinationals. Accordingly, an enormous part of these activities is carried out cooperatively with organizations and individuals that operate beyond the company's boundaries. Numerous investigators (e.g. Teece, 1992; Powell et al., 1996; Baum et al., 2000; Gloor, 2006) have supported the opinion of Möller and his colleagues regarding the importance of networks for innovation and the value-creating activities of modern companies. In view of this, it would be counterproductive to focus solely on structures and activities inside the company.

Appreciating the role of networks in innovation activities entails a whole new array of competencies that management must consider. When analyzing one's own organization in isolation, it will probably seem obvious that there must be employees working proactively, employees with a reactive mindset, or employees capable of both. However, if we propose that a company itself is only one actor in an innovation process that has multiple actors that can exist outwith the boundaries of the company, it is not so obvious that both mindsets need to be present in a single company. It could be argued, for example, that a company can concentrate internally on exploitation only and, at the same time, embark upon exploration in concert with its business partners. Alternatively, a company may focus solely on exploration, as long as it is able to find partners for exploiting.

In what follows, we will examine issues concerning three central themes associated with the concept of network ambidexterity:

- Theme 1. The structural level at which ambidexterity is to be introduced and balanced. We compare two possible levels: that of the organization and that of the network.
- Theme 2. Innovation processes and balance. We consider whether it is better to achieve balance within the explorative and exploitative innovation processes separately, or between the two processes taken together.
- Theme 3. Individuals and balance. We consider how individuals inside and outside the company might implement, and balance, exploratory and exploitative innovation processes. Our primary focus here will be on the role of knowledge and learning.

Ambidexterity and structural level

Many researchers have maintained that an organization should balance its reactive and proactive orientations toward customers and engage in both exploitation and exploration over a long period. Note that on this view, the unit of focus is the *organization*; it is this that needs to be ambidextrous. For example, Tushman and O'Reilly (1996; 2004) considered that the company is an appropriate level for ambidexterity to be instantiated. This thought has been adopted by a range of other authors, including Benner and Tushman (2003), He and Wong (2004), and Lavie and Rosenkopf (2006). Gibson and Birkinshaw (2004), while maintaining that the organization should be ambidextrous, propose that this should be achieved by each individual employee demonstrating ambidexterity.

Gupta et al. (2006) proposed that, if it is accepted that innovation occurs in social systems broader than a single firm (Powell et al., 1996; Pittaway et al., 2004), it could be argued that the balance between exploitation and exploration is also a matter that concerns a broader social system. As their proposal suggests, some companies could specialize in exploiting while others could focus on exploring, provided that a balance is maintained at the network level. However, they noted that there are certain preconditions that must be met before ambidexterity can function at network level. A company that specializes in exploration should operate in a highly dynamic environment, whereas one that specializes in exploitation operates best in very stable environments. In addition, the two organizations need to collaborate to control the usage of complementary resources and the degree of co-specialization should be low.

Although these ideas on network-level ambidexterity appear intuitively sensible, there are some potentially serious pitfalls that call into question their feasibility. To begin with, there is no substantive difference between structural ambidexterity as proposed by Tushman and O'Reilly (1996) and network-level ambidexterity when companies specialize in different orientations. This similitude exposes the idea of network-level ambidexterity to the same criticisms regarding coordination and inflexibility that have been leveled at structural ambidexterity (Gibson and Birkinshaw, 2004). Moreover, one great difference that does exist, namely, difference in the structure of ownership at the single-firm level and the network level, which makes ambidexterity at the network level even more difficult to achieve from the perspective of management.

Consider the situation of a company that innovates in a network context along the lines proposed by Gupta et al. (2006) (Model A, Figure 1), to illustrate some of the drawbacks of this type of ambidexterity. The interest of shareholders in a company lies at the company level, because it is the company that pays dividends and issues the shares that can be traded with other investors. Initially, the main reason for developing ambidexterity was to ensure the long-term feasibility of a company in order to guarantee the present and the future dividends for its owners. However, if ambidexterity is a property of the network, such that it is the network is ambidextrous and the companies within it serve only as component parts of that ambidexterity, the focus is on the network and on its survival. To shift the focus of value in this way from the company to the network is hardly in the interest of any individual company or its shareholders, because there is no guarantee that all individual companies are always valuable from the network's perspective.

Of course, it could be argued that the well-being of the network as a whole would have beneficial consequences for individual companies, perhaps because the network as a whole should aim for the common good and tolerate also its less fortunate parties. However, this is an issue of certain kind of welfare system that awaits resolution. Since limitations of space prevent us from exploring this issue further, we shall work on the assumption that all companies are probably better off acting in their own self interest, because an individual company does not benefit directly from the well-being of the social network system.

Researchers in marketing and strategic management, such as March (1991) and Berthon et al. (1999), commented that reactive orientation advances predictable, proximate and profitable returns, whereas proactive exploration frequently yields only uncertain, distant and even negative payback. Thus, it very unlikely that companies would voluntarily enter into such relationships if they had to forego all types of opportunism and even risk their survival at the expense of other companies. This insight also receives support from researchers who have found that owners of for-profit organizations are more concerned about generating profits than meeting their organization's missions (D'Aunno et al., 2000). Hence, if a company becomes unprofitable, old functions, missions, and goals are rapidly abandoned and replaced by new, more profit-oriented initiatives.

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INSERT FIGURE 1 ABOUT HERE

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However, there is another form of network-level ambidexterity that we consider more appropriate and manageable in practice. In model B (see Figure 1), we describe a type of network ambidexterity that is created via the collaboration of companies, each of which is itself ambidextrous. The difference between model A and model B is that in model A, companies make the network ambidextrous by taking on different burdens with respect to exploitation and exploration, whereas in model B, the companies make each other ambidextrous by using the network. This difference arises from the different underlying assumptions of the models. Model A is based on Tushman and O'Reilly's (1996; 2004) idea that the two orientations disturb each other to the extent that the system would be more effective if they were separated at the operational level. Model B is based on Gibson and Birkinshaw's (2004) proposal that individual employees should embody ambidexterity, which individual embodiment would then manifest itself at the level of the organization. Nonetheless, at the network level of Model B, this difference in assumptions becomes irrelevant because by employing each other's and outside resources, companies do not face problems in orientations disturbing each others as different actors are separately located maintaining the distance that is considered the most appropriate in any particular situation.

In the network level, we conclude that the ambidexterity described in Model B is superior to the ambidexterity of Model A because it enables the positive combinations of ambidexterity fostering structural and behavioral attributes while shunning the potential pitfalls inherent in Model B and the previously-mentioned non-network models. In Model B, companies run both proactive and reactive processes cooperatively with other companies in their business networks. A certain amount of exploratory and exploitative

activity originates from the company in question, and the residual amount is sourced from the network. This model is consistent with the real world, in which companies utilize suppliers, customers, consultancies, partner companies, universities, and research centers in their innovation and business processes (Von Hippel, 1988; Pittaway et al., 2004; Faems et al., 2005).

We are now in a position to introduce the following proposition:

Proposition 1 Companies make each other ambidextrous by supplementing each other's and outside knowledge and other resources.

We consider that companies can balance their different orientations by employing different networks of value creation and innovation. Möller et al. (2005) identified three different types of business networks, which differ from one another in the way that they facilitate the proactivity of value and innovation. Since we are not discussing businesses that emphasize non-innovative cost-efficiency (see, e.g. Möller et al. 2005 'core value production'; Berthon et al., 1999 'isolate-strategy'; Treacy and Wiersema, 1993 'operational excellence-strategy'; Porter, 1980 'cost-leadership-strategy'), we will only focus on two of the three network types of Möller and his colleagues (2005). *Value-adding relational value production* is a type of network that facilitates incremental innovation. It facilitates the exploitation of current markets, while at the same time aims at continuous change and improvement. The second type of network, *future-oriented value production,* promotes radical innovation and the exploration of new business opportunities, such as the development and commercialization of new technologies, products and businesses. Finally, Möller and his colleagues suggested that a business network may encompass at least two value-system types (Möller et al., 2005, p. 1275–

1277.) Hence, it is possible, and sometimes even to be expected, that a particular company will source both explorative and exploitative knowledge and other resources from a business network. However, firms that are independently capable of generating a sufficient level of either exploitation or exploration, tend to only seek the missing element from their collaborators. We now present our second proposition:

Proposition 2 (A) Firms employ networks to supplement their capability to explore and exploit simultaneously. (B) Firms use two types of networks. The first is for enhancing current business and incremental innovation and the second for enhancing future business and introducing radical innovation. (C) This may happen through one stretched business network or through multiple networks.

Ambidexterity within and between innovation processes

This subsection addresses whether it is possible to amalgamate exploitative and explorative orientations within a particular innovation process, or whether such amalgamation is only possible at the level of the company or business unit. Duncan (1976) argues that the initial process of an innovation is more proactive and thus requires exploration. This contrasts with the implementation and more exploitative stage that functions better with formal and centralized structures. Accordingly, an organization should use different structures for initiation and implementation, thereby making a clear distinction between the two activities. In such circumstances, there is a great need to remove complexity and ambiguity from the system as the innovation process proceeds from initiation to implementation. Subsequently, others such as Rothaermel and Deeds

(2004) adopted this method for linking explorative alliances to R&D and exploitation to marketing activities. O'Reilly and Tushman (2004) present a different opinion, stating that each orientation should have its own process with separate structures and distinct cultures. The crucial difference between the proposal of Duncan and that of O'Reilly and Tushman is that Duncan proposes ambidexterity within processes, while O'Reilly and Tushman favor ambidexterity between the processes.

The latter view is in line with the contingency theory of organizations and emphasizes the importance of fit between an organization, its environment and strategy (Lorsch, 1977; Luthans and Stewart, 1977). According to contingency theory, a company that pursues an exploitative strategy is expected to operate in relatively stable environments. Thus, it is doubtful whether the initial, explorative orientation of the innovation process would generate results that would comply with the strategy and the markets. Rather, it can be anticipated that incremental innovations, which are intimately customer-oriented from their outset until the end, would be much more appropriate (Naman and Slevin, 1993). Similarly, companies that pursue an explorative strategy in turbulent environments are unlikely to adopt exploitative measures and formal, centralized structures when implementing radical innovations.

In reality, companies do not perceive their business environments simply as turbulent or stable, but rather as something in-between; and even if they did, there would always be an advantage to varying the strategy, such as exploring in a mature industry (Miles and Snow, 1986, p. 66–67). For these reasons, it is unreasonable to expect that exploitative processes would not include any explorative components, or that the explorative process should be exclusively explorative. Nerkar (2003) and Atuahene-Gima

(2005) have independently advocated this line of reasoning by stating that each of exploration and exploitation require a small dose of the other. It then follows that exclusively explorative or exploitative innovation processes are hardly ever optimal.

Nevertheless, the issue of what constitutes the most advantageous ambidexterity within innovation processes remains unresolved. A small dose of one orientation is not sufficient to make any process ambidextrous, let alone a company. Despite some proposals to the contrary, we suggest that processes of innovation can never have strict, predetermined degrees of ambidexterity. Nevertheless, it will be rare indeed that a process will be either completely exploitative or completely explorative; in almost all cases, there will be a mixture of the two orientations to varying degrees. We can illustrate the two basic options of carrying out innovation processes using a simple example of two companies: one with separate explorative and exploitative innovation processes and the second with amalgamated processes (see Figure 1).

In Model B, in which the company conjoins the two orientations within its innovation processes, we must acknowledge that since these orientations are mutually exclusive in a single domain (Gupta et al., 2006), proceeding according to one orientation precludes proceeding according to the other. For example, when a tailor sews a dress according to her customer's instructions, she cannot make changes as she pleases without compromising the instructions. The tailor may negotiate the changes with the customer, who may authorize them. Nevertheless, even if the process of dress-sewing consisted of half exploitation and half exploration, the two orientations would cancel another half of each other out. For example, if the tailor proposed red buttons and the customer wanted brown ones, one party would have to submit to the other's wishes. Accordingly, we argue

that the type of ambidexterity embodied in Model B implicitly involves the need for compromise. This, in turn, leads to a suboptimal level of ambidexterity at the total company level (see, B* in figure 2). In Model B, one step towards exploration constitutes one step away from exploitation, and vice versa.

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INSERT FIGURE 2 ABOUT HERE

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In Model A, ambidexterity at the company level is best realized through differentiated innovation processes, as shown in Figure 2. Using the same example of a tailor, differentiation means sewing one dress in accordance with the customer's instructions and sewing a second that using only the tailor’s imagination and creativity. The first dress meets the current needs of the customer whereas the second one is an attempt to secure a further customer base. In this way, the highest possible level of reactive orientation and proactive orientation is employed, which will eventually result in the eventual attainment of a point at which ambidexterity is realized without the orientations interfering with each other. As a result, a company achieves an optimal level of total ambidexterity and is truly competent to compete with companies that are state-of-the-art in either orientation. However, the specialization should not be total. There should be a small dose of each orientation in each process to avoid an excessive focus on either orientation.

Proposition 3 The optimal level of the two orientations at the company level is reached when individual innovation processes specialize one or other of the orientations, but not both.

Consider the case of a company that aims at achieving ambidexterity by constructing highly explorative innovation processes as well as other, very exploitative, processes. The ambidexterity of the company management then becomes crucial. This conclusion is consistent with all previous publications on ambidextrous organizations (e.g. O'Reilly and Tushman, 2004; Birkinshaw and Gibson, 2004; Lubatkin et al., 2006). The most critical level of ambidexterity is that at which the management has to take responsibility for balancing the different orientations. Depending on the organizational structure, the balance must usually take place at the level of either the company or the business unit.

Unlike Birkinshaw and Gibson (2004), we do not think it is necessary that all employees have ambidextrous mindsets and be able to divide their time between the orientations. Indeed, such a situation may, drawing upon the lessons learned from Figure 2, lead to suboptimal ambidexterity and interfere with employees' knowledge and skills. For this reason, we are more inclined to adopt the thesis of O'Reilly and Tushman (2004), who claimed that the processes need to be strongly independent of one another. It follows from this that some employees have to be highly focused on building competence in their chosen orientation. However, this does not entail that these highly-focused employees should work in the same company in the networked business environment. Instead, as Faems and his coauthors (2005) found, collaborators significantly influence the type of the innovation the company produces. Accordingly, we now present a further proposition:

Proposition 4 (A) In the networked environment, only top-level management needs to have an unconditional ambidextrous attitude. (B) There

must be experts of both orientations involved in the respective innovation processes. (C) A company does not necessarily have to employ any experts, provided the required expertise is available for the processes elsewhere.

Learning and knowledge in ambidextrous network contexts

The integration of exploration and exploitation is not an objective in itself. Rather, the intent is to create innovations that suit a particular market. As a result, as the environment changes, so a demand for different strategies emerges (Naman and Slevin, 1993). For example, a proactive orientation is of paramount importance in turbulent markets, whereas a reactive orientation dominates in stable markets (Miles and Snow, 1986; Levinthal and March, 1993). As a result of the fact that the environment is in continual flux, so is the knowledge that an organization needs for its innovation processes in continual flux. Collaboration with other actors in the network ensures that a company will always have access to the type of information, knowledge, and other resources that it needs for its purposes. In like manner, if it is to be a useful member of the network, the company will also have something to offer its collaborators. For example, a company may supplement the capabilities of its partners in exploration by dispensing knowledge on relevant issues while simultaneously gaining essential support in exploitation.

As already acknowledged, creating innovations requires knowledge. Fundamentally, there are two sources of knowledge and information in an innovation process: the markets and the organizations that create innovations. The information that originates from the market is usually explicit and has been systematically acquired and distributed (Lubatkin et al., 2006; Nonaka, 1994). For these reasons, it is easier to locate

information that originates from the market than information and knowledge that originates from the organizations, and to track where and when it has been used. Market-originated information has been acquired using test groups, surveys, benchmarking, methods of observing users of products, etcetera. It has two sources: customers and competitors. This is in accordance with the multicited market-orientation measurement scales of Narver and Slater (1990) and Kohli et al. (1993). For instance, Kohli and his coauthors (1993) defined market orientation in terms of customer and competitor intelligence generation, dissemination, and responsiveness.

Further, an important consideration is that a firm cannot learn anything radically new if it only keeps mimicking its competitors and meeting the expressed needs of its customers. Thus, the generation of market knowledge and information about the market are particularly important when the intention is to exploit. When that occurs, there is little radical innovation activity, which dovetails well with the strategic objectives of a reactive orientation towards markets. In addition, market information can be bought more often outside the organization. This conclusion follows on from the perception that information and explicit knowledge are easier and cheaper to acquire from the market than tacit knowledge, which is more embedded in organizations and not easily replicated (Nonaka and Toyama, 2002).

In contrast, exploration involves the use of tacit knowledge to a greater extent than exploitation (Lubatkin et al., 2006; Nonaka, 1994). Koza and Lewin (1998), for example, proposed that learning objectives are particularly important in exploration-oriented alliances and less important in exploitation-oriented alliances. Nevertheless, one should not forget that March (1991, p. 73) wrote that learning and imitation inhibit

experimentation as reason inhibits foolishness. This holds even though knowledge generation supports the necessary capabilities for successful exploration that is rooted deep within an organization, it simultaneously strengthens the company's commitment to this knowledge and makes future change difficult (Leonard-Barton, 1992). Accordingly, unlearning is almost as important as learning itself. Similarly, explorative companies need more knowledge and learning. They also require more unlearning and alternative knowledge. Therefore, one could conclude that proactive orientation requires more knowledge than a reactive orientation.

We are now in a position to clarify the role of information and knowledge in innovation processes that operate in different orientations toward markets. We proceed by examining not only what kind of information and knowledge is used more characteristically in each of the exploitative and explorative orientations, but also the way the organization processes these different kinds of information and knowledge. We suggest that explorative processes are facilitated by the unimpeded and active circulation of tacit knowledge and the use of a store of explicit knowledge that, to a large extent, already exist within the company. By contrast, exploitative processes are best facilitated by using a store of tacit knowledge that, to a large extent, already exists within the company, while promoting the rapid circulation of explicit information, such as that delivered in the form of customer feedback.

In explorative processes, circulating tacit knowledge is driven by the need to recruit the best available technical expertise to the innovation processes. It may be thought that this would result in the free aggregation of tacit knowledge and cumulative learning. However, technical state-of-the-art capabilities rapidly become outdated. Hence, if a

competitive advantage is to be maintained, a company and its partners need to circulate their tacit knowledge constantly. Since tacit knowledge is embedded in organizations, and more specifically, in individuals who are embedded in organizations, access to the employees of other organizations will facilitate the circulation of tacit knowledge. Hence, there is a need for very close collaboration between a company and those of its partners in the network who are involved in the innovation process, because tacit knowledge will be shared in the interaction between individuals (Nonaka, 1994).

In contrast to the above, we hold that in explorative innovation processes, explicit knowledge is more aggregated than circulated because of the very nature of these processes. The force that drives explorative innovations is the tacit knowledge of the employees. Tacit knowledge uses existing explicit knowledge and so it is not necessary for such knowledge to circulate. Rather, as tacit knowledge is drawn upon to drive innovations, explicit knowledge accumulates slowly and, as time goes on, will gradually result in the revision of tacit knowledge, to the extent that explorative processes can use it.

As already elaborated, explicit knowledge has a more central role in exploitative innovation processes and is the opposite of its role in the explorative innovation processes. In addition, we have already noted that, in these cases, explicit knowledge circulates faster. This is not altogether surprising, because we already know that a reactive orientation towards market intrinsically involves collecting information about competitors and customers and responding expeditiously. Thus, there is a constant need for up-to-date explicit knowledge because it rapidly becomes outdated. Tacit knowledge, in turn, has a more subtle role in exploitative innovation processes. For example,

fostering continuity in relationships, such as getting to know the customer, ultimately assists in making predictions about their latent needs. In this respect, exploitative innovation processes nurture the renewal of tacit knowledge which, in turn, essentially fuels explorative processes.

On the basis of the preceding line of argument, we present the following two propositions:

Proposition 5 (A) A company needs expansive sources of relevant and continuously circulating tacit knowledge in order to keep its explorative innovation processes running. (B) In explorative processes, explicit knowledge exists more in the background, and as it aggregates it can alter processes via its slow but steady influence on tacit knowledge bases. (C) Exploitative processes need rapidly circulating explicit knowledge. (D) Tacit knowledge operates in exploitative processes subtlety by aggregating and then structuring explicit knowledge.

Proposition 6 (A) Exploitative processes ultimately strengthen explorative processes and are essential for their survival. (B) Explorative processes do not have a similar effect on the survival of exploitative processes because explicit knowledge is always available in the markets.

The role of the network requires further clarification in the context of knowledge. As already mentioned, explorative innovation processes depend on a versatile assortment of high-quality sources of tacit knowledge. This, in turn, places too great a responsibility

on the shoulders of any single company. Powell et al. (1996, p. 117) claimed that no company has all the internal capabilities necessary for success, especially when they are making rapid technological advances and breakthroughs in research. This trait of exploration-oriented activities creates a demand for specific tacit knowledge and the resources of other organizations and actors (Lavie and Rosenkopf, 2006).

Researchers on absorptive capacity (a company's ability to utilize outside knowledge) have also propogated ideas that support our view regarding the great need for collaboration with partners and the ability to absorb knowledge when exploring (Koza and Lewin, 1998, p. 259–260). Nonaka and Toyama (2002) also noted that tacit knowledge in particular is difficult and costly to acquire through the market. Therefore, the internal generation of knowledge fosters better results and generates the type of knowledge that goes beyond the existing constraints imposed by the realities of the market. At the same, the authors recognized that the juridical boundaries of firms do not determine the boundaries of knowledge creation. Accordingly, they stated that knowledge can also be created in a shared context with such partners as universities, customers, and suppliers. Similarly, DeSanctis et al. (2002) found that networked development is best suited to explorative strategies. Furthermore, they stated that a company's access to knowledge and its ability to utilize relationships support learning from collaborators. Several authors have discovered that exploration in innovation processes benefits especially from collaboration with universities and research centers (Häusler et al., 1994; Faems et al., 2005), as well as from co-practicing and conducting joint R&D with other companies (Koza and Lewin, 1998).

Exploitative innovation processes do not have the same need for networks that explorative processes have. To be precise, these processes have usually been described only in terms of downstream activities in a value chain compromising activities associated with commercialization and marketing, and relying mostly on explicit knowledge (Rothaermel, 2001; Lavie and Rosenkopf, 2006). However, we have adopted a different perspective regarding innovation processes. We argued that there is no reason for exploration in the beginning of the process if one is aiming at developing an innovation that meets current needs of existing customers. Rather, it is more reasonable to conduct the entire process according to reactive business logic.

As Biemans (1991) wrote, incremental innovation relies more on potential users than other business partners. Involving potential user needs in the process enables a product to be developed that is better suited to user needs, shortens the duration of the process and accelerates its market acceptance (Biemans 1991). Thus, it is important in these processes to stress the network for engaging customers and potential users. Moreover, it is also important to conduct the entire process, from initiation to establishing market position, using the same logic. Even though we have just concluded that many horizontal activities are associated with exploration, we now propose that there are also exploitative forms. For example, trading market data, joint production, and standard harmonization are examples of horizontal activities connected to exploitation. On these grounds, we present the following proposition:

Proposition 7 (A) Explorative innovation processes depend more on intimate relationships than do exploitative innovation processes. (B) These relationships are usually horizontal in their nature, such as

collaboration with research partners. (C) Exploitative processes can also benefit from more arm-length collaboration. (D) Their relationships are more commonly vertical such as collaboration with customers.

SUMMARY OF MODEL

We have presented, in brief, a basic framework for contemplating explorative and exploitative innovation processes in networked contexts. First, we argued that even if they operate in the context of a network, companies are better off if they collaborate with other actors in the network in order to establish and strengthen ambidexterity at the company level, rather than attempt to promote ambidexterity in the network by focusing on being either an explorative or exploitative unit within it. Second, we discussed ambidexterity within the innovation processes. In this context, we concluded that at the company level, exploitation and exploration are at their most effective and hence ambidexterity is at its optimum when innovation processes have a particular focus on either exploration or exploitation but are not amalgamated. However, excessive proactivity or reactivity are seldom suited to the prevailing environment, and hence each orientation requires a small amount of the other for practical reasons. Finally, we briefly examined knowledge and learning with respect to the building of ambidexterity in a network. Therein, we highlighted two important issues. First, we proposed that there is a constant need for the renewal of tacit knowledge in explorative processes, which need emphasizes the importance of turnover in sources of tacit knowledge. Conversely, explicit knowledge has a more subtle influence: it aggregates in the holders of tacit knowledge and, with the passage of time, enables the tacit knowledge to be modified. In

exploitative processes, explicit knowledge impinges directly on innovation. Tacit knowledge, in turn, has a role in aggregating and enforcing the processes over a long period of time by, for example, strengthening the in-depth knowledge about the customers.

We believe that we have laid a solid foundation for approaching the phenomenon of network ambidexterity. Thus, future research should consider our claims and the issues we have raised, and investigate empirically whether we are building robust network ambidexterity models. However, even if the foundations we have laid herein receive support from future empirical research, the seven propositions that we have presented will not, on their own, be sufficient to constitute the basis for a model of this magnitude. Therefore, we hope that further research will result in the development of new propositions to fill in the gaps in our incomplete model. Knowledge and learning, in conjunction with other phenomena connected with the innovation process, require a great deal more research. Despite the obvious limitations in our preliminary model, we do believe that it provides a fitting platform for further development. Since network ambidexterity is critical for the future success of a whole range of companies, there is an urgent need for further investigation on this topic.

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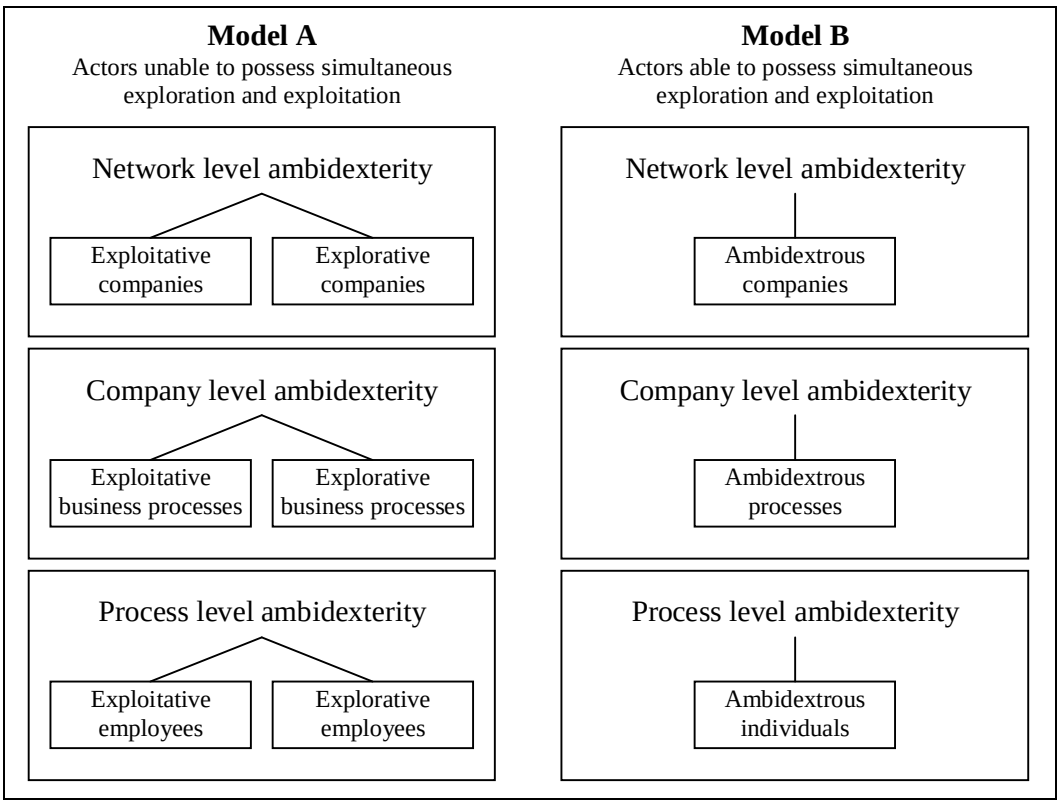

Figure 1 Two models of ambidexterity at three levels of organization

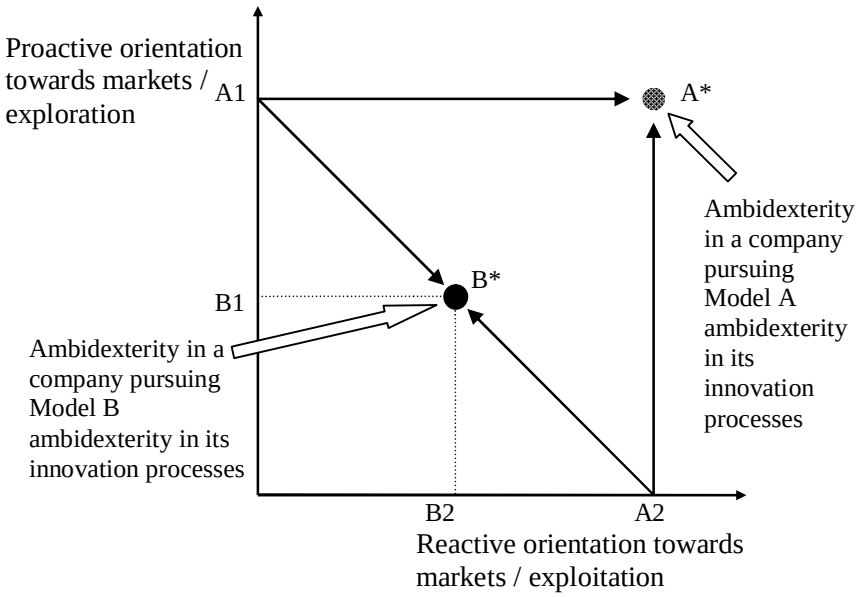

Figure 2 Amalgamated and non-amalgamated innovation processes