ALEXANDER ALEXIEV

Exploratory Innovation

The Role of Organizational and Top Management Team Social Capital

EXPLORATORY INNOVATION: THE ROLE OF ORGANIZATIONAL AND TOP MANAGEMENT TEAM SOCIAL CAPITAL

Exploratory Innovation: The Role of Organizational and Top Management Team Social Capital

Exploratieve innovatie: De rol van organisatorisch en top management team sociaal kapitaal

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by
Alexander Stoyanov Alexiev
born in Silistra, Bulgaria

Doctoral Committee

Promoters:	Prof.dr. F.A.J. Van Den Bosch
	Prof.dr. H.W. Volberda
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PREFACE

We shall not cease from exploration, and
the end of all our exploring will be to
arrive where we started and know the
place for the first time.

T. S. Eliot

This dissertation is about exploration. Often, we use the journey metaphor to describe the path a PhD candidate follows to arrive to the cherished title. Undoubtedly, it is a journey of exploration. My wish is though, that this is not the journey, or at least not the end of it. Indeed, one explores plenty of things – how to do research, how the academic world works, and even gains some good insights about the topic of the dissertation. Few can testify that all that is easy and smooth. An anecdote goes that the only easy PhD to get is that in astronomy – all you need to do is to name and describe a new star from the nearly billion-entry database gathered by the Hubble telescope… The task of everyone else from all other disciplines is quite more challenging. Yet, I do not wish that all these efforts mark the journey's end. I hope that the studies of exploration continue as the research ideas can be further developed and translated into academic articles, applied to develop managerial tools and trainings and be taught in classrooms.

This dissertation is also about making choices. Strategy, and life as well, follow the pattern of decisions taken through time. Being creatures of habit, we tend to settle into certain patterns and often routinize them for our convenience. Exploration is about moving away from those habits and probing into the unknown. Exploratory learning can be therefore quite disturbing or perhaps even painful. The studies in this dissertation were motivated by the urge to understand exploration in organizations and how managers can influence it by the decisions they make. This dissertation is for those who believe that choices can make a

difference. Timely disrupting the comfort of our habitual patterns may carry the recipe of success and survival for us as individuals and for our communities.

Finally, this dissertation is about multiple levels and transcending their boundaries. In the story about top management teams and internal and external connectedness, we try to look how the actions of one level can have consequences on another. The demarcations between them are sometimes too obvious and that makes us hesitant to cross them. Transcending boundaries can bring exploration and learning. Sometimes boundaries are more like walls and crossing them is not so easy. Having grown up behind the Iron Curtain and witnessing the long and painful integration process of the Eastern European countries in the European Union is my own testimony to that.

The T.S. Eliot quote reminds us to look back at where we started even though we have to accept the immanence of change. My first acknowledgement goes to all whose support made it possible that I come and be able to stay in the Netherlands. I am immensely grateful to my family and their community in my hometown Silistra, to Daniel Mitov, Peter Marchal, Ferenc Roos, Bart Pels, Ying Li, Jana Teneva, Nikola Chalev, Myrna Njiokiktjien, Vereniging Trustfonds Erasmus Universiteit Rotterdam, Schuurman Schimmel- van Outeren Stichting. To them I owe my chances during the most critical first days and months. Fortunately, it was not necessary to always swim against currents and the years at ERIM and RSM were years of support and good guidance. I would like to thank my supervisors Frans van den Bosch and Henk Volberda for their advice and for creating great conditions for exploration with academic freedom, encouragement and constructive feedback on papers and chapters of this thesis. My co-supervisor, Justin Jansen has been a very motivating force throughout the whole process with helpful insights and thoughtful comments on the many drafts of the papers. His are also the credits for the coordinating effort in the massive yearly data collection project of the Erasmus Innovation Monitor, which provided the frame for the empirical studies in this dissertation. The ERIM organization offered invaluable help in terms of support for conferences, courses and trainings and the creation of this volume. My indebtedness extends also to all my colleagues and friends. Their presence, through sharing, collaborating or having fun together, has given me a lot more meaning and perseverance.

Alexander Alexiev
Rotterdam / Amsterdam
July 2010

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1.

INTRODUCTION

1.1. Introduction

Innovation lies at the heart of human progress both in economic and social sense. A limitless human ingenuity together with the ability to build on existing achievements has pushed forward the boundaries of what we know, how we live, and how we relate to each other in societies. In spite of a multitude of ongoing challenges, human condition has reached unprecedented levels of improvements in health, literacy, education, poverty reduction and environmental sustainability. Consider the boom of information and communication technologies in the recent decades. It has allowed people to stay in contact, collaborate or exchange information, bridging divisions in space and time. Innovation has also contributed to leaps of productivity of the workforce, allowing people to enjoy more free time and spurring the emergence of industries for entertainment and leisure. Although both technological and non-technological innovation drivers have contributed to an endless long-term economic growth and have led economies out of recessions and crises (Volberda & Van Den Bosch, 2005), considerable debates have been sparked off about the role of innovation in societal issues such as the maintenance of employment levels.

Understanding the mechanisms of the virtuous power of innovation provides interesting challenges for social scientists and researchers in management in particular. One of them is about how organizations as social institutions contribute to innovation. A knowledge-based view of the firm (Grant, 1996b; Kogut & Zander, 1992, 1996) has defended the argument that organizations possess unique advantages of coordination, learning and purposeful action, which are key for successful creation of new knowledge and innovation. The mechanisms by which this is achieved include the combination and exchange of various organizational resources (Moran & Ghoshal, 1996; Schumpeter, 1934). Combination involves bringing together of various factors of production into products and services, while exchange allows for resources to reach their point of utilization as the parties that own them interact.

Classical views on innovation have accentuated the power of "creative destruction": the force behind the demise of existing industries and emergence of new ones (Abernathy & Clark, 1985; Schumpeter, 1934). In these views, the main part is played by opportunistic entrepreneurial firms who, lacking the burden of the organizational machine of an existing business, have the liberty to recombine production factors in radically new ways and introduce innovative products and services that challenge the status-quo and redraw industry boundaries. These views predict that existing firms are unable to compete with such changes as they are at the hands of inertial forces (e.g. Hannan & Freeman, 1984) and dependent on critical resources from powerful stakeholders (Christensen & Bower, 1996; Pfeffer & Salancik, 1978).

Although from a macroeconomic point of view the process of creative destruction is deemed positive for society as consumers reap the benefits of innovation, from the point of view of existing, incumbent firms this is different. Such firms are more concerned with preserving continuity while dealing with such changes. Key stakeholder groups, such as governments and employees, are likely to be interested in the survival of the enterprise, and unwilling to bear the costs associated with the firm's ceasing to exist. In order to survive, an existing firm therefore needs to find a way to overcome its inertia and learn to adapt to environmental change (Levinthal, 1991; Lewin & Volberda, 1999; March, 1991). Pushing forward the theoretical understanding of organizational adaptation through innovation is therefore a worthwhile endeavor.

Organizational and strategic management theory distinguishes two processes of organizational adaptation: the exploitation of existing competences through

refinement, incremental improvement and adjustment and the exploration of new knowledge through experimentation, discovery and variation (March, 1991). Exploitation, however, improves only existing competences, which can be beneficial in the short run but it can exacerbate inertia and thus prove insufficient for survival (Levinthal, 1991). Exploration becomes particularly relevant and important mode for adaptation to environmental shifts.

Exploratory innovation is innovation directed at new and emerging customers or based on radically new technologies (Benner & Tushman, 2003; He & Wong, 2004; Jansen, Van Den Bosch, & Volberda, 2006). Introducing more exploratory innovations is a means to adopting new technological trajectories or reaching out to novel customer segments. The defining criterion is the novelty in relation to a firm's existing knowledge base (Dougherty, 1992; Greve, 2007; Jansen et al., 2006; Rosenkopf & Nerkar, 2001). The degree of novelty determines the intensity of organizational effort required for the changes needed to improve fit. Exploratory innovation is therefore an important vehicle for strategic renewal and adaptation.

1.2. The problem with exploratory innovation

Paradoxically, as important as exploration is for an organization's survival, its systematic pursuit remains challenging for many firms. March (1991) considers exploration as a "vulnerable" activity with returns that are "systematically less certain, more remote in time, and organizationally more distant from the locus of action and adaption" (p. 73). Developing products that are very different from existing products is lengthy and development durations are uncertain (Greve, 2007). The fast feedback from exploitation can tie the organization to a path of specialization, which is a condition for a "competence trap" – the situation when an organization forgoes a superior routine, technology or activity for the short term benefits of efficiency (Leonard-Barton, 1992; Levitt & March, 1988; Volberda, 1998). Exploration often remains off the radar for incentive systems, and managers are punished for failed exploration rather than for lack of exploration (Danneels, 2008).

Behavioral theory of the firm has suggested two conditions which can stimulate inexperienced in exploration firms to introduce more exploratory innovation: performance decline and organizational slack (Cyert & March, 1963).

Performance decline refers to failure in achieving the aspired levels of pre-defined organizational goals, such as profitability or growth. Firms tend to search for solutions to such organizational problems in the neighborhood of their current expertise and choose for the first one that can satisfy their aspiration levels (Cyert & March, 1963; March & Simon, 1958; Rosenkopf & Nerkar, 2001; Stuart & Podolny, 1996). At this stage, exploration ideas might get rejected as not fitting existing strategy (Dougherty, 1992). However, if performance is below aspiration levels, managers are likely to reevaluate their current strategy and be willing to take additional risk and make more exploratory moves (Greve, 2007; Kahneman & Tversky, 1979; McDonald & Westphal, 2003). For example, technological exhaustion or market expansion may trigger change in the scope and space of exploratory search (Ahuja & Katila, 2004; Sidhu, Commandeur, & Volberda, 2007). The opposite process is observed as well: strong performance and successes in achieving the aspiration levels can induce firms to adopt defensive decision making and refrain from exploration (Amason & Mooney, 2008).

Organizational slack is the other mechanism that supports exploratory innovation. Slack refers to excessive organizational resources in addition to those required to run the existing business (Nohria & Gulati, 1996). The presence of slack can create a favorable atmosphere for experimentation and variation with new ideas (Nohria & Gulati, 1996; Sidhu, Volberda, & Commandeur, 2004; Voss, Sirdeshmukh, & Voss, 2008). In this sense, exploratory innovation can be born not as a result of a search for a solution to a problem, but as "pet projects" to individuals or groups within the organization who have slack resources at their disposal (Greve, 2007). Although there might be a tendency for approval of those innovation proposals that fit closely with existing firm strategies, some slack-based exploratory search may lead to exploratory innovation. Specifically, slack can increase exploratory innovation when environmental threats are perceived (Gilbert, 2005; Voss et al., 2008) and when market sensing is higher (Simsek, Veiga, & Lubatkin, 2007). Firms that are alert to environmental changes can use slack resources for nonmimetic response by developing their own exploratory innovation (Greve & Taylor, 2000).

The key problem that remains is how organizations develop exploratory innovation before their performance declines, that is, before it is too late, or regardless of the availability of slack. Both performance decline and organizational slack are economic triggers, which might be outside the scope of direct control by managers and might be insufficient for adaptation and survival.

Performance decline may weaken the organization and hamper its ability respond adequately to competition threats. Developing exploratory innovation might not guarantee success on the marketplace if competitors have developed first-mover advantages. Slack, on the other hand, requires accumulation of different forms of capital: physical, human or financial, which can be a time-consuming and path-dependent process. Organizations that do not possess such accumulations are at disadvantage with regard to the need to develop exploratory innovation. What behavioral theory of the firm has not been able to explain is how certain organizations are yet able to timely recognize discontinuous change regardless of the two economic triggers: performance decline and organizational slack and develop exploratory innovation (Kaplan et al., 2003). The aim of this dissertation is to address this gap.

1.3. Research aim

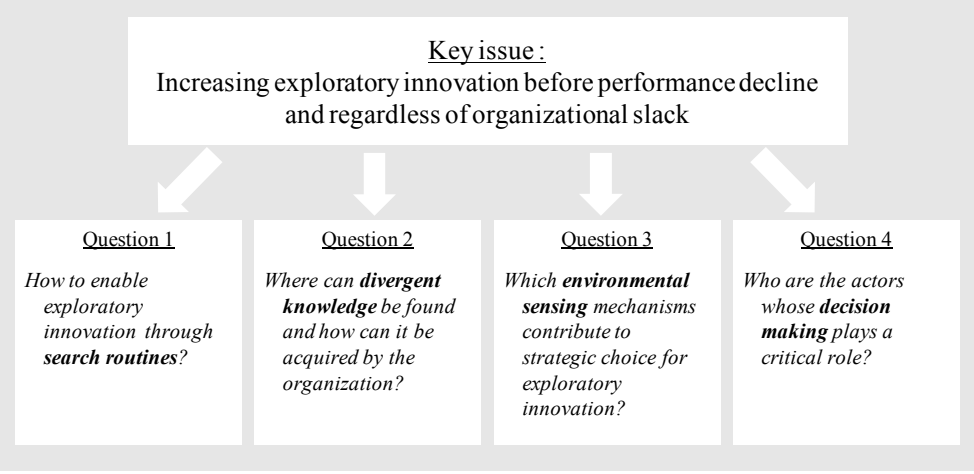
The following research aim is established for this dissertation:

> *The aim of this dissertation research is to understand the antecedents of exploratory innovation beyond performance decline and organizational slack.*

To address this issue, in this doctoral dissertation a theoretical approach is taken with its roots in behavioral and learning theories. We base the analysis of exploratory innovation on the view that organizations are problem-facing and problem-solving entities that need to deal with complex situations (Cyert & March, 1963; March, 1991; March & Simon, 1958; Simon, 1947 [1997]). These situations are not fully knowable, but are at least interpretable. Key processes in this endeavor are *searching*, *learning* and *deciding* (Cyert & March, 1963; Levinthal & March, 1993; Thompson, 1967). In the case of exploratory innovation, learning specifically may refer to the acquisition and application of divergent knowledge and the activities for sensing environmental change (Cohen & Levinthal, 1990; Crossan, Lane, & White, 1999; Greve, 2007; Sidhu et al., 2004). Searching, learning of divergent knowledge, learning through sensing the environment, and deciding shape in essence the perimeter of inquiry for the

antecedents of exploratory innovation. The theoretical framework that addresses the goal of this dissertation needs to answer four critical questions, each relating to the key processes outlined above. On Figure 1-1, the research aim is broken down into four critical questions that refer to these processes.

Figure 1-1 Key Issue in Research on Exploratory Innovation and Four Critical Questions



*Question 1: How can organizations that lack experience develop **search routines** towards exploratory innovation before their performance declines and regardless of the availability of slack resources?*

As exploratory knowledge is distant, a theoretical perspective needs to have propositions with regard to organizational search routines that are aimed beyond the neighborhood of existing organizational competences (Rosenkopf & Nerkar, 2001). If exploratory innovation would be possible independent from performance decline and slack, search should be embedded in ongoing, repeated activities in the organization (Nelson & Winter, 1982). Routinization may be associated with the development of organizational capability related to search (Greve, 2007). Embedded in this way, search would not require a problem to trigger it nor the allocation of slack, but be a feature of existing organizational behaviors and tasks.

*Question 2: How can organizations ensure the access and acquisition of **divergent knowledge** from within or outside the organizational boundary?*

A theory should explore the nature of divergent knowledge itself as an ingredient to exploratory new products and services. Rosenkopf & Nerkar (2001) argued that divergent knowledge can be located through spanning across a technological domain or across organizational boundaries. Sidhu et al. (2007) identified supply-side, demand-side, and geographic spaces for conducting exploration. The location of divergent knowledge with regard to the organizational boundary can have a pivotal role for the task of organizing for exploratory innovation.

*Question 3: What causes some organizations to have better **environmental sensing** mechanisms that signal them about changes and threats?*

A theoretical perspective needs to examine these features vis-à-vis the organizational environment as a source of adaptation requirements as well as a source of divergent technological and market knowledge. This implies conceptualizing the nature of the environment and specifying the mechanisms that the organization is using for sensing changes in it (Sidhu et al., 2004; Simsek et al., 2007; Voss et al., 2008)

*Question 4: As organizations are composed of different layers and groups of individuals, are there specific actors whose **decision making** is particularly important in promoting exploratory innovation?*

Finally, a behavioral theoretical framework for exploratory innovation should account for how decisions are made and taken. Acknowledging that development and introduction of exploratory innovation follows a pattern of strategic decisions, attention should be given to the process of decision making and the key actors involved in it (Forbes, 2007).

1.4. Literature review

A review of existing literature points to two theoretical perspectives that have been linked to the four critical questions about exploratory innovation. These are the perspectives of social capital theory and upper echelon theory. In the following section, the two perspectives are introduced and their relation to the four critical questions is discussed. This thesis explores whether specific constructs can be drawn from these two perspectives that can explain exploratory innovation beyond

already existing antecedents, such as performance decline and organizational slack. Table 1-1 summarizes the main premises of the two theoretical perspectives, as well as their relation to the critical issues related to exploratory innovation.

Social capital theory

Central proposition of ***social capital*** literature is that exploratory innovation can be facilitated by structures of relationships between individuals. These structures are conduits for new resources and are resources themselves (Adler & Kwon, 2002; Bourdieu, 1986; Burt, 1992, 2005; Nahapiet & Ghoshal, 1998; Portes, 1998). The social capital mechanisms are active on multiple levels: individual, group, interunit, and interorganizational. Nahapiet & Ghoshal (1998) define social capital as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (p. 243). Nahapiet & Ghoshal (1998) argued that because of social capital, organizations possess a unique advantage over market forms with regard to coordination of the creation of new knowledge. Specific structural, relational, and cognitive characteristics of the relations among individuals and among units within organizations can facilitate the processes of exchange and combination of resources and thus account for new knowledge creation. The authors referred to the value of relationships and the potential they have for resource exchange and combination as the "organizational social capital". The literature distinguished also internal social capital, or "bonding", from external social capital – "bridging" (Adler & Kwon, 2002) depending on whether the focus is on the structure of relations within an organization or with other actors outside of it.

- *Search routines*

  From social capital perspective, search behavior for exploratory innovation is conducted across networks of connections. Sidhu (2007) defined supply, demand, and spatial search dimensions of exploratory search. Suppliers, customers, competitors, international partners, members of alliance networks, units of the firm form networks of possible sources that can channel valuable new information on new opportunities and emerging trends (Ghoshal & Bartlett, 1990; Ingram & Roberts, 2000; Inkpen & Choudhury, 1995). Acquiring knowledge through key customer relationships can be positively related to the technological distinctiveness

of firms (Yli-Renko, Autio, & Sapienza, 2001), and boundary spanning informal networks of scientists can account for learning and new knowledge creation (Liebeskind, Oliver, Zucker, & Brewer, 1996).

- *Divergent knowledge*

  The creation of exploratory knowledge involves novel ways of combining previously associated elements (Nahapiet & Ghoshal, 1998) and the networks facilitate the transfer of such divergent knowledge elements (Rodan & Galunic, 2004). Relationship quality appears to be a factor for the transferability of new knowledge. Weak ties can facilitate the exchange of non-redundant knowledge and strong ties support the transfer of complex knowledge needed for new combinations (Hansen, 1999; Van Wijk, Van Den Bosch, & Volberda, 2003). The process of exchange allows for resources to reach their point of utilization as the parties that own them interact.

- *Environmental sensing*

  The environment from this perspective is conceptualized as consisting of social actors – individuals and other organizations. The social connectedness of organizations is deemed as a nearly exclusive mechanism for supplying information. Opportunities for innovation reach the firm through direct and indirect ties (Ahuja, 2000) and connections are at the heart of organizational environmental sensing efforts (Almeida, Dokko, & Rosenkopf, 2003).

- *Decision making*

  Studies from the social capital perspective often do not explicitly account for agency and decision making in the formation of exploratory innovation. Network structure determines opportunities and constraints, which is assumed sufficient for the exploration process (Burt, 1992, 2004). For example, a central position in an internal network improves the innovation output of an organizational unit (Tsai, 2001). In this sense, attention to the decision making process constitutes a gap in the literature on social capital's role for exploratory innovation.

Table 1-1 Key Theoretical Features of the Social Capital and Upper Echelon Perspectives on Exploratory Innovation

Key Features	Social Capital Theory	Upper Echelon Theory
Main premises	• There is value in social connections (e.g. Nahapiet & Ghoshal, 1998) • The structure and own position in social networks influence an actor's behavior (e.g. Burt, 1992; Coleman, 1990)	• Organizations are reflections of top managers and the pattern of their decisions (Hambrick & Mason, 1984) • Top managers act on the basis of their personalised interpretations of the strategic situations they face (Hambrick & Mason, 1984; Hambrick, 2007)
Relation to *exploratory innovation*:		
• Search routines	Conducted across networks of connections	Sensemaking based on cognitive maps and mental models, championing of initiatives of low-level managers
• Divergent knowledge	Transfer through strong or weak ties	Heterogeneous TMT composition
• Environmental sensing	Consists of other actors with whom an actor is or is not connected, organizational boundary to connectedness	Exogenous, in the form of stakeholder power; internal or external resource dependency
• Decision making	Absent, structure determines opportunities and constraints	Rational or political process, managerial cognition important for recognition of opportunities and framing of threats, collective cognition through intra-team debate
Focal actors	Employees, teams, business units, firms, alliances	CEO, Business unit heads, Top management teams, Board of directors
Illustrative studies	Ahuja, 2000; Tsai, 2001; Burt, 2004; Yli-Renko et al., 2001; Rodan & Galunic, 2004; Inkpen & Tsang, 2005; Van Wijk et al., 2003	Day 1994, Kaplan et al. 2005, Eisenhardt & Bourgeois 1988, Fredrickson & Mitchell 1984, Eisenmann & Bower 2000, Simons et al. 1999

Upper echelon theory

The other distinctive literature that pertains to exploratory innovation is that of the ***upper echelon theory***. This theoretical view argues that organizational outcomes are the result of the behavior and strategic choices of the organization's senior executives (Hambrick, 2007; Hambrick & Mason, 1984). Senior executives are CEOs, business unit heads, members of top management teams (TMT), and of boards of directors. Although there is variation across organizations in the managerial discretion available (Hambrick & Finkelstein, 1987), top executives play an important role in organizations, and specifically in orchestrating strategic reorientations through exploratory innovation (Eisenhardt & Tabrizi, 1995; Song & Montoya-Weiss, 1998; Tushman & Rosenkopf, 1996; Virany, Tushman, & Romanelli, 1992). The mechanisms used for explanations in upper echelon theory are based on the premise of bounded rationality and the selective perceptions and interpretations of uncertain strategic situations (Cyert & March, 1963). Executives fulfill multiple roles and have to deal with ambiguity and information overload (Mintzberg, 1973). Thus, they are guided in their actions by personalized interpretations of the situations they are facing. This channels the organizational strategic decision making, and in this way turning organizations into reflections of their senior management (Hambrick & Mason, 1984). Researchers have studied observable experiences and psychological factors that can account for organizational outcomes. A key assertion in this perspective is that a focus on top management teams can offer better explanation of organizational outcomes than studying the characteristics of individual senior managers, such as the CEO (Hambrick, 2007).

- *Search routines*

  Senior executives can themselves execute exploratory searches on behalf of the organization or interact with lower-level managers that bring exploration initiatives to their attention. In the former case, search can be directly linked to the presence of cognitive maps and mental models that are open to distant and divergent experience (Gavetti & Levinthal, 2000; Tripsas & Gavetti, 2000). Such cognitive structures can filter and guide the interpretation of environmental information into a particular frame, for instance as a threat to the firm's survival (Gilbert, 2005). In the latter case of search behavior seen from upper echelon perspective, senior executives are assigned the role of resource allocators to exploratory initiatives

originating at lower levels of organizations (Bower, 1970; Burgelman, 1983). Through establishing selection criteria and strategic context, top management can set a path towards exploratory innovation for the organization.

- *Divergent knowledge*

  Divergent knowledge is treated in the upper echelon literature as a compositional property of top management teams. Heterogeneous TMTs are able to combine multiple perspectives and information from their members into new innovative combinations, thus enabling an advantage over homogeneously composed teams (Simons, Pelled, & Smith, 1999; Van Knippenberg, De Dreu, & Homan, 2004).

- *Environmental sensing*

  In an upper echelon treatment, the environment is seen as exogenous, yet asserting influence through its characteristics, such as turbulence, munificence, or instability (Tushman & Romanelli, 1985). Complex and unstable environments pose additional demands for information acquisition and processing as well as for timely response (Eisenhardt, 1989). Environmental events can trigger changes in upper echelon variables (Cho & Hambrick, 2006). Key stakeholders both from within or outside the firm can possess power over the information streams as well as over the strategic decisions being taken (Christensen & Bower, 1996; Pfeffer & Salancik, 1978).

- *Decision making*

  Upper echelon theory views decision making as an intermediary link between executive characteristics and organizational outcomes (Hambrick & Mason, 1984). It is through this process that environmental stimuli towards exploratory innovation are realized in concrete strategies and decisions (Mintzberg, Raisinghani, & Theoret, 1976). This can be a rational process of deliberate steps or an incremental political process of a clash between powerful coalitions pursuing their own interests (Eisenhardt & Bourgeois, 1988; Eisenhardt & Zbaracki, 1992). Framing and cognitive maps are important here as well as conditions for gaining organizational support in the implementation phase of exploratory innovation (Gilbert, 2005). Debate within the TMT can ensure the formation of a shared

collective cognition with regard to the changes required to adopt exploratory innovation (Simons et al., 1999).

In summary, both social capital and upper echelon literatures shed some light on the four critical questions pertaining to exploratory innovation. Although both offer insightful propositions with regard to these aspects, it is striking that there is a lack of research that combines the two perspectives. As it can be seen from Table 1-1, both views relate to each of the analytical elements defined by the critical questions in the introduction. However, these relationships seem scattered and unrelated to each other, that is, in a model that predicts exploratory innovation. For instance, even though we know that individuals in organizations search for new knowledge, social capital literature does not tell which actors' search behavior is critical and whether top managers' search behavior can be linked to exploratory innovation. On the other hand, divergent knowledge within management teams relates to exploratory innovation, but it is not known how top management teams use knowledge sources outside the boundaries of the team. As already mentioned, decision making seems to be left out in the discussion of social capital and is more central in upper echelon theory. And finally, acknowledging that senior executives interact with the environment by means of connecting with other social actors can also improve the understanding of how inexperienced organizations develop exploratory innovation. The parallels drawn from the analytical comparison of the two suggest that such a combination can be very fruitful and can engender specific new constructs and relationships in the study of exploratory innovation. In the following section, a research framework based on the review of the two theoretical perspectives is elaborated.

1.5. Research framework

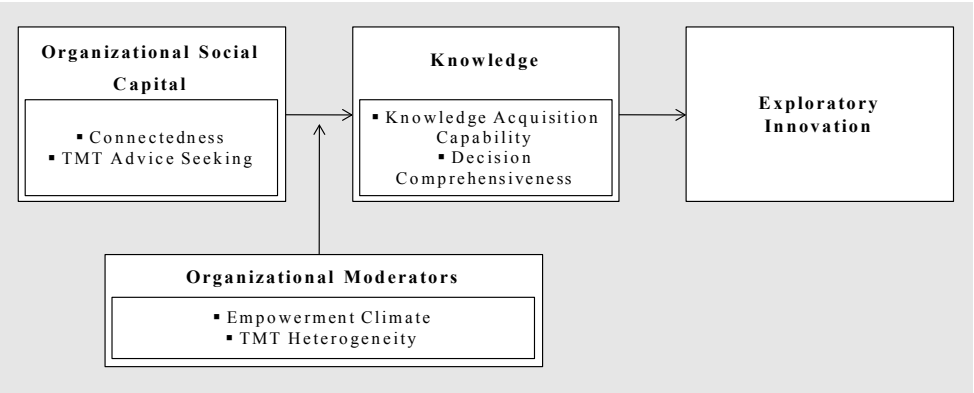
The research framework for this dissertation draws on both theoretical perspectives and identifies variables as antecedents of exploratory innovation. The framework suggests also mediating mechanisms as well as moderator variables.

The framework is focused on two *levels of analysis*: organizational and top management team level. It has to be noted that the theoretical perspectives reviewed in the previous section have both been studied on multiple levels of analysis. Existing studies from the social capital perspective have already developed propositions on organizational and individual levels of analysis and

some progress has been made (e.g. Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). Upper echelon theory has been studied on individual and group level (e.g. Arendt et al., 2005; Hambrick, 1994). To address the research gap pertaining to exploratory innovation, the research framefork for this dissertation is elaborated on organizational and top management team levels of analysis.

On Figure 1-2, an encompassing framework for the studies in this dissertation is drawn. Organizational social capital, represented by connectedness and TMT advice seeking, is theorized as a source of exploratory innovation. Knowledge-related variables mediate this relationship and its effect is modified by organizational moderators.

Figure 1-2 Encompassing Framework for the Studies in the Dissertation



Organizational social capital is examined on organizational-level and on TMT-level. Organizational-level social capital can be conceptualized as inter-unit (*internal*) or inter-organizational (*external*) *connectedness*. Interestingly, prior studies have tended to focus on only one of the two (Adler & Kwon, 2002). For instance, there is a vast literature on various types of external relations, such as strategic alliances or board interlocks, which has not discussed how such connections relate to the internal dimension of organizational social capital. A series of recent studies has drawn attention to examining both types of social capital. Such works contain the argument that the mechanisms that govern external and internal relationships differ from each other in significant ways, which justifies them being studied together (e.g. Burt, 2005; Gupta, Smith, & Shalley,

2005). For example, “bridging” ties across the organizational boundary, although non-hierarchical, are subject to forces of competition, risk of opportunism and instability (Burt, 1992; Inkpen & Tsang, 2005). Internal ties, or “bonding” social capital, on the other hand, are more stable, more cohesive and are governed by an institutional-based trust (Coleman, 1988; Inkpen & Tsang, 2005). The relationship between the level of connectedness and exploratory innovation can thus be empirically tested for both kinds of connectedness.

On TMT-level, organizational social capital is represented by the construct TMT advice seeking and is linked with exploratory innovation. On this level, the value of integration of the two theoretical perspectives is especially pronounced. Although some works have studied the involvement of senior executives in exploratory innovation, little has been said about the value of their relationships (Day, 1994; Kaplan, Murray, & Henderson, 2003; Podolny, 2005; Young, Charns, & Shortell, 2001). Research has shown that senior executives’ social networks differ substantially from those of non-managers in terms of network size, the closeness of the ties and membership in outside organizations (Carroll & Teo, 1996). As executives act on the basis of personalised interpretations of the strategic situations they face (Hambrick, 2007; Hambrick & Mason, 1984), it is appropriate to assume that these interpretations reflect the TMT members’ experiences with their immediate social environment. To account for such experiences, research has put forward the concept of *advice seeking*, defined as the formation of opinions, attitudes, and judgments through deliberate information exchange with other individuals, also called advisers (Bonaccio & Dalal, 2006; Brehmer & Hagafors, 1986; Sniezek & Buckley, 1995; Sniezek, Schrah, & Dalal, 2004). Top managers also operate at the boundary of the organization and maintain contacts both within and outside their organization, which justifies studying both their external and internal advice seeking behavior.

The position of ***knowledge*** in the framework as a mediating concept rests on the assumption that realizing the potential of organizational social capital for exploratory innovation goes through effective management of knowledge. The focus is on knowledge about environmental opportunities and threats, as well as about internal capabilities (Andrews, 1971). Although there are multiple ways to conceptualize knowledge, in this dissertation we focus on an organizational-level knowledge acquisition capability and on a TMT-level comprehensive decision making process. *Knowledge acquisition capability* is a firm-level dynamic capability comprising search and scanning routines, experiential learning, and

deliberate efforts for integration and institutionalization of new knowledge (Crossan et al., 1999; Eisenhardt & Martin, 2000; Huber, 1991; Teece, Pisano, & Shuen, 1997; Zollo & Winter, 2002). This concept addresses directly the question about the ability of organizations to develop exploratory innovation despite performance declines. This dissertation research elaborates arguments how organizational social capital can stimulate knowledge acquisition capability and exploratory innovation. With regard to knowledge on TMT-level, we explore *decision comprehensiveness* of the strategic process (Elbanna & Child, 2007; Forbes, 2007; Fredrickson, 1984; Fredrickson & Mitchell, 1984). From a rational decision making perspective, a comprehensive decision making process can contribute to decision quality decisions, through, for instance, simultaneous consideration of multiple options for action instead of relying on the satisficing principle (Cyert & March, 1963). This may mean timely and appropriate initiation and approval of exploratory innovation initiatives and acknowledging the need to move away from existing strategies. The focus in this dissertation is on how organizational social capital variables can influence decision comprehensiveness.

The effect of organizational social capital on exploratory innovation is subject to the influence of ***organizational moderators***. Within the scope of this dissertation research, two moderator concepts were investigated, which by no means should be considered exhaustive. The choice for focusing on them was based on their relevance and potential for integrating the two perspectives on exploratory innovation. The first one is *TMT heterogeneity*, which refers to the degree of knowledge and background differences among the members of the top management team (Simons et al., 1999; Van Knippenberg & Schippers, 2007). This compositional characteristic can influence the cognitive and information processes related to the conversion of organizational social capital into exploratory innovation strategies. *Empowerment climate* is an organizational-level context variable (e.g. Seibert, Silver, & Randolph, 2004) that moderates the relationship between social capital and decision comprehensiveness. Considering the effect of empowerment climate is related to a power and political model of strategic decision making (Eisenhardt & Zbaracki, 1992).

1.6. Research questions

The following specific research questions can be derived from the research aim and the conceptual framework:

1. *How does organizational social capital contribute to exploratory innovation?*
    a. *How do external connectedness and internal connectedness relate to exploratory innovation?*
    b. *How do external TMT advice seeking and internal TMT advice seeking relate to exploratory innovation?*
2. *How does knowledge mediate the relationship between organizational social capital and exploratory innovation?*
    a. *What is the role of connectedness as a source of knowledge acquisition capability?*
    b. *How does TMT advice seeking behavior relate to decision comprehensiveness?*
3. *Which organizational moderators influence the conversion of organizational social capital into exploratory innovation?*
    a. *How does TMT heterogeneity influence the relationship between TMT advice seeking and exploratory innovation?*
    b. *How does empowerment climate influence the relationship between TMT advice seeking and decision comprehensiveness?*

1.7. Contributions

By addressing the research questions, this dissertation research makes several important contributions to theory on exploratory innovation.

- *Antecedents of exploratory innovation: Introduce the concept of TMT advice-seeking behavior*

  The concept of TMT advice-seeking behavior emerged as signifying the role of the upper echelon in the conversion of the benefits of organizational social capital for exploratory innovation. This concept allows for studying a specific prevailing behavior of the TMT as a whole rather than individual executives (c.f. McDonald & Westphal, 2003; Menon, Thompson, & Choi, 2006). This contains a potential for practical use of this concept as it refers to behavior that is very concrete and can be monitored by managers.

- *Upper-echelon theory: knowledge beyond TMT boundary*

  Upper-echelon research is mostly concerned with the contribution of demographic and composition characteristics of individuals or groups of senior executives (Hambrick, Cho, & Chen, 1996; Lubatkin, Simsek, Ling, & Veiga, 2006; Simons et al., 1999). The studies in this dissertation research probe beyond the individual and the group and develop propositions with regard to the interactions beyond the team – internally within the organization or externally with other parties.

- *Social capital theory: establish the TMT as a key player in organizational social capital*

  This dissertation research argues for a special attention to senior executives when organizational social capital is discussed. Existing studies about the role of social capital on organizational level have considered organizations as homogeneous collectivities (Tsai, 2001, 2002). Top management teams deserve to be set apart. Not only they operate at the boundary of the organization, which has specific implications about their use of social capital, but they can directly contribute to exploratory innovation through strategic knowledge management (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

- *Social capital theory and antecedents of exploratory innovation: explore differential effects of external and internal dimensions of organizational social capital*

  Although scholars have pleaded for studying the effects of both external and internal organizational social capital, few studies have actually done so (Adler & Kwon, 2002; Gupta et al., 2005). In the studies of this dissertation, both dimensions are examined on organizational (Study 1), and TMT-level (Studies 2 and 3). Specifically, the studies test whether firm or TMT preferences for one or the other (Menon & Pfeffer, 2003) can have a differential impact on exploratory innovation. Besides the main effects of the organizational social capital variables and the mediating counterparts of knowledge, the studies contribute with important boundary conditions represented by the organizational moderators in the models.

- *Empirical tests in multiple industries*

  The studies contribute with the strength of empirical evidence gathered in the context of a small country with dynamic and advanced economy. Much research in management is criticized for being US-centric. The studies in this dissertation offer a complementary perspective, the results of which are generalizable to commercial organizations in the Dutch economy.

1.8. Overview of the empirical studies

Three studies constitute the body of empirical research in this dissertation. Each study is focused on specific structure of relationships from the research framework with a twofold aim. First, clarify and find evidence for the role of organizational social capital for exploratory innovation on both organizational and TMT level, and second, make specific contributions to various streams of management literature. For this reason, the studies are presented as separate articles and the contributions are delineated in each of them.

The studies used multiple sources including secondary data and surveys as a primary data source. The surveys consisted of questionnaires addressed to the CEOs of Dutch firms with more than 20 employees from multiple industries randomly drawn from the population of Dutch commercial organizations. The

surveys were conducted in 2005, 2007, and 2009. Study 2 is focused specifically on small and medium enterprises (SMEs), which are firms between 20 and 250 employees.

The surveys used multiple-item measurement scales, which were additionally adapted and validated for the purposes of this research. Respondents were compared with non-respondents to establish representativeness and exclude non-response bias. Statistical procedures were used to assess the impact of common-method bias. Relationships were tested by means of regression analyses.

A brief overview of each study along with key characteristics of the data collected are presented next.

Study 1 – External and Internal Knowledge Sources and the Capability of Knowledge Acquisition

In the first study, organizational-level connectedness represents how organizational social capital contributes to exploratory innovation. External and internal connectedness are conceptualized as knowledge sources and conduits for exchange. The study shows that connectedness is linked with learning and capabilities and also associated with exploratory innovation. The mediating role of knowledge acquisition capability is investigated. Figure 1-3 provides a scheme of the conceptual model employed in this study and Table 1-2 summarizes some key characteristics of the empirical data.

Figure 1-3 Study 1

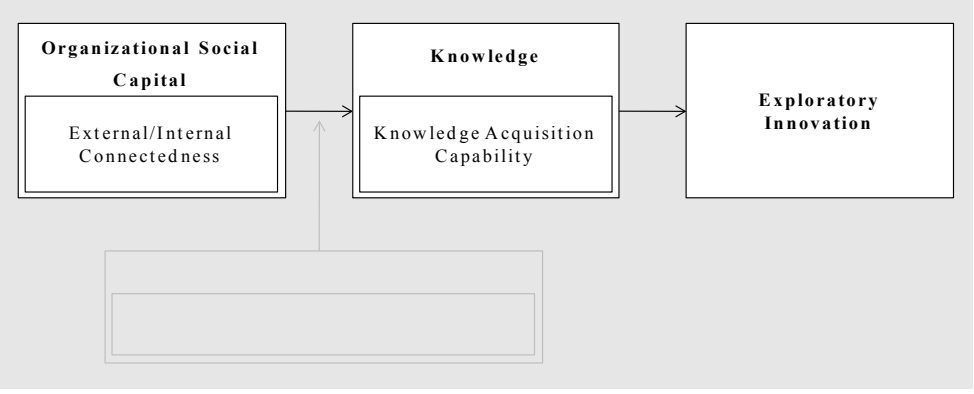


Table 1-2 Key Data Characteristics of Study 1

Study 1	
Dependent variable (mean)	Exploratory innovation
Independent variables	External connectedness
	Internal connectedness
Mediating variable	Knowledge acquisition capability
Number of firms in sample	4000
Sample selection criteria	• Minimum 20 fte
	• Commercial organizations
Response rate	9.78% (391)
Average firm size	690 fte
Year of data collection	2005
Country	The Netherlands

Study 2 – TMT Advice Seeking and Exploratory Innovation: Moderating Role of TMT Heterogeneity

This study brings the analysis to the upper echelon level of the firm. TMT social capital is represented with two key TMT behaviors – external and internal advice seeking. Both are hypothesized as antecedents to firm exploratory innovation, thus making a link between group and firm level of analysis. TMT heterogeneity provides a context for the information exchange and combination process that links advice seeking to exploratory innovation. Figure 1-4 shows how the concepts for this study relate and Table 1-3 shows the key data characteristics.

Figure 1-4 Study 2

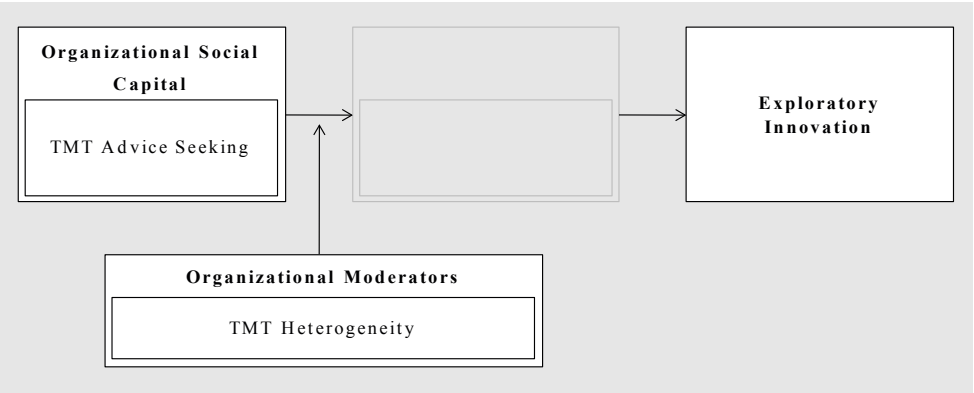


Table 1-3 Key Data Characteristics of Study 2

Study 2	
Independent variables	External TMT advice seeking Internal TMT advice seeking
Dependent variable	Exploratory innovation
Moderating variable	TMT Heterogeneity
Number of firms in sample	7884
Sample selection criteria	• Minimum 20 fte • Maximum 250 fte • Commercial organizations
Response rate	8.94% (705)
Average firm size	58 fte
Year of data collection	2007
Country	The Netherlands

Study 3 – TMT Advice Seeking and Decision Comprehensiveness: The Role of Empowerment Climate

Study 3 explores in further detail the role of TMT advice seeking for the process of decision making. Decision comprehensiveness characterizes the rationality of the decision making process. Yet, organizations differ in the way power is distributed across organizational levels, or in other words the presence of

empowerment climate. These differences can implicate how advice seeking relates to the process of comprehensive decision making. Figure 1-5 shows a conceptual map of the constructs and the relations between them as hypothesized in this study. Table 1-4 presents the key data characteristics.

Figure 1-5 Study 3

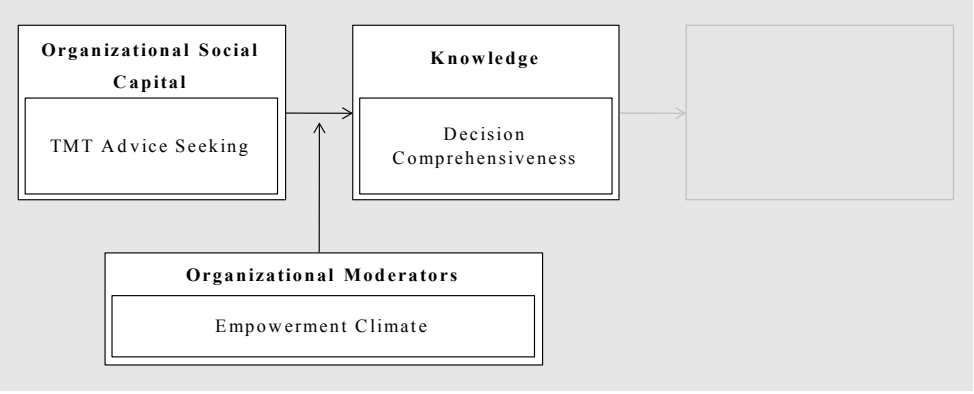


Table 1-4 Key Data Characteristics of Study 3

Study 3	
Independent variables	External TMT advice seeking Internal TMT advice seeking
Dependent variable (mean)	Decision comprehensiveness (4.70 on a 7-point scale)
Moderating variable	Empowerment climate
Number of firms in sample	9000
Response rate	8.98% (808)
Sample selection criteria	• Minimum 20 fte • Commercial organizations
Average firm size	415 fte
Year of data collection	2009
Country	The Netherlands

1.9. Structure of the dissertation

Table 1-5 depicts the structure of the dissertation. After the introductory chapter, the three empirical studies are presented. Finally, a concluding chapter summarizes the findings, presents the implications for theory and practice and offers suggestions for future research.

Table 1-5 Dissertation Contents

Chapter	Title
Chapter 1	Introduction and theoretical frame
Chapter 2	Study 1. External and internal knowledge sources, knowledge acquisition capability and exploratory innovation
Chapter 3	Study 2. TMT Advice Seeking and Exploratory Innovation: Moderating Role of TMT Heterogeneity
Chapter 4	Study 3. TMT advice seeking and decision comprehensiveness
Chapter 5	Conclusions, implications and suggestions for future research

CHAPTER 2.

EXTERNAL AND INTERNAL KNOWLEDGE SOURCES, KNOWLEDGE ACQUISITION CAPABILITY AND EXPLORATORY INNOVATION[1]

2.1. Abstract

A critical issue for innovating organizations is the coordination of effort between external and internal sources of knowledge. This chapter uses insights from the literature on organizational learning and dynamic capabilities to test the role of connectedness as a knowledge resource and precursor to innovation. We describe mechanisms through which organizations use their external or internal connectedness to reach exploratory innovation. Strong support is found for the intuitive argument that diverse and distant knowledge is to be found outside the firm boundary. Yet, learning mechanisms can help internally connected companies build a dynamic capability for knowledge acquisition, which in turn also contributes to exploratory innovation. The empirical evidence from 391 firms from 7 industries showed that knowledge acquisition capability is partially mediating the process of leveraging internal connectedness into exploratory innovation.

[1] Earlier versions of this study have been presented at the Academy of Management Annual Meeting 2007, Philadelphia, USA and the Tilburg Conference on Innovation, 10-12 June 2010, the Netherlands.

2.2. Introduction

Open innovation, multi-firm networks, and learning-race alliances have received a lot of attention in the last decade from researchers and practitioners alike. These forms of boundary-spanning innovation have been well-documented in cases of successful firms that rapidly introduced radical innovation in turbulent environments (e.g. Ahuja, 2000; Powell, Koput, & Smith-Doer, 1996). On the other hand, radical ideas continue to emerge from within the organization as a dedicated, coordinated effort of closed internal cooperation. In fact, open innovation has been criticized that it fails when the task is more complex and requires high coordination. But are openly innovating companies able to cope with these challenges too? The Linux system for instance, has enormously benefited from external input of testers and diverse set of contributors that perfected the system, although its birth was the product of a single individual – Linus Torvalds, eventually supported by a group of close collaborators who managed and filtered the flow of all the external input (Carr, 2007).

The problem of coordination and allocation of managerial effort to either modes of organizing innovation raises important questions, particularly in the case of exploratory innovation, which is radical and designed to meet the needs of emerging customers or markets (Benner and Tushman 2003). Essential for organizations operating in more dynamic environments (Jansen et al. 2006), and key to long-term survival (Levinthal and March, 1993), this type of innovation requires new knowledge or departure from existing knowledge. Often, it is associated with experimentation, flexibility, and divergent thinking (Benner & Tushman, 2003; Jansen et al., 2006; Levinthal & March, 1993; McGrath, 2001), which demand organizational capabilities, practices and structures that enable the effective acquisition and deployment of new knowledge.

Following previous literature, firm knowledge inputs can be well modeled as the degree of connectedness an organization maintains inside or outside its borders. Numerous studies have provided theoretical and empirical evidence about the role of "bridging" and "bonding" connectedness (Adler & Kwon, 2002) as a source of knowledge exchange and combination – the key processes underlying innovation (e.g. McFadyen & Canella Jr., 2004; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). Rarely, however, empirical works have concentrated on the effect on innovation of both kinds of connections. Our first contribution is to address a gap in the literature that deals with the conceptual distinction between

external and internal connectedness as knowledge sources to exploratory innovation.

Secondly, we employ the concept of knowledge acquisition capability as a mediator to the role of connectedness for innovation. As a dynamic capability, knowledge acquisition refers to organizational structures, practices and routines orientated at scanning, noticing, and integrating new knowledge (Crossan et al., 1999; Eisenhardt & Martin, 2000; Grant, 1996a; Huber, 1991). As a dynamic process of deliberate and structured learning, knowledge acquisition needs to be considered in reference to the role of external and internal configuration of connection that an organization possesses. We argue that learning mechanisms are at play when well connected organizations are able to develop such capability, which in turn, contributes to higher exploratory innovation. By focusing on knowledge acquisition capability, we effectuate a "management matters" perspective in the predominantly external forces dominated research in innovation (Eisenhardt & Martin, 2000).

Thirdly, we contribute with empirical evidence to studies on the role of connectedness for innovation that have been limited to single organization settings. Problematic with such approaches, which have typically used a network methodology, have been the need for establishing a boundary for connectedness, especially with regard to external networks, and the lack of possibility for generalizations. Our study samples a large number of organizations from multiple industries, thus providing alternative operationalizations and robustness to some of the conclusions drawn in this area of innovation research.

We start off by laying out a review of the relevant literature and delineation of the hypotheses. Further, we explain our research methodology and results of the empirical study. We conclude with discussion of the result, implications and suggestions for further study.

2.3. Literature review and hypotheses

External and Internal Connectedness and Exploratory Innovation

In this study, both the internal and external sources of innovation are modeled as the patterns of connectedness in which individuals, units and firms are embedded (Kogut, 2000; Nohria, 1992; Van Wijk et al., 2003). Naturally, interaction between

individuals offers channels for information exchange (Homans, 1950). Relations, though formed and "maintained for other purposes", can be valuable "merely for the information they provide" (Coleman, 1998: S104). Regardless of the context and the specific structure or content, connections appear as important conduits of information exchange among individuals, units, organizations (Sandefur & Laumann, 1998). For example, information benefits of access, timing and referrals are key advantages from positioning in a "structural hole" between disconnected parts of such a network (Burt, 1992).

We relate connectedness with exploratory innovation as organizational outcome, following the view that innovation is the product of new knowledge creation through the exchange and combination of knowledge resources available in the networks (Nahapiet & Ghoshal, 1998). Exploratory innovation utilizes novel technologies or targets customers from new market segments (Benner & Tushman, 2003; Jansen et al., 2006; Tushman & O'Reilly, 1996).

External Connectedness and Exploratory Innovation

External networking activity is characterized by spanning structural holes (Oh, Labianca, & Chung, 2006), which carries brokerage benefits (Burt, 1992, 2000). Following that, external networking is done for competitive purposes. Firms would have concerns about opening up with proprietary knowledge to the competition due to the risk of losing the "third man in the middle" advantage (Hitt, Hoskisson, Johnson, & Moesel, 1996). External relations are challenged by the lack of trust outside the firm boundary, which hinders the effective transfer of knowledge (Inkpen & Tsang, 2005).

External networking, is often deliberately directed towards exploratory innovation, as studies in biotechnology and chemicals industries have suggested (e.g. Ahuja, 2000; Powell et al., 1996). In this way, organizations reach out for knowledge beyond their scope of existing activities in their struggle to overcome the boundaries of their current geographical and technological contexts. Firms use alliances, mobility of inventors, and social networks of scientists to execute distant knowledge searches that cross these contexts (Ahuja, 2000; Rosenkopf & Almeida, 2003). This perspective challenges the predictions of structural hole and market transaction theories, advocating that external cooperative relationships can be established in regions of high social capital, thus countervailing concerns for opportunistic behavior (Walker, Kogut, & Shan, 1997). Externally, the lack of

shared cognition, which leads to merely accessing the knowledge of the external partner, and not exchanging or transferring pieces of it, can in fact allow for novel ways of seeing things, seeking combinations with larger differences than the existing technology or market orientation of the firm (Grant & Baden-Fuller, 2004). Thus, we argue that external connectedness will be positively associated with exploratory innovation.

> *Hypothesis 1-1: External connectedness is positively associated with exploratory innovation.*

Internal Connectedness and Exploratory Innovation

Work-related ties inside the firm are likely to have higher frequency, emotional intensity, intimacy and reciprocal services (Granovetter, 1973) due to the commonality of organization context, including established formal structures, communication channels, formal and informal initiatives that bring people together. The effective knowledge exchange across the organizational boundary, as evident from alliance literature for instance, is quite often hindered by the tacitness, complexity, and ambiguity of the knowledge, and by the cultural and organizational distances that make two firms dissimilar (Simonin, 1999). Stronger ties allow for the transfer of more complex knowledge (Hansen, 1999), which is an ingredient of exploratory innovation. The stronger ties inside the organization are the soil for cultivating a climate of trust (e.g. Krackhardt, 1992; Nelson, 1989), which is institutional-based, and the risk of opportunism is smaller (Inkpen & Tsang, 2005). Levin & Cross (2004) demonstrate that trust has a mediating effect between stronger ties and internal knowledge transfer. If units trust the competence and the goodwill of their partner units, they are more inclined to put efforts in knowledge sharing (Reagans & McEvily, 2003; Uzzi, 1996). High levels of internal connectedness allow people to exchange freely complex ideas. It supports unorthodox ideas and propositions that challenge the status quo to be developed and used in the innovation processes, thereby creating a fertile environment for exploratory innovation. The internal network is also rich in closure patterns, which are dense network areas of interrelated actors allowing for free information exchange (Burt, 1992, 2005; Coleman, 1988). This closure climate can allow original and new information circulate freely. The higher diffusion capacity of internally well-connected firms leads to a higher probability that a good exploratory idea is backed and implemented (Nerkar & Paruchuri, 2005).

Hypothesis 1-2: Internal connectedness is positively associated with exploratory innovation.

Knowledge Acquisition Capability

The acquisition process of the key ingredient of innovation – knowledge – can be a critical driving force in the mechanisms that link innovation sources to innovation output. From organizational learning literature it can be drawn that knowledge acquisition is a key process which comprises search and scanning routines, experiential learning, and deals with the integration and institutionalization of new knowledge in the organization (Crossan et al., 1999; Huber, 1991). According to the knowledge-based view, the supply of knowledge is critical for the firm's existence, as arguably the single most important resource for the organization (e.g. Grant, 1996b; Kogut & Zander, 1992; Moran & Ghoshal, 1996).

Firms differ in their capability to acquire knowledge and we argue that this capability is dynamic. Given the existing market positions and path dependencies of resource endowments, competitive advantage goes to those firms that are able to "integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997: 516). Such ability is embodied in "organizational structures and managerial processes which support productive activity" (Teece et al., 1997: 517). Eisenhardt & Martin (2000) further noted that these processes are very specific, such as product development, alliancing or strategic decision making, and that they are common to effective firms. The objects of these processes are the firm's operating routines, which are activities geared towards the operational functioning of the firm (Zollo & Winter, 2002).

Capabilities evolve through learning mechanisms, such as experience from repeated practice and codification and formalization of experience into procedures (Eisenhardt & Martin, 2000). The learning processes can be both emergent and deliberate – from pure experience accumulation to more conscious and streamlined processes of knowledge articulation and codification. The emphasis on dynamic is for those capabilities where the approach to learning is systematic and persistent (Zollo & Winter, 2002). Effective firms embody these qualities in the decision making steps in the course of search and selection, configuration and deployment of operating routines and resources (Helfat et al., 2007).

Knowledge acquisition capability fits the description of a dynamic capability for two reasons. First, it is directed at manipulating other resources as the newly acquired information increases the opportunities for altering the base of existing ideas, resources and routines. Second, we set apart the organizations where this process is systematic and deliberate. Such organizations have the systems to identify new pieces of knowledge, systematize it, organize it in structures and information systems, and have the ability to deploy it to the correct place in the organization (Crossan et al., 1999). In effect, these organizations are "learning organizations" and possess a larger pipe to feed other learning processes of information distribution, information interpretation, integration and institutionalization (Argyris & Schön, 1978; 1999; Huber, 1991).

Both external and internal connectedness contribute to the development of knowledge acquisition capability. The exposure and interactions that organization members experience through communicating with external or other internal parties trigger learning mechanisms and organizations that are highly connected are likely to have recognized the need to systematize and institutionalize the process of knowledge acquisition (Crossan et al., 1999). For instance, firms with large experience with alliances create and dedicated alliance management function, whose task include coordination and management of new knowledge (Lorenzoni & Baden-Fuller, 1995).

The function of knowledge acquisition is then catalytic to exploratory innovation. Search effort is more coordinated, and the choice of external partners is determined by the learning potential of the prospective collaboration (Hamel, 1991). Studies of alliances for example have shown that previous experience in alliance formation is not sufficient for alliance efficiency (Doz, 1996; Larsson, Bengtsson, Henriksson, & Sparks, 1998). Knowledge acquisition capability provides the collaborative "know-how" (Simonin, 1997) that allows extracting the benefits of the alliance relationship faster. Firms that have developed knowledge acquisition capability are also capable of dealing with rigid managerial beliefs and unwillingness to unlearn past practices that hinder the possibility of learning from the alliance relationship (Inkpen & Choudhury, 1995). We argue therefore that knowledge acquisition capability mediates the association between external connectedness and exploratory innovation.

> *Hypothesis 1-3: Knowledge acquisition capability mediates the relationship between external connectedness and exploratory innovation.*

Highly connected internally firms develop too a knowledge acquisition capability. Firms realise that the exchange between specialised and homogenous units is more beneficial for the firm if systems are installed for active acquisition of new knowledge (Nahapiet & Ghoshal, 1998). Knowledge acquisition then contributes to exploratory innovation, thereby increasing the efficiency of recombination (Tsai & Ghoshal, 1998). Firms would achieve faster and better exploratory innovation since available unrelated knowledge is easier to be found and exchanged across the internal network. The effect of shared cognitions is activated the systems of interunit knowledge acquisition help connect previously disconnected parts and related knowledge (Tsai, 2001). For example, an inventor can look up in a knowledge management system for previous experience on a similar problem and easily understand the language of that piece of information when deliberating whether a radical idea would fit existing organizational capabilities. Knowledge acquisition capability will therefore mediate the association between internal connectedness and exploratory innovation.

> *Hypothesis 1-4: Knowledge acquisition capability mediates the relationship between internal connectedness and exploratory innovation.*

2.4. Method

Sample

To test the hypotheses, we relied on data collected through a survey and secondary sources from a sample of Dutch firms with more than 25 full-time employees. The sample of four thousand firms from nine industries was drawn randomly from an electronic database. We obtained survey responses from 405 of them (10.1% response rate) and after a clean-up of records with missing data a final sample of 391 firms was reached. The questionnaire was addressed to the CEO or general manager as the most knowledgeable figure with regard to the functioning of the organization. The sample consisted of manufacturing firms (51.7%), construction companies (16.6%), business services (10.2%), financial services (8.4%), transportation (6.6%), trade (5.4%), and others (1.0%). The firms had on average 690 employees, with firm size ranging between 25 and 63 386 employees. Firm age was on average 39.5 years, ranging between 1 and 204 years.

To tackle single informant bias, the firms were asked to provide one additional respondent to fill in the survey. The validation survey had a response rate of 48 filled questionnaires (11.9% of the sample). Interrater agreement score r_{wg} was computed for each multi-item variable (James, Demaree, & Wolf, 1993). Median interrater agreement was 0.89 for external connectedness, 0.94 for internal connectedness, 0.94 for knowledge acquisition, 0.89 for exploratory innovation, and 0.92 for exploitative innovation. The measure varies from 0 ("no agreement") to 1 ("perfect agreement"), so the observed scores show a very strong interrater reliability of the collected data.

Measures

The constructs were operationalized using multi-item measurement scales adapted from previous empirical studies and relevant conceptual works. Additional validation and reliability analyses were conducted to ensure the applicability of the measures with the current data. The scale of responses on the self-reported questions ranged from 1 (strongly disagree) to 7 (strongly agree).

Innovation sources. For *external connectedness*, six items were used, which reflected the degree to which the firm interacted with other organizations. The measure basically captures the density of external ties of the studied firm (Burt, 1992; Sheremata, 2000). Similarly to other studies (Powell et al., 1996) the items enquire for formal collaborations of different types: research and development, marketing/licensing, distribution/supply. Although the measure is not relational, i.e. it does not include specific information about the opposing partner, it is indicative for the extent to which the firm sees itself as externally connected. Yli-Renko et al. (2001) use in a similar way a one-sided measure of the degree of network connectedness. Exploratory factor analysis on the scale gave the items high loadings on the factor (between 0.70 and 0.83). Cronbach's α for this scale is 0.88.

Internal connectedness was measured with four items. The items measured the respondents' opinion on the degree of internal inter-departmental interaction (Van Wijk et al., 2003). The measure taps the degree of connectedness by enquiring about lateral relations across different departments (Tsai, 2001). The exploratory factor analysis showed high loadings on the factor variable. The items loadings range between 0.51 and 0.67. Cronbach's α for the scale was 0.71.

Knowledge acquisition capability. The measure for *knowledge acquisition capability* consisted of six items, developed based on previous studies (Jansen, Van Den Bosch, & Volberda, 2005; Yli-Renko et al., 2001). We asked the respondents (a) whether they have routines for acquiring large amount of information through their customers or third parties (accountants, branch organizations, suppliers) and about competitors (3 items), (b) whether this is done regularly and systematically, using a variety of ways (2 items), and (c) whether acquiring industry information is done through informal channels as well (1 item). The scale showed reliability ($\alpha = 0.68$), and factor loadings between 0.51 and 0.74.

Exploratory innovation. The scales for *exploratory innovation* are based on the study by Jansen et al. (2006), which used previous conceptual contributions (Benner & Tushman, 2003; Danneels, 2002; March, 1991) to develop seven-item measurement scales. They aim at covering the main distinction between the two types of innovation, namely the "newness" of the innovation and the distance to existing customer or technological bases. For exploratory innovation, factor loadings ranged between 0.54 and 0.80. The α reliability was 0.84.

Validation of Measures

For all multi-item variables, an integrated model for confirmatory factor analysis (CFA) was constructed in order to test for convergent and discriminant validity. Each item was constrained to load on the respective latent variable. The model showed moderate fit ($\chi^2/df = 3.34$, CFI = 0.80, RMSEA = 0.076). All loadings were significant ($p < 0.001$), which gives some information about the convergent validity of the scales. Some loadings had relatively low standardized estimates, which is in line with the conclusions from the exploratory factor analysis. The factor correlation matrix had moderate values (between 0.14 and 0.67), which shows discriminating validity of the latent variables. We also constructed models where this correlation was constrained to one and compared with the unconstrained model. The results from each of the pairwise comparisons showed that constraining to unity worsens the models' fit in each case, which attested to the discriminant validity of the latent variables.

To deal with some limitations related to collecting self-reported data, we correlated the responses with a sample of questionnaires addressed at a second respondent from each firm (Podsakoff & Organ, 1986). Response rate was 48 questionnaires. All correlations were significant and high (average r=0.54), except

for the measure for exploitative innovation, which had a much lower coefficient of correlation.

Control Variables

Several control variables were included in the study. The organization's *size,* as the natural logarithm of the number of full-time employees was included. Larger organizations possess bigger pool of resources and can have different approaches to management of innovation and knowledge. The more interfaces with the external environment provide them with more learning opportunities. Also, larger scope of activities naturally increases the options to apply the newly-acquired knowledge (Almeida et al., 2003; Jansen et al., 2006). The *age* of the organization, measured by the number of years since the founding is another control variable. Older firms might have more experience with managing innovation or have had more time to develop a knowledge acquisition capability (Autio, Sapienza, & Almeida, 2000). Age can be seen as an approximation measure for path dependency in the development of absorptive capacity capability (Cohen & Levinthal, 1990). Dummy variables for the *industry* were used to control for the effect of the external environment as well a measure of *environmental dynamism* (Dess & Beard, 1984; Eisenhardt & Martin, 2000). Variance between industry sectors may be the result of different practices of knowledge management and some sectors may experience relatively more exploratory innovation due to existing product life-cycles. Dynamic business environments are said to change the nature of dynamic capabilities, which tend to resemble routines in stable environments and experiential, unstable processes in high-velocity markets (Eisenhardt & Martin, 2000).

2.5. Results

Table 2-1 contains the descriptive statistics and bivariate correlations between the numeric variables used in the analysis. To estimate the hypothesized relationships, linear regression models were built. The unstandardized coefficients and the standard errors are reported in Tables 2-2 and 2-3 for knowledge acquisition capability and exploratory innovation respectively.

Required conditions for the regression method were satisfied. The histograms of the residuals showed that the error terms were approximately normally

distributed. Outlier check led to elimination of several observations that had dispersed values on exploitative innovation, age and firm size, resulting in sample size of 391. Scatterplots of the standardized residuals against the predicted values showed no evidence of heteroscedasticity. The examination for nonlinearity of the partial regression plots showed evidence of linear relationships or no relationships at all. Multicollinearity diagnostics were performed for the three models. To avoid multicollinearity problems from the interaction, we centered the variables prior to multiplying them (Aiken & West, 1991). Variance inflation factors (VIFs) were calculated in all regression equations. The highest VIF was 1.37, which is well below the cut-off point of 10 (Neter, Wasserman, & Kutner, 1990). The full models showed good fit with the data and have relatively good explanatory value with R^2 reaching 27%.

For each dependent variable the Model 1 (Table 2-2 and 2-3) includes only the control variables, and the models thereafter capture the effects of the studied constructs. From the controls, environmental dynamism emerges as a strong predictor to exploratory innovation, significant in all models. Firm size is significant as a predictor of knowledge acquisition capability. A few industry effects were also significant in the models.

Table 2-1 Descriptive Statistics and Correlation Coefficients of the Numeric Variables [a]

Variable	Mean	s.d.	1	2	3	4	5	6
1. Exploratory innovation	4.35	1.17						
2. Firm size[b]	689.71	4465.46	-0.03					
3. Firm age[c]	39.47	32.13	0.03	0.06				
4. Environmental dynamism	4.28	1.26	0.42 **	-0.03	0.00			
5. External connectedness	3.58	1.36	0.33 **	-0.01	0.02	0.23 **		
6. Internal connectedness	4.92	1.02	0.23 **	-0.10	0.03	0.18 **	0.10	
7. Knowledge acquisition	4.47	1.31	0.21 **	0.04	0.01	0.15 **	0.13 *	0.25 **

[a] $N = 391$.

[b] Number of full-time employees

[c] Years since founding

* $p < 0.05$

** $p < 0.01$(two-tailed)

Table 2-2 Results of Hierarchical Regression Analyses[a] : Knowledge Acquisition Capability

	1		2		3		4	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	3.31	(.33) ***	3.06	(.35) ***	1.92	(.43) ***	1.75	(.44) ***
Firm size (log)	.14	(.05) **	.13	(.05) **	.15	(.05) **	.15	(.05) **
Age	.00	(.00)	.00	(.00)	.00	(.00)	.00	(.00)
Environmental dynamism	.12	(.05) *	.10	(.05) *	.08	(.05) †	.07	(.05)
Construction	.09	(.19)	.10	(.18)	.06	(.18)	.07	(.18)
Trade	-.54	(.30) †	-.57	(.30) †	-.39	(.29)	-.42	(.29)
Transport	.15	(.27)	.13	(.27)	.23	(.27)	.22	(.27)
Finance	.03	(.25)	.04	(.25)	.06	(.24)	.07	(.24)
Business services	.08	(.23)	.08	(.23)	.02	(.23)	.02	(.23)
Others	-.27	(.66)	-.21	(.66)	-.13	(.64)	-.08	(.64)
External connectedness			.10	(.05) *			.08	(.05) †
Internal connectedness					.31	(.06) ***	.30	(.06) ***
R^2	.05		.06		.10		.11	
R^2 change	.05		.01		.05		.06	
F change	2.24 *		4.22 *		22.54 ***		12.86 ***	

[a] Unstandardised coefficients with standard errors in parenthesis

† $p < 0.10$

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

The hypothesized effects of the knowledge sources variables on exploratory innovation are examined for statistical support in Model 4 of Table 2-3. Both internal and external connectedness have positive and significant association with exploratory innovation, meaning that both Hypothesis 1-1 and Hypothesis 1-2 are supported. The coefficient of internal connectedness ($\beta = 0.17$, $p < 0.01$) shows a weaker relationship than that of external connectedness. External connectedness has a strong association with exploratory innovation ($\beta = 0.22$, $p < 0.001$). The support for Hypothesis 1-1 is therefore stronger than that for Hypothesis 1-2.

The addition of the knowledge acquisition capability variable in the models of exploratory innovation (Model 5, Table 2-3) leads to an interesting finding. The association of external connectedness with exploratory innovation maintains its strength and level of significance ($\beta = 0.22$, $p < 0.001$). The coefficient of internal connectedness on exploratory innovation, however, declines and the level of significance declines as well (from $\beta = 0.17$, $p < 0.01$ to $\beta = 0.14$, $p < 0.05$).

Table 2-3 Results of Hierarchical Regression Analyses[a] : Exploratory Innovation

	1		2		3		4		5	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	3.00	(.27) ***	2.42	(.28) ***	2.11	(.37) ***	1.66	(.36) ***	1.45	(.37) ***
Firm size (log)	-.01	(.04)	-.03	(.04)	.00	(.04)	-.02	(.04)	-.03	(.04)
Age	.00	(.00)	.00	(.00)	.00	(.00)	.00	(.00)	.00	(.00)
Environmental dynamism	.32	(.04) ***	.28	(.04) ***	.30	(.04) ***	.26	(.04) ***	.25	(.04) ***
Construction	-.32	(.16) *	-.29	(.15) *	-.34	(.15) *	-.31	(.15) *	-.32	(.15) *
Trade	.25	(.25)	.18	(.24)	.35	(.25)	.27	(.24)	.31	(.24)
Transport	-.40	(.23) †	-.43	(.22) *	-.34	(.23)	-.38	(.22) †	-.41	(.22) †
Finance	-.46	(.21) *	-.44	(.20) *	-.44	(.20) *	-.43	(.20) *	-.43	(.19) *
Business services	.18	(.19)	.16	(.19)	.14	(.19)	.13	(.18)	.12	(.18)
Others	.28	(.55)	.42	(.53)	.37	(.54)	.50	(.52)	.51	(.52)
External connectedness			.23	(.04) ***			.22	(.04) ***	.22	(.04) ***
Internal connectedness					.20	(.05) ***	.17	(.05) **	.14	(.05) *
Knowledge acquisition									.12	(.04) **
R^2	.16		.23		.19		.26		.27	
R^2 change	.16		.07		.03		.09		.02	
F change	8.28	***	35.09	***	12.80	***	23.35	***	7.99	**

[a] Unstandardised coefficients with standard errors in parenthesis

† $p < 0.10$

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Examining the mediation role of knowledge acquisition, we analyzed the mediation triads (Baron & Kenny, 1986) among the variables by comparing the regressions of knowledge acquisition and exploratory innovation on external and internal connectedness (Tables 2-2 and 2-3). First, external and internal connectedness must predict the mediating variable knowledge acquisition capability. Both of these relationship were statistically significant ($\beta = 0.08$, $p < 0.10$; $\beta = 0.30$, $p < 0.001$). Second, knowledge acquisition capability must predict exploratory innovation. In Model 5 of Table 2-3, we show that knowledge acquisition is a significant predictor of exploratory innovation ($\beta = 0.12$, $p < 0.01$). Finally, the coefficients before external and internal connectedness must become non-significant when we control for the mediating variable. As shown in Table 2-3, only internal connectedness becomes less significant, while external connectedness maintains its significance. Therefore, Hypothesis 1-3 is not supported, and Hypothesis 1-4 receives only partial support.

2.6. Discussion

This study investigated the effect of both external and internal connectedness as knowledge sources for the exploratory innovativeness of firms. Additionally, the study tested the role of the dynamic capability for knowledge acquisition as a mediator of those relationships. The empirical data collected from a survey among medium and large companies showed strong evidence that both external and internal connectedness of firms are linked to exploratory innovation. As a direct effect, external networks facilitate the development of unrelated or exploratory innovation, such as those that reach for new customers and technologies.

The empirical evidence supports also the conclusion that both types of sources play an important role for the development of knowledge acquisition capability within firms. Firms that demonstrate high connectedness inside and outside their organizational boundary are more likely to possess the dynamic capability to scan, interpret, and integrate new knowledge. As other studies have previously suggested (Tsai & Ghoshal, 1998), internal and external connections act as conduits for the transfer of knowledge resources. This study provides additional empirical evidence for that link.

The findings showed strong support for the knowledge distance argument. Internal connections are closer in knowledge distance and relatedness, hence they may also provide input for exploratory innovation, but external connectedness offers the distant search opportunities needed for exploratory learning and innovation. The mechanism of the association of internal connectedness is rather different. Internal ties are stronger by institution, which allows complex knowledge to be exchanged within the boundary of the organization without the risk of spillover (Hansen 1999, Kogut & Zadner 1992). This leads the firm to develop knowledge acquisition capability. Experience in networking is a learning mechanism that leads to the development of this dynamic capability. Further, as a systematic and deliberate process of organizational leaning, knowledge acquisition ensures channeling of distant, external information in the right internal place to develop exploratory innovation. Internally connected firms are thus able to combine their existing knowledge resources in novel, and non-traditional ways, improving the exploratory innovation output of the organization.

Altogether, similarly to other studies, the findings confirm that firms are able to overcome the local search through tapping the resources available in their external networks (Powell et al., 1996). An alternative explanation for the direct

association between networks and innovation can be related to the role of management as a driving factor behind both phenomena. It can be speculated that firms highly connected with external partners have also more exploratory innovation because of a more open and exploratory oriented mode of management (Sidhu et al., 2004). This speculation deserves to be further researched by studying the role of top management teams in innovation (Hambrick & Mason, 1984).

This study extends previous works that connect knowledge sources with innovation outcomes. Using the definition of exploratory innovation (Benner & Tushman, 2003; Jansen et al., 2006) we provide a way of explaining some of the mechanisms of conversion of knowledge input into innovation output. Our empirical contribution shows evidence about the role of external and internal sources, thus integrating previous studies that have looked at knowledge sources exclusively within or outside the firm boundary.

The findings of this chapter highlight a strong correlate of dynamic capabilities: the experience with knowledge sources. Previous studies on the evolution of dynamic capabilities have emphasized market dynamism, as an external force that pressures firms to develop dynamic capabilities (Eisenhardt & Martin, 2000). Building on the idea that dynamic capabilities result from learning mechanisms that can be deliberate and emergent (Eisenhardt & Martin, 2000; Zollo & Winter, 2002), we demonstrate that knowledge sources can serve a base role for these learning processes. In this sense, this study is in line with other works that have investigated the informational role of connectedness for the formation of dynamic capabilities (e.g. Blyler & Coff, 2003).

Our study makes a case for the learning organization as well (Argyris & Schön, 1978). We put accent on the knowledge acquisition capability as a driving force for learning processes of organizations (Crossan et al., 1999; Huber, 1991). The findings show that this capability is very important for the generation of exploratory innovation, and that it is caused by external and internal connectedness. In the case of internal connectedness, knowledge acquisition capability explains part of the effect that that connectedness has on exploratory innovation.

Finally, this chapter integrates insights from social networks literature in the study of the role of external and internal knowledge sources (Powell et al., 1996; Tsai, 2001; Tsai & Ghoshal, 1998). Although further challenges in operationalization of the constructs are to be tackled, it is an initial attempt to

bring closer a relational dimension to the explanations of knowledge sourcing in organization.

For managers, the study provides several insights regarding strategic issues on corporate and business level. Discussing external and internal knowledge sources is relevant in the context of managerial endeavors for corporate strategic renewal. Strong internal connectedness of the corporation facilitates innovation as it leads to interaction and exchange of knowledge and other resources inside the company. Corporate strategy for strategic renewal has to consider juxtaposing its internal network connectedness to the existing and potential ties outside the corporation. A major problem for many firms is their falling in a "competence trap" as they overemphasize inward looking for new competences. While previous studies have suggested that developing exploratory innovation is one of the ways to cope with it (Levinthal & March, 1993; March, 1991), this study gives one answer to the "how" question. Firms struggling to diversify their innovation portfolio should examine their connectedness both internally and externally. Although connecting to new sources is a long and rather emergent process, managers have the possibility to establish a more external orientation through creating an organizational environment that encourages external connectedness.

Limitations and Conclusions

The empirical limitations are related to the operationalization of the variables, the sample and the use of a survey method. Although this study relied on validated scales and efforts were made to eliminate single informant-bias, only the perspective of the focal firm is being taken to measure connectedness variables. Collecting data from both sides of a dyadic relationship can improve the quality of the measurements. Future research should focus on relational measures to confirm the relationships outlined in the models. With regard to the sampling, in the current research, external and internal network antecedents are considered in a single country context with some industries more represented than others. To allow for further generalizations beyond the studied population, subsequent research can be directed to replicate the study to other contexts.

Although the scales were tested for reliability and validity, self-reported data may reflect respondents' biases, poor memory, or misunderstanding of the questions. Subjectivity and the need for recall are inherent issues in the chosen instrument for research. Another limitation is the cross-sectional character of the

data, and future longitudinal studies can put the hypothesized causalities to a further test.

As the connectedness of a firm grows, the maintenance costs of the connections also grow, thus triggering the decrease in the positive effects (McFadyen & Canella Jr., 2004). Following studies may consider such negative implications as potentially optimal levels of connectedness can be sought.

Firms need to develop both exploratory and exploitative innovation. Research on ambidexterity (Gibson & Birkinshaw, 2004; He & Wong, 2004; Jansen et al., 2006; Tushman & O'Reilly, 1996) draws attention on the management efforts to balance between the two types of innovation. A study that considers the complementarity of the external and internal knowledge sources (Cassiman & Veugelers, 2006) as a potential antecedent of ambidexterity can further contribute to the development of that research stream. Furthermore, an interesting possibility to extend this research is to investigate whether specific external and internal network configurations promote certain structural organizational characteristics, and hence structural ambidexterity (Tushman & O'Reilly, 1996). Combining external and internal connectedness might produce tensions for the structuring of the organizational activities.

As suggested earlier, the firm's knowledge sources may be also influenced by the realized outcomes. For instance, the introduction of an innovation may reshuffle the structure of connections within an industry or even lead to internal repercussions. A future longitudinal study may consider the effects on the networks of the organization as for example Greve & Taylor (2000) concluded that introducing innovation triggers changes in the firms of an industry, forcing them to imitate or intensify their exploration efforts.

Finally, future research would benefit from a more specific attention to the role of management. Exploration or entrepreneurial orientation (Lumpkin & Dess, 1996; Matsuno, Mentzer, & Özsomer, 2002; Sidhu et al., 2004) may be a common factor for the emergence of both radical innovation and external connectedness in some firms. Therefore, future research can test a model which includes management variable as a potential common determinant to both knowledge sources orientation and innovation.

CHAPTER 3.

TMT ADVICE SEEKING AND EXPLORATORY INNOVATION. THE MODERATING ROLE OF TMT HETEROGENEITY[2]

3.1. Abstract

Research on strategic decision making has considered advice-seeking behavior as an important top management team attribute that influences organizational outcomes. Yet, our understanding about how top management teams utilize advice to modify current strategies and pursue exploratory innovation is still unclear. To uncover the importance of advice seeking, we delineate between external and internal advice seeking and investigate their impact on exploratory innovation. We also argue that top management team heterogeneity moderates the impact of advice seeking on exploratory innovation. Findings indicated that both external and internal advice seeking are important determinants of a firm's exploratory innovation. In addition, we observed that top management team heterogeneity facilitates firms to act upon internal advice by combining different perspectives

[2] This study will appear in a forthcoming issue of the *Journal of Management Studies* as: Alexiev, A. S., Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2010) Top Management Team Advice Seeking and Exploratory Innovation: The Moderating Role of TMT Heterogeneity. *Journal of Management Studies,* forthcoming.

and developing new products and services. Interestingly, heterogeneous top management teams appeared to be less effective to leverage external advice and pursue exploratory innovation.

3.2. Introduction

In the face of market or technological discontinuities senior managers are confronted with the need to facilitate or champion exploratory innovation (Benner & Tushman, 2003; Hoffman & Hegarty, 1993). Exploratory innovation builds on new knowledge and requires the departure from existing skills and capabilities (Benner & Tushman, 2003; Jansen et al., 2006). This type of innovation is crucial for organizations operating in more dynamic environments (Jansen et al. 2006), and is considered to be key to an organization's long-term survival (Levinthal and March, 1993). Studies have shown that some top management teams have the ability to recognize distant opportunities and devote organizational resources to exploratory innovation, while others fail to do so and put their organizations at risk of becoming obsolete (Day, 1994; Kaplan et al., 2003; Young et al., 2001). In this sense, the impact of top management teams (TMTs) on the pursuit of exploratory innovation has emerged as an important theme.

Previous research has shown that TMTs play an important role by orchestrating strategic renewal, including organizational reorientations (Tushman & Rosenkopf, 1996; Virany et al., 1992), new product launches (Boeker, 1997; Ciborra, 1996; Eisenhardt & Tabrizi, 1995; Song & Montoya-Weiss, 1998), and changes in research and development strategies (Kor, 2006). Although TMTs can influence organizational responses by establishing formal and informal coordinating mechanisms for implementation of exploratory innovation (Jansen et al., 2006), little attention has been given to the ways in which TMTs deal with knowledge sources that can enable them to notice and interpret environmental change, or that influence their decisions whether or not to pursue certain courses of action. Interestingly, researchers have observed that top management attribution biases can lead to the persistence of existing strategies and the avoidance of exploratory efforts (Hambrick, Geletkanycz, & Fredrickson, 1993; Kaplan et al., 2003). Blame is attributed to failed attempts of exploration rather than to lack of exploration (Danneels, 2008). As a result, firms follow paths where they have solid prior experience and make investments to proximate markets rather than distant ones (Dimov & de Nolan, 2009). Executives are often unable to recognize

new opportunities unless they are closely related to their existing knowledge and skills (Haynie, Shepherd, & McMullen, 2009). Little investigation has been made into the ways in which management teams use their knowledge sources to overcome these biases. Following from this, tracing how TMTs develop views on potential courses of action and overcome the persistence of existing strategies, can carry important benefits for research and practice.

Strategic decision making literature has proposed executives' advice seeking behavior as an important determinant of TMTs' decisions about whether or not to modify current strategies (McDonald and Westphal, 2003) and pursue exploratory innovation. A network of external advisers – managers at other companies – provide knowledge to TMTs to stay in touch with environmental changes. In addition to that, top executives maintain linkages with managers from within their own organizations. These lower-level managers are another important knowledge source as they may possess critical operational information or propose their own initiatives for exploratory innovation (Bower, 1970; Burgelman, 1983). Thus, advice from external and internal sources are two independent information streams that can provide TMTs with new knowledge and qualitative assessments of current and future exploratory innovation strategies. In this study, we argue that the extent to which senior executives seek and use advice is associated with the inclination of organizations to pursue exploratory innovation (Arendt, Priem, & Ndofor, 2005; Balkundi & Kilduff, 2005; McDonald, Khanna, & Westphal, 2008; McDonald & Westphal, 2003).

We provide a refined understanding of senior executives' role in pursuing exploratory innovation and contribute to prior literature in at least two important ways. Firstly, we probe into the mechanisms that connect TMT advice-seeking behaviors to exploratory innovation as an organizational-level outcome. We go beyond previous studies that have sought to explain organizational innovation with top management group demographics or individual-level executive attributes (e.g. Barker & Mueller, 2002; Papadakis & Barwise, 2002; Srivastava & Lee, 2005; West & Anderson, 1996). We emphasize that TMT behavior is another crucial determinant of an organization's exploratory effort (Hambrick & Mason, 1984; Simsek, Veiga, Lubatkin, & Dino, 2005). To elaborate that, we examine TMT advice-seeking behaviors directed both externally and internally (c.f. Arendt et al., 2005; McDonald et al., 2008; McDonald & Westphal, 2003). Power and social identity theories have explained the tendency of individual senior executives to prefer one type over the other (Menon & Pfeffer, 2003; Menon et al., 2006). For

instance, a preference for internal advice may be associated with in-group favoritism and out-group derogation while the choice for external advice may be triggered by internal competition and extensive criticism of internal ideas (Menon & Pfeffer, 2003). Yet, empirical evidence is still lacking on whether these theoretical mechanisms continue to be relevant on a group level, that is, whether the cumulative advice-seeking behavior of the TMT can implicate the pursuit of exploratory innovation.

Secondly, we acknowledge the role of TMT composition in the processing of acquired advice by studying the moderating role of TMT heterogeneity. TMT heterogeneity refers to the degree to which there are differences in demographic, functional, and background dimensions in team composition (Simons et al. 1999). Since heterogeneous teams approach information processing and decision making differently than a homogeneous ones (Dahlin, Weingart, & Hinds, 2005; Van Knippenberg & Schippers, 2007), we suggest that the impact of external and internal advice seeking is contingent upon TMT heterogeneity. Characteristically, heterogeneous teams are able to recombine acquired information and knowledge in different ways (Rodan & Galunic, 2004) and to connect with a qualitatively more diverse set of advisers both from across and from within firm boundaries (Granovetter, 1973; Hoffman & Maier, 1961; Jackson, 1992; Reagans, Zuckerman, & McEvily, 2004). In this sense, we argue that TMT heterogeneity moderates the relationship between both types of advice seeking and exploratory innovation. As a result, our study contributes to new insights as to how TMT heterogeneity affects the effectiveness of different behavioral attributes (i.e. external and internal advice seeking) to exploratory innovation.

3.3. Literature and Hypotheses

TMT Advice Seeking and Exploratory Innovation

Exploratory innovation is radical and designed to meet the needs of emerging customers or markets (Benner and Tushman 2003). It requires new knowledge or departure from existing knowledge and often is associated with experimentation, flexibility, and divergent thinking (Levinthal and March, 1993; McGrath, 2001). Exploratory innovation offers new designs, new approaches to new markets, or the utilization of new distribution channels (Benner & Tushman, 2003). The rationale to pursue exploratory innovation rests on the insight that it is important for a

firm's long term survival and for its ability to cope with discontinuous environmental change (Levinthal & March, 1993; March, 1991).

To pursue exploratory innovation, organizations must engage in distant search and radical product development during which they face high uncertainty about their probability of success (Jansen et al., 2006). This makes exploration a non-trivial option and organizations have a tendency to persist with existing strategies and with exploitation of current products and markets. This tendency is often associated with absence of systems for monitoring and analyzing environmental signals or for fostering action in response to these signals. Managers who dare to explore also risk punishment and attribution of blame if their exploration efforts fail (Danneels, 2008; Sitkin, 1992). Firms become also deeply embedded in the demands of existing customers, which obstructs them from adopting emerging disruptive technologies (Christensen & Bower, 1996; Pfeffer & Salancik, 1978).

Surmounting the persistence of existing strategies can be achieved when senior executives become involved as product champions or organizational sponsors to exploratory innovation initiatives (Day, 1994). In such cases, TMTs actively participate in resolving issues regarding resource allocation and modification of organizational requirements (Bower, 1970; Ettlie & Subramaniam, 2004). For example, Kaplan et al. (2003) found that the TMTs of some major pharmaceutical firms are particularly skilled in recognizing external discontinuities and adequately committing organizational resources to strategic renewal. In recent literature, scholars have studied how TMT advice-seeking behavior is associated with the motivation of TMTs to focus their attention on environmental discontinuities. Advice seeking is defined as the formation of opinions, attitudes, and judgments through deliberate information exchange with other individuals, also called advisers (Bonaccio & Dalal, 2006; Brehmer & Hagafors, 1986; Sniezek & Buckley, 1995; Sniezek et al., 2004). Multiple studies have suggested that advice seeking is a ubiquitous phenomenon as senior executives have a tendency to rely on oral and personal information sources more heavily than they do on written and impersonal ones, such as reports or outputs from management information systems (Brown & Eisenhardt, 1997; Elenkov, 1997; McDonald & Westphal, 2003; Mintzberg, 1973). The focus of the concept of advice seeking lies primarily on the intensity of effort with which TMTs pursue advice rather than on the particular source of advice. In this sense, advisers to the TMT can be both external and internal to the organization, including managers of other firms, or lower level managers within the same organization.

The primary role of advice seeking is considered to be the task-related information exchange that can improve the probability of accurate decisions (Bonaccio & Dalal, 2006; Goldsmith & Fitch, 1997; McDonald & Westphal, 2003). Advisers also offer decision makers new alternatives that may have not been considered earlier and provide new perspectives on the problem at hand. Credible advice from external and internal sources can alter the choices TMT members make and may guide subsequent organizational action and behavior away from established patterns and routines (Druckman, 2001).

Previous qualitative research on individual level has viewed external advice seeking and internal advice seeking as alternatives to each other highlighting social identity and power issues. Firstly, in hierarchical organizations, some managers tend to prefer external advisers over internal ones, because they see the latter as competitive threats to their position and status (Menon & Pfeffer, 2003). Acknowledging ideas and suggestions from internal advisers can be seen as a transfer of power to rivals who are also competing for organizational rewards (Salancik & Pfeffer, 1982). Such status implications may prompt managers to be less inclined to seek for internal advice. Furthermore, internal knowledge is more readily available, allowing managers to be more thorough in examining it and thus be more critical of it compared to external advice. This can lead to the overvaluation of external advice, solely based on its relative scarcity and costs to obtain (Menon & Pfeffer, 2003; Menon et al., 2006). Secondly, other managers may prefer internal advisers and resist knowledge from external sources, known as the "not-invented-here" syndrome (Katz & Allen, 1982). The tendency to dismiss external knowledge may bias managers towards considering internal ideas as superior to advice gained from outside sources, even in situations when the latter would have more advantages to the organization. In such situations, managers that rely solely on internal sources of advice may reinforce a perception of reality that ridicules external sources and glorifies information that has come only from within their own firm. Consequently, on a TMT level, the presence of externally or internally oriented managers can determine the degree of external or internal advice-seeking behavior of the group. Therefore, we distinguish these two behaviors as two independent TMT-level characteristics, each representing the external or internal advice-seeking activities of different members of the team.

External Advice Seeking and Exploratory Innovation

External advice seeking may be beneficial to facilitating exploratory innovation as organizational outcome as it enables TMTs to span organizational boundaries and gain new external knowledge. External advisers that possess specialized knowledge can affect TMT cognition with regard to possibilities for new learning alliances, technological transfers, and knowledge exchange (Kaplan et al., 2003). The more actively a top management team seeks external advice, the wider the array of opportunities to acquire and assimilate knowledge that is not yet known by TMT members. For instance, Cao et al. (2006) argued that CEO turnover, and arguably of any other senior executive, would have negative consequences for the firm's exploration due to the loss of the external social capital resources that they possess. In addition to spanning organizational boundaries, external advice can be instrumental in coping with resistance to radical organizational changes that accompany exploratory innovation. Seeking external advice can facilitate the effort of the TMT to provide legitimacy for particular exploratory strategies. For instance, external managers can be consulted with the purposes of training employees to work with unfamiliar technologies, managing the process of change or substantiating the necessity of the intended shift towards exploratory innovation (Gable, 1996; Ko, Kirsch, & King, 2005).

Finally, seeking external advice may also assist in reaching consensus among TMT members. TMT members may be in competition with one another for promotion within the hierarchy and thus have biases towards particular exploratory efforts that can bring them personal status gains. Thus, they may be unwilling to support projects proposed by their internal rivals (Menon & Pfeffer, 2003; Menon et al., 2006), which can also be an obstacle to achieving organizational commitment to radical changes. External advice seeking can be used for reaching consensus among disagreeing sides through the supply of independent analyses and evaluation of proposals. Hence, we predict that TMT external advice seeking enables organizations to pursue exploratory innovation.

> *Hypothesis 2-1: TMT external advice seeking will be positively related to a firm's exploratory innovation.*

Internal Advice Seeking and Exploratory Innovation

TMTs may also use internal advice seeking as leverage to innovation that departs from existing products and markets. Firstly, by allowing for internal

consultation, a climate of openness to daring new ideas is created. Under the frame of trust that internal advice seeking creates inside the organization (Inkpen & Choudhury, 1995; Sniezek & Van Swol, 2001), the process of idea generation is catalyzed. If the TMT has established a pattern of seeking advice internally, other organizational members would be more willing to share their ideas, especially when the ideas they present could be seen as unconventional or when proposing new ideas diverges greatly from their existing job description and function. Prior studies have suggested that this type of consultative mode for decision making creates a positive atmosphere for exploratory innovation (Somech, 2006; Vroom & Yetton, 1973). Not seeking internal advice may seal off opportunities for potentially valuable initiatives stemming from within the organization itself. Secondly, TMTs that look for input from other organizational members have the ability to form more feasible, as opposed to bold but unrealistic, exploratory innovation strategies. Seeking internal advice makes TMTs more aware of the existing skills and capabilities of the firm and that may prove crucial to the implementation of exploratory strategies. Trying to implement radical product diversification, for instance, may fail because the TMT did not foresee a mismatch between the required and available resources or competences needed to produce and market new products (Grant, 1996b; Wernerfelt, 1984). Consulting functional specialist managers to undergo thorough analyses of new ideas and suggestions may provide useful feedback and criticism (Menon & Pfeffer, 2003) and highlight important details about the implementation phases of radically new product development projects or process improvements.

> *Hypothesis 2-2: TMT internal advice seeking will be positively related to a firm's exploratory innovation.*

The Moderating Role of TMT Heterogeneity

Besides directly relating external and internal advice seeking to exploratory innovation, it is also important to consider how acquired advice is further processed within TMTs. TMT heterogeneity is a compositional characteristic that strongly influences the cognitive and information processing capabilities of TMTs. Heterogeneity refers to the degree to which there are differences along demographic, functional, and background dimensions in the composition of a group (Simons et al., 1999; Van Knippenberg & Schippers, 2007). Heterogeneity enhances problem solving, judgment, and decision making capabilities through team-level processing of unique job-relevant information, team reflexivity, and

healthy task-related conflicts (Hinsz, Tindale, & Vollrath, 1997; Van Knippenberg et al., 2004; Van Knippenberg & Schippers, 2007). Interestingly, prior studies have also shown that team heterogeneity can have also detrimental effects on group functioning due to processes of social categorization and emotional conflict (Mannix & Neale, 2005; Pelled, Eisenhardt, & Xin, 1999; Van Knippenberg & Schippers, 2007). Each of these "optimistic" and "pessimistic" views may prevail depending on the characteristics of the task at hand (Mannix & Neale, 2005; Pelled et al., 1999). The primary task of external and internal advice seeking is information acquisition, therefore we consider the mechanisms of the "optimistic" view of TMT heterogeneity as the most relevant and applicable for this context. As heterogeneous TMTs approach and process advice differently than homogeneous ones (Dahlin et al., 2005), we argue that the effectiveness of both types of advice seeking will depend on the degree of TMT heterogeneity.

Regarding external advice seeking and exploratory innovation, we expect that the benefits of using external advice in generating exploratory innovation will be amplified when TMTs are heterogeneous. Because the external networks of heterogeneous TMTs are less overlapping, external advice seeking provides a wider range of possible unique information inflows (Granovetter, 1973; Reagans et al., 2004). Heterogeneous TMTs are able to connect to a larger pool of potential external advisers from various areas of expertise (Hambrick, 1994), and enhance their ability to create novel strategic combinations for generating exploratory innovation (Hansen, 1999). Rather, homogeneous TMTs would likely regard information from external contacts as redundant, causing them to remain insensitive to environmental changes and external threats. In addition to this, the cohesiveness associated with homogeneous TMTs (Coleman, 1988) can contribute to the development of social control mechanisms that can stifle attempts for radical thinking and ideas. Therefore, even though senior executives may increase their external advice-seeking behavior, they will face difficulties to put more radical and unconventional proposals on the table and thus would prefer to conform to the status quo. Strong cohesion also raises suspicion against external information, creating an "us versus them" mentality and "not-invented-here" bias (Katz & Allen, 1982).

With regard to integrating acquired external advice, heterogeneous teams also have a larger absorptive capacity (Cohen & Levinthal, 1990; Van den Bosch, Van Wijk, & Volberda, 2003). Members of such teams come from varying knowledge backgrounds and are able to recognize patterns in idiosyncratic ways and to

contribute with multiple interpretations on a single piece of advice. Such heterogeneity leads to the creation of more original and valuable exploratory ideas than, in comparison with, if senior executives with similar backgrounds were to pool their ideas (Van den Bosch, Volberda, & De Boer, 1999). A homogeneous TMT may not seek external advice that is difficult to comprehend or to relate to their existing knowledge base, thereby limiting the potential for exploratory innovation.

> *Hypothesis 2-3: TMT heterogeneity moderates the relationship between TMT external advice seeking and exploratory innovation, such that TMT external advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.*

We also argue that TMT heterogeneity enables TMTs to apply internal advice more effectively to pursue exploratory innovation. The availability of heterogeneous skills and knowledge among TMT members often implies that different perspectives are represented at a higher hierarchical level within organizations (Ibarra, 1995; Podolny & Baron, 1997). Ideas for developing exploratory innovation often originate from lower organizational ranks in the form of minority dissent to established procedures and ways of doing things. A heterogeneous TMT means that various minorities are likely have representation at the highest level in the organization. The opportunity to connect with a similar individual from the TMT increases the minorities' willingness to share information (Burt, 1982; Tsai & Ghoshal, 1998). A lack of representation, on the other hand, lowers the probability of acceptance of novel ideas (De Dreu & West, 2001). If heterogeneity is low, such organizational members are likely to consider themselves excluded and on the peripheral, with their proposals lacking impetus and legitimacy.

When there is diversity of top executives' prior related knowledge, increasing the level of internal advice seeking can lead to more original interpretations to seemingly non-radical and incremental improvements suggested by the internal advisers (Cohen & Levinthal, 1990). Heterogeneous TMTs, therefore, have a stronger ability to assess the feasibility of exploratory ideas, because the members of heterogeneous TMTs are each in dialogue and relate to different internal advisers. In comparison with homogeneous TMTs, the variation in the pool of advisers to heterogeneous TMTs is much larger. Such TMTs have a higher

capacity to assimilate and incorporate highly-specialized and tacit information from their internal advisers into their decision making (Hansen, 1999). Hence, internal advice that flows towards heterogeneous TMTs is richer and contributes to their advantage over homogenous TMTs with regard to the contributions to a firm's exploratory innovation.

> *Hypothesis 2-4: TMT heterogeneity moderates the relationship between TMT internal advice seeking and exploratory innovation, such that TMT internal advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.*

3.4. Methods

Sample and Data Collection

Our empirical research was conducted at small and medium-sized firms (SMEs) across a wide variety of industries in the Netherlands. We focused on TMTs within SMEs as prior studies had suggested that SMEs cannot rely on slack resources or extensive systems to pursue exploratory innovation. Because of this, TMTs in small and medium-sized companies possess a higher discretion concerning decisions related to exploratory innovation (Simsek et al., 2005). Our primary source of data was a survey sent to a sample of 7884 firms drawn from the REACH electronic database, the largest information source about organizations registered in the Netherlands Chambers of Commerce. To ensure we were able to survey knowledgeable respondents for typically confidential information (Miller, Burke, & Glick, 1998), we addressed the survey strictly to the CEO. Two weeks after the initial mailing, we sent reminder notes and followed up with telephone calls to increase responses. We obtained fully completed surveys from 705 respondents (8.94 % response rate). The final sample included firms from multiple industries, categorized into four broad groups: manufacturing (34%), construction (17.7%), services (14%), and others (34.2%). The average number of employees was 58 (s.d. = 44), the average firm age was 19.10 years (s.d. = 10.11), and the average TMT size was 4.9 (s.d. = 4.96) individuals.

To test for nonresponse bias, we examined differences between respondents and nonrespondents. A t-test showed no significant differences ($p > .05$) between the two groups based on the number of full-time employees, revenues, and years

since the firm's founding. We also compared early and late respondents and paper and web respondents in terms of demographic characteristics and model variables. These comparisons did not reveal any significant differences ($p > .05$), indicating that differences between respondents were not related to nonresponse bias. To examine reliability issues associated with single-informant data, we surveyed an additional TMT member from each respondent firm. We received a total of 104 second-respondent surveys, or 14.8% of our final sample, from firms that were comparable in size, age, and revenues to our full sample. We calculated an interrater agreement score (r_{wg}) for each study variable (James et al., 1993). The median interrater agreement ranged from .88 to .93, which suggests high agreement. The examination of intraclass correlations also revealed a strong level of interrater reliability: correlations were consistently significant at the .001 level (Jones, Johnson, Butler, & Main, 1983).

We also examined the potential for the occurrence of single method bias. We performed Harman's one-factor test on items included in our regression model to examine whether common method bias augmented relationships. We found multiple factors, and the first factor did not account for the majority of variance. Also, we tested whether the addition of a single latent method factor connected with all the item scales would significantly improve the fit over a model with just the studied constructs as latent factors (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Widaman, 1985). The overall chi-square fit statistics for the model with the common method factor was significant ($\chi^2/df = 1.761$, CFI = .989, RMSEA = .033), but the incremental fit index had a rho of .006, which suggests non-significant improvement. Additionally, the factor loadings for the studied constructs remained significant even after we had considered the method effect. These results suggest that common method bias did not dramatically affect the study's findings and that the respondents were able to differentiate well between the variables.

Measurement of Constructs

We used existing scales from previous literature that were verified through various analyses.

Exploratory innovation. To measure exploratory innovation we adapted a five-item measure developed by Jansen et al. (2006). It captures whether organizations depart from existing knowledge and pursue radical innovations for emerging customers or markets. The respondents were asked about the extent to which (1)

the organization accepts demands that go beyond existing products and services, (2) they invent new products and services, (3), they experiment with new products and services in their local market, (4) they commercialize products and services that are completely new to the firm, and (5) they utilize new opportunities in new markets ($\alpha = .85$). To assess reliability and validity for the exploratory innovation scale we correlated the responses with objective measures. Following previous literature (He & Wong, 2004; Manu, 1992), we used the percentage of total sales accounted for by new products introduced within the past three years. This measure showed significant positive correlation with the perceptual measure for exploratory innovation ($r = .33$, $p < .001$), which increased our confidence in the scale's validity.

External and internal advice seeking. We followed McDonald & Westphal (2003) and adapted a team-level scale that captured the extent of TMT advice-seeking behavior. We generated a number of alternative wordings and variations, which were refined and validated by gathering expert researchers' opinions and through pre-testing among managers for clarity and unambiguity. In the final version of the scale, we asked the respondents to rate the TMT's (1) frequency of their advice seeking, (2) the extent to which they gathered knowledge with regard to their current strategy, and (3) the extent to which they sought advice with regard to future strategy. We repeated the questions twice, firstly about advice sought from managers from other organizations (*external advice seeking*) and secondly, about advice sought from within their own organization (*internal advice seeking*). To provide evidence for convergent and discriminant validity, we used exploratory factor analysis. The results replicated the intended two-factor structure, with each item loading clearly on its intended factor (all factor loadings were between .86 and .91 for external advice seeking and between .88 and .94 for internal advice seeking). The Cronbach's α were .89 and .93 for external and internal advice seeking respectively.

TMT heterogeneity. The scale used for TMT heterogeneity was adopted from Campion et al. (1993). It is a 5-item composite measure that asked respondents to assess the degree of heterogeneity on both demographic and functional attributes, namely expertise, background, experience, complementary skills, and education ($\alpha = .74$). Research has shown that composite team heterogeneity constructs are good predictors of team outcomes (Van Knippenberg & Schippers, 2007).

Control variables. We included various control variables that have appeared in previous literature as determinants of exploratory innovation (e.g. Jansen et al.,

2006; Sidhu et al., 2007; Sidhu et al., 2004; Srivastava & Lee, 2005). Because larger firms may have more resources yet may lack the flexibility to pursue exploratory innovation, we included the natural logarithm of the number of full-time employees within organizations to account for *firm size*. Secondly, incumbent firms may be more inclined towards existing strategies and face difficulties in pursuing exploratory efforts; we included *firm age* measured by the natural logarithm of the number of years from founding. Thirdly, *TMT size* might affect dynamics in decision making processes and therefore we included TMT size by measuring the number of senior executives who are responsible for strategy formulation and implementation (Siegel & Hambrick, 2005). Fourthly, context or industry effects may influence the extent to which organizations pursue exploratory innovation (Sidhu et al., 2007). In view of this, we included four *industry dummies* based on Standard Industry Classification codes: manufacturing, construction, services, and other industries (c.f. McGrath, 2001). Fifthly, environmental attributes such as dynamism tend to affect organizations in pursuing exploratory innovation. We therefore included a four-item measure for *environmental dynamism* (cf. Dill, 1958; Jansen et al., 2006). The scale for environmental dynamism (α = .80) tapped into the rate of change and the instability of the external environment. Finally, we also controlled for the level of *exploitative innovation* as prior studies have argued that it may influence the level of exploratory innovation (Tushman & O'Reilly, 1996). We used a four-item scale (Jansen et al., 2006) that captures the extent to which organizations build upon existing knowledge and pursue incremental innovations that meet the needs of existing customers or markets (α = .73).

Validation of Measures

For all multi-item scales, we constructed an integrated confirmatory factor analysis (CFA) in order to test for convergent and discriminant validity. Each item was constrained to load only on its respective latent variable. The results showed a good fit within the model (χ^2/df = 2.039, CFI = .982, RMSEA = .038). All loadings were significant ($p < .001$), which showed the convergent validity of the scales. The factor correlation matrix had moderate values (between .142 and .235), and we tested whether each correlation differed significantly from unity. We constructed models where this correlation was constrained to one and compared with the unconstrained model. The results from each of the six pairwise comparisons showed that constraining to unity worsens the models' fit in each

case (rho values between .222 and .390), which attested to the discriminant validity of the latent variables.

3.5. Analysis and Results

Table 3-1 contains the descriptive statistics and bivariate correlations between the numeric variables used in the analysis. We constructed linear regression models and have reported the standardized coefficients in Table 3-2. Model 1 (Table 3-2) is the baseline model and includes only the control variables, Model 2 shows the main effects, and Model 3 includes the interaction effects.

The required conditions for the regression method were satisfied. To reduce the impact of multicollinearity, we mean-centered the independent variables that were used in the interaction terms (Aiken & West, 1991). We used variance inflation factors (VIFs) to judge the presence of multicollinearity in the models. Across all models, the highest VIF was 1.42, which is well below the cut-off point of 10 (Neter et al., 1990). The full model showed an R^2 of 30.9%. Of the control variables, TMT size is positively associated with exploratory innovation ($p < .01$). Environmental dynamism is associated with pursuing exploratory innovation ($p <. 001$) as organizations try to avoid the obsolescence of their product portfolio. Interestingly, our results also indicate that exploitative innovation is positively associated with exploratory innovation ($p <.01$), which suggests that often firms possess both types of innovative capabilities.

We will discuss the regression results obtained in model 3. As predicted, external advice seeking has a positive and significant association with exploratory innovation ($\beta = .073$, $p <.05$). Hypothesis 2-1 is supported. As predicted by Hypothesis 2-2, model 3 indicates a positive and significant relationship between internal advice seeking and exploratory innovation ($\beta = .123$, $p < .001$). Overall, our results indicate that both types of advice seeking contribute to exploratory innovation; however, internal advice seeking has a relatively stronger association than external advice seeking.

Contrary to Hypothesis 2-3 that posited a positive moderating effect of TMT heterogeneity, model 3 shows that TMT heterogeneity reduces the strength of the positive relationship between external advice seeking and exploratory innovation ($\beta = -.088$, $p <.01$). Hypothesis 2-3 was not supported. We did find support for Hypothesis 2-4, as TMT heterogeneity positively moderates the effectiveness of

internal advice seeking to exploratory innovation (β = .070, p <.05). Whereas TMT heterogeneity decreases the effectiveness of external advice seeking, our results show that TMT heterogeneity increases the relation of internal advice seeking on developing new products and services for emerging markets. Figure 1 plots the interaction effects using the values of one standard deviation above (i.e. high level) or below the mean (i.e. low level) of the advice-seeking variables (Aiken & West, 1991). Figure 1a shows that under high levels of TMT heterogeneity, the effect of external advice on exploratory innovation has a slightly negative slope (β = .070), but a t-test (Aiken & West, 1991) revealed that this slope is not significantly different from zero (p >.10). Under low levels of TMT heterogeneity the relationship between external advice seeking and exploratory innovation is positive and significant (β = .159, p <.01). Figure 1b illustrates the positive effect of TMT heterogeneity on the relationship between internal advice seeking and exploratory innovation (Hypothesis 2-4). The positive slope under high TMT heterogeneity is stronger and significant (β = .184, p <.001), while under low TMT heterogeneity it is not significant (β = .062, p >.10). Thus, heterogeneous TMTs are in a better position to utilize internal advice and to develop exploratory innovation than homogenous TMTs.

Table 3-1 Descriptive Statistics and Correlation Coefficients

	Variable	Mean	s.d.	1	2
1.	Exploratory innovation	4.28	1.21		
2.	External advice	3.63	1.45	0.19**	
3.	Internal advice	4.94	1.36	0.23**	0.19 **
4.	TMT heterogeneity	5.22	0.96	0.15**	0.14 **
5.	Firm age[b]	19.10	10.11	-0.10**	-0.10 **
6.	Firm size[c]	58.35	43.59	-0.05	0.00
7.	TMT size	4.90	4.96	0.08*	-0.01
8.	Environmental dynamism	4.49	1.25	0.48**	0.18 **
9.	Exploitative innovation	5.20	1.09	0.23**	0.14 **

[a] $N = 705$.
[b] Years since founding
[c] Number of full-time employees
* $p < 0.05$
** $p < 0.01$(two-tailed)

3.6. Discussion

Upper-echelon theory argues that senior executives act on the basis of highly personalized interpretations of the situations they face (Hambrick & Mason, 1984). Several studies have acknowledged that the ability to respond to opportunities for exploratory innovation, such as performance declines or the emergence of discontinuous technologies, is a function of TMT cognition, and particularly their search for and use of advice (Gilbert, 2005; Kaplan et al., 2003; McDonald & Westphal, 2003). Our results provide strong evidence that TMT external and internal advice-seeking behavior is an important determinant for firms pursuing exploratory innovation. By engaging in external and internal advice-seeking behavior, TMTs are not only able to signal successfully environmental discontinuities and threats, but are also able to facilitate strategic renewal and increase exploratory innovation in their respective organizations (Day, 1994; Volberda, Baden-Fuller, & Van Den Bosch, 2001).

3	4	5	6	7	8
0.17**					
-0.07*	-0.03				
0.05	-0.02	0.11**			
0.06	-0.01	0.05	0.10**		
0.16**	0.08*	-0.09*	-0.02	-0.02	
0.22**	0.22**	-0.03	0.07	0.03	0.18**

Table 3-2 Results of Hierarchical Regression Analyses[a] : Exploratory Innovation

	1	2	3
	β	*β*	*β*
(Constant)			0.001
Firm age[b]	-0.054	-0.038	-0.028
Firm size[c]	-0.048	-0.054 †	-0.054 †
TMT size	0.091 **	0.087 **	0.088 **
Environmental dynamism	0.450 ***	0.423 ***	0.426 ***
Exploitative innovation	0.156 ***	0.114 **	0.105 **
Construction	-0.024	-0.014	-0.009
Services	-0.071 *	-0.072 *	-0.067 †
Others	0.015	0.025	0.035
External advice		0.072 *	0.073 *
Internal advice		0.109 **	0.123 ***
TMT heterogeneity		0.067 *	0.066 *
External advice X TMT heterogeneity			-0.086 **
Internal advice X TMT heterogeneity			0.061 *
N	705	705	705
R^2	0.273	0.298	0.309
F change	32.60 ***	8.20 ***	5.71 **

[a] Standardised coefficients
[b] Logarithm of years since founding
[c] Logarithm of number of employees
† $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

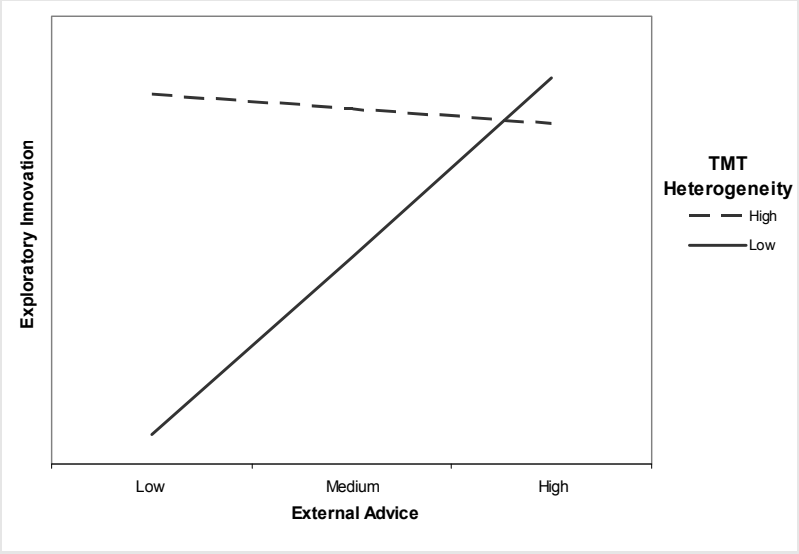
Our study unites two contrasting theoretical perspectives on the preference and effectiveness of external versus internal advice seeking. The first perspective puts managers against each other in rivalries to obtain organizational resources and higher status within the hierarchy (Menon et al., 2006). In this sense, organizations tend to prefer external to internal advice seeking and utilize information from external sources to generate new ideas for products and services. The second perspective emphasizes in-group favoritism and out-group derogation (Katz &

Allen, 1982), which explains the tendency for organizations to incorporate information from internal sources into strategic decision making and strategic renewal. Our proposition was that both mechanisms have strong merits as predictors of exploratory innovation, thus making a case for integrating the two perspectives rather than opposing them as mutually exclusive views (Menon & Pfeffer, 2003). Although our empirical study provides evidence that TMTs seek more often advice from internal than from external advisors (mean of 4.94 and 3.63 respectively – see Table 3-1), both types of advice-seeking behaviors contribute to a firm's exploratory innovation. In this sense, our study provides important evidence for answering previous calls for multi-firm and multi-industry research that increases our understanding of organizational outcomes of managerial information search both within and across organizational boundaries (Menon & Pfeffer, 2003). Our findings suggest that future research on advice seeking needs to go beyond investigating potential benefits of either external or internal advice seeking in isolation. Future research might not only consider senior executives as environmental monitors and disseminators (Mintzberg, 1973), but also as active information seekers from within their own organizations. Although the positive correlation between external and internal advice seeking confirms such a complementary effect, future research needs to uncover contextual attributes that explain the potential complementarities between both types of advice seeking in increasing important TMT as well as organizational outcomes.

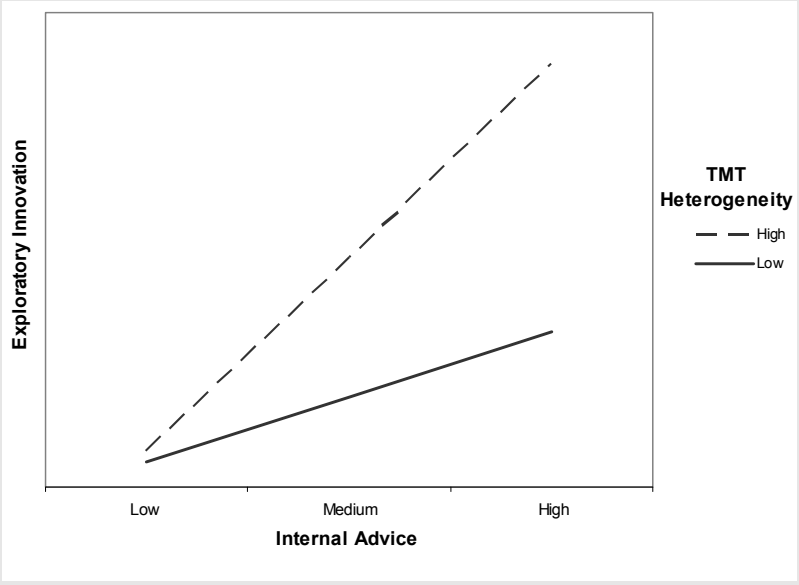
Our findings indicate that external advice seeking is an important TMT determinant of an organization's exploratory innovation. External advice seeking not only provides possibilities for learning new insights; it may also provide legitimacy for particular exploratory innovations. External advisers can be sought to train employees to work with unfamiliar technologies, to manage the process of change and to convince and substantiate the necessity of the intended shift towards exploratory innovation (Hambrick et al., 1993). By revealing the importance of TMT external advice seeking for exploratory innovation, our study confirms previous assertions on the importance of organizational boundary-spanning and distant knowledge search (Ancona & Caldwell, 1992; Hambrick et al., 1993; Menon & Pfeffer, 2003). Specifically, in addition to knowledge transfer across boundaries at lower levels within the organization (Henderson and Cockburn, 1994), our study reveals that upper echelons are also able to encourage firms to stay abreast of emerging technologies by soliciting external advisers themselves.

Figure 3-1 Interaction Effects

a) TMT Heterogeneity x External Advice



b) TMT Heterogeneity x Internal Advice



This study also indicates that TMT advice seeking from internal sources contributes to a firm's exploratory innovation. Through internal advice seeking, TMTs are able to catalyze new ideas generation from within the organization and to realize potential opportunities for new products and services. Our findings provide new insights into the process of innovation championing literature, which has explored both top-down and bottom-up origination and development of innovative ventures. Scholars generally agree that in both cases the role of senior executives is critical. In bottom-up processes, top management teams members need to give impetus and provide strategic context to emerging exploratory innovation initiatives (Bower, 1970; Burgelman, 1983). In top-down models, senior executives actively create and champion such initiatives (Day, 1994; Eisenmann & Bower, 2000). Our study suggests that the implementation of new initiatives may benefit from a consultative decision making approach by senior executives. TMTs that encourage interaction across hierarchical levels during decision making regarding exploratory innovation signal that new initiatives are desirable.

Our study also contributes to prior literatures on the role of senior executives in overcoming the persistence of current strategies. Senior managers are often restrained by their own perceptual biases or are keen to seek advice exclusively from their closest contacts (McDonald et al., 2008; McDonald & Westphal, 2003). Our study shows that the increased information flows surrounding more connected TMT members enable them to reduce inertia and stimulate organizational change and renewal. Arguably, internal processes within the top management team may also play an important role for that purpose. We therefore suggest that future attention needs to be given to specific TMT attributes and processes such as shared vision, contingency rewards and social integration that may influence the extent to which top management teams are inclined to acquire and apply divergent advice (Jansen, George, Van den Bosch, & Volberda, 2008).

In addition to the importance of external and internal advice seeking, we also argued that TMT heterogeneity increases the effectiveness of both types of advice seeking. Contrary to our prediction, however, heterogeneous teams were not able to generate benefits from external advice seeking for pursuing exploratory innovation than homogenous TMTs. A possible explanation for this rather interesting result could be the notions of local search and learning as a process of satisficing (March & Simon, 1958; Stuart & Podolny, 1996; Winter, 2000). Heterogeneous TMTs may not be benefiting from external advice seeking because

their members may have sufficient access to heterogeneous knowledge within the team and consider external advice only as a substitute. Homogeneous TMTs, on the other hand, may consider external advice as complementary to their own knowledge sources and skills and are more willing to use external advice as leverage to pursue exploratory efforts. In essence, increasing external advice seeking can be a substitute for the lack of diversity within the team. Still, the combinative impact of TMT heterogeneity and external advice seeking deserves further attention through in-depth case studies.

Our study reveals that under heterogeneous TMTs, internal advice has a stronger relationship with exploratory innovation. Underlying diversity in heterogeneous TMTs encourages organizational members to share ideas for radical new products or new uncharted markets (Ibarra, 1995; Podolny & Baron, 1997; Tsai & Ghoshal, 1998). The possible occurrence of conflict and creation of fault lines between senior executives with diverse backgrounds deserves more attention in further research (Pelled et al., 1999; Van Knippenberg & Schippers, 2007). Nonetheless, the study contributes to the literature on TMT heterogeneity with additional evidence that the effects of diversity on organizational outcomes must be understood beyond the typologies of the demographic or functional, and as underlying processes of information exchange and decision making (Van Knippenberg & Schippers, 2007).

For managers, our study suggests important guidelines for analyzing and assessing the use of strategic advice when the organization aims at increasing exploratory innovation. Firstly, it provides an analytical framework for the possibilities of sourcing distant knowledge by the TMT. Increasing external advice leads to higher exploratory innovation for homogeneous TMTs, while increasing internal advice seeking leads to higher exploratory innovation for heterogeneous TMTs. An increase in external advice for heterogeneous TMTs, and an increase in internal advice for homogeneous TMTs would have no significant effects on exploratory innovation. Secondly, our study provides a caution to organizational transformation efforts that attempt costly reshuffling of the TMT advice linkages. The results show that the intensity of advice-seeking behavior targeted at acquiring distant knowledge is important for exploratory innovation regardless of whether it is sourced externally or internally. Thirdly, we encourage selection and promotion policies that favor heterogeneity in TMTs, since they influence exploratory innovation more than the use of external advisers.

Limitations and Conclusion

Several limitations of this study deserve discussion. Firstly, although our survey technique attempted to achieve aggregated measurements for the TMT, not all TMT members in the responding organizations completed our survey. This may affect construct validity even though we have attempted to reduce such issues by validating our scales through interrater agreement scores and interclass correlations. Another limitation is the cross-sectional design of the study, which prevents us from making a firm conclusion about the direction of causality between the variables we have studied. For instance, firms strong on exploratory innovation might also be more skilled in attracting and building heterogeneous TMTs that are more prone to seek advice more intensely. Future research could address this shortcoming through a longitudinal setup.

Future studies could also consider the role of TMT discretion over the innovation process (Hambrick, 2007; Hambrick & Finkelstein, 1987). Our sample consisted of small and medium-sized firms in which TMTs have significant latitude of action. In large organizations, under multiple layers of hierarchy, TMTs may need to use other levers to steer the organization towards more exploratory innovation. Under low managerial discretion, advice seeking may retain its information gathering purpose, but the structure of TMT's informal networks of influence may play a stronger role in executing decisions (Ibarra, 1993; Krackhardt, 1990). Future research should also investigate when TMTs turn to the board of directors for advice. This is a special category of advisers, because they fulfill also monitoring and control functions on behalf of the shareholders (e.g. Hillman & Dalziel, 2003; Westphal, 1999). They can be an important source of advice especially if they possess relevant strategic information by virtue of their external network ties (Carpenter & Westphal, 2001).

Although this study is focused on the role of TMTs, exploratory innovation in organizations may be a consequence of factors that exist beyond the scope and power of senior executives and groups. Organization-wide policies, processes, and cultures may provide nurturing contexts for the creation of exploratory ideas by stimulating exchange and combination of knowledge resources at all levels (Tsai & Ghoshal, 1998). Good examples of these are policies for encouragement of experimentation or for tolerance of failures (Danneels, 2008). Such contexts can predispose individuals and teams to distant search and recognition of new opportunities, and may precede the advice-seeking behaviors of managers.

Exploring the antecedents of advice seeking across different hierarchical levels can therefore be a fruitful path for future research.

Finally, we looked at TMT advice seeking through a knowledge and information exchange lens by adopting a rational model of strategic decision making (Eisenhardt & Zbaracki, 1992). Strategic decisions, however, may be derived from political interests and concerns. Particularly in cases where large-scale changes are undertaken, various groups and stakeholders can become active and senior managers would need to consider their response to them. Therefore, further research can incorporate a power and politics perspective and study how the interaction with the rational approach can impact the organizational outcomes (e.g. Eisenhardt & Bourgeois, 1988; Pfeffer, 1981, 1992).

CHAPTER 4.

TMT ADVICE SEEKING AND DECISION COMPREHENSIVENESS[3]

4.1. Abstract

Management teams operate at the boundary of the organization. Their perceptions, images of their organization and its environments can influence their behavior and determine the course of organizational action. In this chapter, we ask the question of how top management teams use external and internal advice seeking to connect to their internal and external environments. We investigate the relationship of these behaviors with the comprehensiveness of the decisions they are making. Empowerment climate, or the degree to which senior management share their power with their subordinates, is conceptualized as a moderator to that relationship. High empowerment climates may pose hindrances but also stimulate how advice seeking contributes to decision comprehensiveness. Our results show that empowerment climate is a substitute for external advice seeking and an enhancer of internal advice seeking in the pursuit of more comprehensive decisions.

[3] This study has been presented at the 11th PREBEM PhD Conference on Business Economics and Management 2010, Nyenrode, the Netherlands.

4.2. Introduction

A central question for strategy is the quality of the decision making process undertaken by the top management team (TMT). Comprehensiveness, or the degree of rationality, of decision making has received considerable amount of attention from scholars in reference to its influence on decision quality and firm performance under different environmental conditions (Elbanna & Child, 2007; Forbes, 2007; Fredrickson, 1984; Miller, 2008). Extensive research has been conducted in order to uncover which TMT characteristics or processes are able to stimulate comprehensive decision making. For example, Simons et al. (1999) argued that diversity in TMT composition and debate are precursors to extracting the benefits of decision comprehensiveness through elaboration and processing of task relevant information and reflection and healthy disagreements on how the team works (Van Knippenberg & Schippers, 2007).

Interestingly, existing TMT research on decision comprehensiveness overlooks how TMTs interact with the sources that feed into the decision process. Studies have shown that connecting to the right knowledge sources can be critical for the organizational ability to adapt and overcome persistence of existing strategies (Jansen et al., 2005; Zahra & George, 2002). This gap is particularly striking, considering the amount of literature emphasizing the importance of understanding the nature of organizational environments, for example through the concepts of uncertainty and dynamism (Forbes, 2007; Fredrickson & Mitchell, 1984; Gilbert, 2005; Huber & Daft, 1987).

The immediate informational environment of senior managers is primarily social, that is, it constitutes of people. TMTs rely on information gathered through advice from lower-level managers and external counselors (Arendt et al., 2005; Elenkov, 1997; McDonald & Westphal, 2003; Mintzberg, 1973). Literature suggests that executive advice seeking has two independent dimensions based on whether the source of advice is external or internal. Each individual TMT member may exhibit preference for either external or internal advice, which can aggregate on a group level as a level of TMT external or internal advice seeking behavior (Menon & Pfeffer, 2003). Although research has postulated their separate positive effect on several organizational outcomes, insufficient attention has been given to how they interact and whether their combination may affect the comprehensiveness of decision making.

The focus of this study is the process that feeds information to decision making and allows new opportunities be recognized or evidence be gathered for selected courses of action (Kaplan et al., 2003; McGrath, 2001). Our first contribution is to demonstrate the interaction between the two distinct dimensions of advice seeking. By exploring these effects, we unravel the structure of the TMT information environment, beyond the team itself, as already studied by extant research. The perspective we take in this study argues that managers do not interact directly with the environment, but with information about the environment (Forbes, 2007; Huber & Daft, 1987). The key to understanding strategic decision making processes is thus to focus on the behaviors that link managers to their environment: external and internal advice seeking of the TMT.

Second, this information acquisition and processing perspective deserves to be complemented with theories about power structures and authority in organizations. Integrating rational and political views on decision making processes has a long standing tradition (Astley & Zajac, 1991; Eisenhardt & Zbaracki, 1992). The concept of empowerment climate, defined as the degree to which the senior management of an organization share their power with their subordinates (Conger & Kanungo, 1988; Seibert et al., 2004), embraces this perspective and provides a context for the processes related to information discussed above. We focus on empowerment climate as a context variable that can explain variation in the way TMTs deal with external and internal advice flows to pursue decision comprehensiveness. Our second goal thus is to contribute with the moderating role of empowerment climate. Diffused power is often associated with reduced information flows towards the management team, reduced control possibilities (e.g. Argyris, 1998; Simons, 1995) and therefore reduced decision comprehensiveness. Our empirical findings suggest that empowerment can substitute the effect of external advice seeking and improve the effect of internal advice seeking. Before we discuss these results, we introduce the key concepts in this study and lay out the arguments for our hypotheses.

4.3. Literature and Hypotheses

Decision Comprehensiveness and the Role of TMT Advice Seeking Behavior

Decision comprehensiveness is defined as “the extent to which an organization attempts to be exhaustive or inclusive in making and integrating strategic decisions” (Fredrickson & Mitchell, 1984, p. 447), which are decisions that are "important, in terms of the actions taken, the resources committed, or the precedents set" (Mintzberg et al., 1976, p. 246). The question of how much comprehensive or rational strategic decisions are has belonged to synoptic views on strategy formulation (Eisenhardt & Zbaracki, 1992), which argue that analyzing and integrating a greater amount of information in decision making is beneficial to firms as it increases the strategic understanding of their environments (Forbes, 2007). For instance, decision comprehensiveness can improve firm performance in turbulent environmental conditions as organizations need information about the dynamics of emerging opportunities and threats (Forbes, 2007; Fredrickson, 1984; Fredrickson & Mitchell, 1984; Goll & Rasheed, 2005; Miller, 2008). Thus, decision comprehensiveness is seen as influential for the functioning of top management teams (Miller et al., 1998; Simons et al., 1999).

Simons et al. (1999) argued that composing a TMT of members with diverse backgrounds who debate multiple and divergent points of views is a very constructive combination for decision comprehensiveness. Subsequent studies have provided additional empirical evidence for that relationship and for that of several other TMT demographic variables, such as average tenure or educational level (e.g. Goll & Rasheed, 2005; Mitchell, Nicholas, & Boyle, 2009; Talaulicar, Grundei, & Werder, 2005). Diverse teams may indeed have an advantage over homogeneous ones, but existing research remains silent about what determines the limits of decision comprehensiveness, or in other words, how do TMTs, diverse and non-diverse, source the information that they use in decision making. In fact, synoptic models of decision making have been criticized of ignoring the limits of rationality, an observation that organizations typically make noncomprehensive choices and “satisfice” in their search for solutions (Cyert & March, 1963; Fredrickson & Mitchell, 1984; Winter, 2000). Moreover, choice sets are not available to decision makers from beforehand, and interpretations of

environmental information must be constructed first (Forbes, 2007; Knudsen & Levinthal, 2007).

In this study, we propose that decision comprehensiveness is limited by the degree to which TMTs connect to external and internal sources of information. The primary information sources for senior managers are social – they interact with advisers from within or outside the firm, such as lower level managers or managers from competitor, consultant, customer or supplier firms (Elenkov, 1997; Ingram & Roberts, 2000; McDonald & Westphal, 2003; Mintzberg, 1973). TMT advice-seeking behavior is aimed at task-related information exchange that can improve the probability of accurate decisions (Bonaccio & Dalal, 2006; Goldsmith & Fitch, 1997; McDonald & Westphal, 2003). Advisers also offer decision makers new alternatives that may have not been considered earlier and provide new perspectives on the problem at hand. Credible advice from external and internal sources can alter the choices TMT members make and may guide subsequent organizational action and behavior away from established patterns and routines (Druckman, 2001).

TMT advice seeking is related to decision comprehensiveness as connecting to more information sources clearly improves the quality of decisions (Forbes, 2007), but the two concepts are also distinct from each other. TMTs may be exhaustive and consider many alternatives in their decision making without relying on information acquired from their advisers inside or outside the firm. TMTs can demonstrate confidence in their own abilities, knowledge of the industry, gathered through experience; they can rely on their intuition and show distaste to interacting with parties outside the TMT. Some TMTs may also prefer impersonal knowledge sources, such as reports from internal information systems and external industry reports, and thus disregard or ignore the social ways to obtain new information.

External and internal advice seeking of TMTs are also two distinctive behaviors, which are driven by competing mechanisms. Individual managers tend to manifest either one or the other behavior (Menon & Pfeffer, 2003; Menon et al., 2006). For example, externally oriented TMT members tend to criticize information obtained internally and venerate external sources, which are scarcer and more costly to obtain. Such managers that go at lengths to obtain such information may become overcommitted to it and reject equally viable options generated internally (Menon & Pfeffer, 2003). Moreover, such managers can see internal lower level managers as a competitive threat to their position and status (Salancik & Pfeffer, 1977). Internally oriented TMT members, on the other hand,

often fail victims to the not-invented-here syndrome (Katz & Allen, 1982). They may also overvalue internal knowledge as a consequence to their local search and "satisficing" (Cyert & March, 1963). As a result of the clash between these two types of managers within the TMT, deadlocks and conflicts may stifle debate and reduce decision comprehensiveness. The prospect of multiple interpretations will create ambiguity and hinder the comprehensiveness of the decision making process (Forbes, 2007). Hence, we project that external and internal advice seeking will negatively affect each other as sources of decision comprehensiveness.

> *Hypothesis 3-1: TMT external and internal advice seeking behaviors will have a joint negative relation with decision comprehensiveness, such that an increase in TMT internal advice seeking will have a negative relation with decision comprehensiveness when external advice seeking is high.*

Empowerment Climate, Decision Comprehensiveness, and Advice Seeking

Conceptualizing empowerment at organizational level as a climate, or a "set of shared perceptions regarding the policies, practices, and procedures that an organization rewards, supports, and expects" (Seibert et al., 2004, p. 334) is more recent than the traditional understanding of it as an individual or team-level psychological experience, based on intrinsic motivation. The practices that empowerment climate embraces are manifested organization-wide and are related to sharing of sensitive information across organizational levels, autonomy through defining areas of responsibility and a clear vision, and accountability for decision making and performance of teams rather than of senior management only (Blanchard, Carlos, & Randolph, 1995; Randolph, 1995). Empowerment climate refers most closely to the perspective on empowerment as a relational construct, or "the process by which a leader or manager shares his or her power with subordinates. Power, in this context, is interpreted as the possession of formal authority or control over organizational resources" (Conger & Kanungo, 1988, p. 473). The idea for diffusion of power down the organizational ranks is central to the concept of empowerment climate and distinguishes it from TMT advice seeking behaviors, which describe the level of information gathering by a TMT through their external or internal advisers. As organizational climate,

empowerment establishes a context for the role of advice seeking for decision comprehensiveness.

A climate of empowerment changes the way advice seeking can contribute to decision comprehensiveness. Under high empowerment climate, TMTs' search for external advice may be interpreted as mistrust and lack of confidence in the internal structure of teams. Delegated authority over decision making can be seen as insincere as TMT demonstratively prefer to connect to external "gurus" to advise them on strategic matters rather than trust their own employees. Such organizational "jealousy" may hinder cooperation across management levels and may undermine the process of comprehensive decision making. TMTs will face difficulties in integrating external knowledge with internal capabilities into an overall strategy (Fredrickson & Mitchell, 1984). Thus we can conclude that empowerment climate moderates the relationship of external advice seeking with decision comprehensiveness.

> *Hypothesis 3-2: Empowerment climate will moderate the relationship between external advice seeking and decision comprehensiveness, decreasing the association with decision comprehensiveness when empowerment climate is high.*

Under high empowerment climate, integrative comprehensiveness may also be a problem for TMTs that rely on internal advice seeking. Such TMTs risk developing the not-invented-here syndrome (Katz & Allen, 1982), thereby ignoring signals that contradict their beliefs, which damages the comprehensive process. By intensively seeking advice from their lower level managers, who hold the balance of power and promote their judgments poses threats for the comprehensiveness of the process. Under high empowerment climate, TMTs with strong internal advice seeking may capsulate the organization and fail to foster decision comprehensiveness.

If empowerment is low, on the other hand, TMTs can achieve efficiencies in organizing the information flows that support decision comprehensiveness. Empowerment climates are costly because they require coordination and controlling skills (Simons, 1995; Smith & Tushman, 2005). A lack of shared vision may make the efforts of internal advice seeking futile as various groups within the organization would try to pursue their own agendas (Eisenhardt &

Bourgeois, 1988). Concentrating and centralizing judgment within the TMT may therefore be an effective way to foster a comprehensive decision making process.

> *Hypothesis 3-3: Empowerment climate will moderate the relationship between internal advice seeking and decision comprehensiveness, decreasing the association with decision comprehensiveness when empowerment climate is high.*

We expect that empowerment climate would moderate the joint effect of TMT external and internal advice seeking in a way that would make the negative effect stronger under high empowerment conditions and would eliminate it and make it positive under low empowerment conditions. Centralized decision making, which is associated with low empowerment climate, gives opportunities to solve the problems between internally and externally oriented TMT members at the table of the TMT, without expounding them across the organization. Multiple conflicts are much more difficult to manage if the issues are not contained within the TMT. Hence, low empowerment climate can be beneficial if a TMT is both externally and internally oriented.

> *Hypothesis 3-4: Empowerment climate will moderate the joint association of external and internal advice seeking with decision comprehensiveness in such a way that when empowerment climate is low and internal advice is high, external advice seeking will have the strongest positive relation with decision comprehensiveness.*

4.4. Methods

Sample and Data Collection

Empirical data for this study was gathered from firms with more than twenty employees across a wide variety of industries in the Netherlands. A sample of 9000 firms was drawn from the REACH electronic database, the largest information source about organizations registered in the Netherlands Chambers of Commerce. The database provided address and management team information, as well as publicly available characteristics such as number of employees and financial data. As a primary source for the analyses, we used a survey

administered in a paper-based and web form. To ensure we were able to survey knowledgeable respondents for typically confidential information (Miller et al., 1998), we addressed the survey strictly to the CEO. We followed up two weeks after the initial mailing with reminder notes and telephone calls. We obtained fully completed surveys from 808 respondents (8.98 % response rate). The final sample included firms from the food and agriculture industry (3.5%), manufacturing (30.2%), transportation (12.6%), construction (11.9%), business and financial services (28.2%), media and ICT (10.3%), and energy and utilities (3.3%). The average number of employees was 415 (s.d. = 4995), the average firm age was 30.11 years (s.d. = 27.88), and the average TMT size was 5.42 (s.d. = 6.14) individuals (Table 4-1).

To test for nonresponse bias, we examined differences between respondents and nonrespondents. A t-test showed no significant differences ($p > .05$) between the two groups based on the number of full-time employees, revenues, and years since the firm's founding. We also compared early and late respondents and paper and web respondents in terms of demographic characteristics and model variables. These comparisons did not reveal any significant differences ($p > .05$), indicating that differences between respondents were not related to nonresponse bias. To examine reliability issues associated with single-informant data, we surveyed an additional TMT member from each respondent firm. We received a total of 111 second-respondent surveys, or 13.7% of our final sample, from firms that were comparable in size, age, and revenues to our full sample. We calculated an interrater agreement score (r_{wg}) for each study variable (James et al., 1993). The median interrater agreement ranged from .88 to .98, which suggests high agreement. The examination of intraclass correlations also revealed a strong level of interrater reliability: correlations were consistently significant at the .001 level (Jones et al., 1983).

We also tested for the possibility of interference of single method bias. First, a Harman's one-factor test on the questionnaire items included in our models found multiple factors, and the first factor did not account for the majority of variance. Second, we tested whether the addition of a single latent method factor connected with all the item scales would significantly improve the fit over a model with just the studied constructs as latent factors (Podsakoff et al., 2003; Widaman, 1985). The overall chi-square fit statistics for the model with the common method factor was significant ($\chi^2/df = 2.513$, CFI = .978, RMSEA = .044), but the incremental fit index had a rho of .023, which suggests non-significant improvement.

Additionally, the factor loadings for the studied constructs remained significant even after we had considered the method effect. These results suggest that common method bias did not dramatically affect the study's findings and that the respondents were able to differentiate well between the variables.

Measurement of Constructs

To measure our constructs we used scales from previous literature verified through various analyses.

Decision comprehensiveness. The dependent variable was measured by a six-item Likert scale, developed by Miller et al. (1998). Respondents were asked to rate the decision making process of the TMT on the degree to which they: (1) developed multiple scenarios and alternatives to solve a problem, (2) considered many diverse criteria for eliminating possible courses of action, (3) thoroughly examined multiple explanations for the problem or opportunity, (4) conducted various analyses on suggested courses of action, (5) investigated multiple responses in depth, (6) based their decisions on factual information ($\alpha = .85$).

External and internal advice seeking. We followed McDonald & Westphal (2003) and adapted a TMT-level scale that captured the extent of TMT advice-seeking behavior. We asked the respondents to rate the TMT's (1) frequency of their advice seeking, (2) the extent to which they gathered knowledge with regard to their current strategy, and (3) the extent to which they sought advice with regard to future strategy. We repeated the questions twice, firstly about advice sought from managers from other organizations (*external advice seeking*) and secondly, about advice sought from within their own organization (*internal advice seeking*). To provide evidence for convergent and discriminant validity, we used exploratory factor analysis. The results replicated the intended two-factor structure, with each item loading clearly on its intended factor (factor loadings were between .88 and .93 for external advice seeking and between .90 and .95 for internal advice seeking). The Cronbach's α was .92 and .94 for external and internal advice seeking respectively.

Empowerment climate. For empowerment climate, we developed a scale that captured the theoretical dimensions of providing information down the hierarchy, autonomy, and team accountability (Conger & Kanungo, 1988; Seibert et al., 2004). We generated a number of alternative wordings and variations, which were refined and validated by gathering expert researchers' opinions and through pre-

testing among managers for clarity and unambiguity. In the final version of the scale, managers had to rate the extent to which, (1) they regularly invested in developing the structure so as to make the most of their staff, (2) their organization allowed employees to define and pursue different roles, and (3) they encouraged groups of employees to set their own structure and functioning (α = .73). An exploratory factor analysis provided evidence that the measure was distinct from the measures of advice seeking and decision comprehensiveness. The three items for empowerment climate had factor loadings of .77, .81, and .79 respectively.

Control variables

We controlled for various factors indentified in previous literature as determinants to decision comprehensiveness (Goll & Rasheed, 2005; Miller et al., 1998; Simons et al., 1999). We accounted for *firm size*, measured by the natural logarithm of the number of full-time employees within organizations, as larger organizations may possess more resources which can allow them to invest in a comprehensive strategic decision making process. We measured also *firm age*, by the number of years since founding, to capture the effect of formalization of organizational practices. Thirdly, TMT size might affect dynamics in decision making processes and therefore we included *TMT size* by measuring the number of senior executives who are responsible for strategy formulation and implementation (Siegel and Hambrick, 2005). Fourthly, context or industry effects may influence the extent to which comprehensive decision making process is adopted. In view of this, we included seven industry dummies based on aggregation of Standard Industry Classification codes: *manufacturing*, *food & agriculture*, *transport*, *construction*, *business & financial services*, *media & ICT*, *energy & utilities* (c.f. McGrath, 2001). We measured also *TMT heterogeneity* (Miller et al., 1998; Simons et al., 1999) with a scale adopted from Campion et al. (1993). It is a 5-item composite measure that asked respondents to assess the degree of heterogeneity on both demographic and functional attributes, namely expertise, background, experience, complementary skills, and education (α = .77). Research has shown that composite team heterogeneity constructs are good predictors of team outcomes (Van Knippenberg & Schippers, 2007). Fifthly, environmental attributes such as dynamism tend to relate to the degree of decision comprehensiveness. We therefore included a four-item measure for *environmental dynamism* (cf. Dill, 1958; Jansen et al., 2006). The scale for environmental dynamism (α = .85) tapped into the rate of change and the instability of the external environment.

Validation of Measures

For all multi-item scales, we constructed an integrated confirmatory factor analysis (CFA) in order to test for convergent and discriminant validity. Each item was constrained to load only on its respective latent variable. The results showed a good fit within the model (χ^2/df = 2.836, CFI = .959, RMSEA = .048). All loadings were significant ($p < .001$), which showed the convergent validity of the scales. The factor correlation matrix had moderate values (between .080 and .478), and we tested whether each correlation differed significantly from unity. We constructed models where this correlation was constrained to one and compared with the unconstrained model. The results from each of the fifteen pairwise comparisons showed that constraining to unity worsens the models' fit in each case (rho values between .041 and .212), which attested to the discriminant validity of the latent variables.

4.5. Analysis and Results

Table 4-1 contains the descriptive statistics and bivariate correlations between the numeric variables used in the analysis. We constructed linear regression

Table 4-1 Descriptive Statistics and Correlation Coefficients

	Variable	Mean	s.d.	1	2
1.	Decision comprehensiveness	4.70	1.00		
2.	External advice	3.72	1.55	.297**	
3.	Internal advice	5.11	1.39	.411**	.406**
4.	Empowerment climate	5.14	1.01	.397**	.108**
5.	Firm age[b]	30.11	27.88	.097**	.050
6.	Firm size[c]	415.02	4994.94	.078*	.063
7.	TMT size	5.42	6.14	.040	-.001
8.	TMT heterogeneity	5.36	0.98	.333**	.088*
9.	Environmental dynamism	4.61	1.36	.287**	.175**

[a] $N = 808$.

[b] Years since founding

[c] Number of full-time employees

* $p < 0.05$, ** $p < 0.01$(two-tailed)

models and have reported the standardized coefficients in Table 4-2. Model 1 (Table 4-2) is the baseline model and includes only the control variables, Model 2 shows the main effects, Model 3 includes the two-way interaction effects, and Model 4 the three-way interaction effect.

The required conditions for the regression method were satisfied. To reduce the impact of multicollinearity, we mean-centered the independent variables that were used in the interaction terms (Aiken & West, 1991). We used variance inflation factors (VIFs) to judge the presence of multicollinearity in the models. Across all models, the highest VIF was 1.73, which is well below the cut-off point of 10 (Neter et al., 1990). The full model showed an R^2 of 35.8%. Of the control variables, firm age is positively associated with decision comprehensiveness ($p < .05$). Environmental dynamism and TMT heterogeneity had both positive relationship ($p <. 001$) with decision comprehensiveness thus confirming existing theories. External advice seeking ($\beta = .247$, $p <.001$) and internal advice seeking ($\beta = .230$, $p <.001$) had positive and significant association with decision comprehensiveness, with external advice seeking with a slightly higher beta than internal advice seeking.

We will discuss the hypotheses tests based on the regression results obtained in model 4. The interaction between external and internal advice seeking was

3	4	5	6	7	8
.300**					
.043	-.048				
.051	.002	.029			
.053	.014	.085*	.020		
.240**	.237**	.091**	.033	.012	
.191**	.236**	-.020	.056	.000	0.199**

positive and significant (β = .065, p <.05), contrary to our Hypothesis 3-1, which predicted a negative relationship. Figure 1 plots the significant interactions using the values of one standard deviation above (i.e. high level) or below the mean (i.e. low level) of the interacting variables (Aiken & West, 1991). Figure 1a shows that when both external and internal advice seeking are high, decision comprehensiveness is highest. There is strong evidence in favor of Hypothesis 3-2, as the interaction between external advice seeking and empowerment climate is negative and significant (β = -.170, p <.001).

Figure 1b pictures this relationship and although decision comprehensiveness remains high under high empowerment climate, variation in external advice is not related with it. Under low empowerment climate, external advice seeking has a significant and positive slope. Contrary to Hypothesis 3-3, in which we argued for a negative interaction between internal advice seeking and empowerment climate, there was support for a positive interaction (β = .064, p <.05). Empowerment climate provides thus positive grounds for the association of TMT internal advice seeking with decision comprehensiveness. Figure 1c shows that the slope of the association between internal advice seeking and decision comprehensiveness is steeper and higher under high level of empowerment climate. Our analyses showed no support for Hypothesis 3-4 and the three-way interaction between external and internal advice seeking and empowerment climate.

4.6. Discussion

Existing research has investigated what aspects of TMT composition and behavior can contribute to a comprehensive strategic decision making process (Goll & Rasheed, 2005; Mitchell et al., 2009; Simons et al., 1999; Talaulicar et al., 2005). We extended this literature by probing into the information sources of TMTs – their internal and external advisers. We placed the study of these relationships in the context of the organizational internal power structures and argued that empowerment climate can alter the individual and joint associations of external and internal advice seeking with decision comprehensiveness.

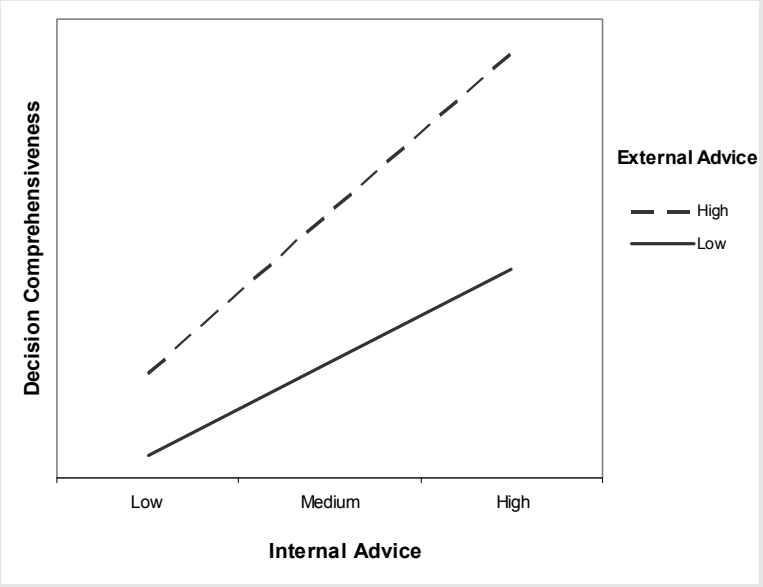
Table 4-2 Results of Hierarchical Regression Analyses[a] : Decision Comprehensiveness

	1		2		3		4	
	β		*β*		*β*		*β*	
(Constant)					-0.023		-0.028	
Firm size[b]	0.036		0.020		0.020		0.021	
Firm age	0.054		0.064	*	0.061	*	0.062	*
TMT size	0.030		0.017		0.019		0.019	
TMT heterogeneity	0.283	***	0.176	***	0.162	***	0.163	***
Environmental dynamism	0.225	***	0.126	***	0.126	***	0.122	***
Food & agriculture	-0.002		0.009		0.008		0.010	
Transport	-0.043		-0.042		-0.038		-0.037	
Construction	-0.068	†	-0.032		-0.031		-0.030	
Business & financial services	-0.018		-0.043		-0.054		-0.051	
Media & ICT	-0.007		-0.022		-0.025		-0.024	
Energy & Utilities	-0.008		-0.040		-0.043		-0.043	
Empowerment climate			0.146	***	0.152	***	0.145	***
External advice			0.210	***	0.245	***	0.247	***
Internal advice			0.251	***	0.241	***	0.230	***
External advice X internal advice					0.064	*	0.065	*
External advice X empowerment climate					-0.169	***	-0.170	***
Internal advice X empowerment climate					0.051	†	0.064	*
External advice X internal advice X empowerment climate							0.022	
R^2	0.172		0.335		0.357		0.358	
F change	15.03	***	64.74	***	9.18	***	0.77	

a Standardized coefficients, N = 808
b Logarithm of the number of full time employees
† $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figure 4-1 Interaction Effects

a) External Advice x Internal Advice



b) External Advice x Empowerment Climate

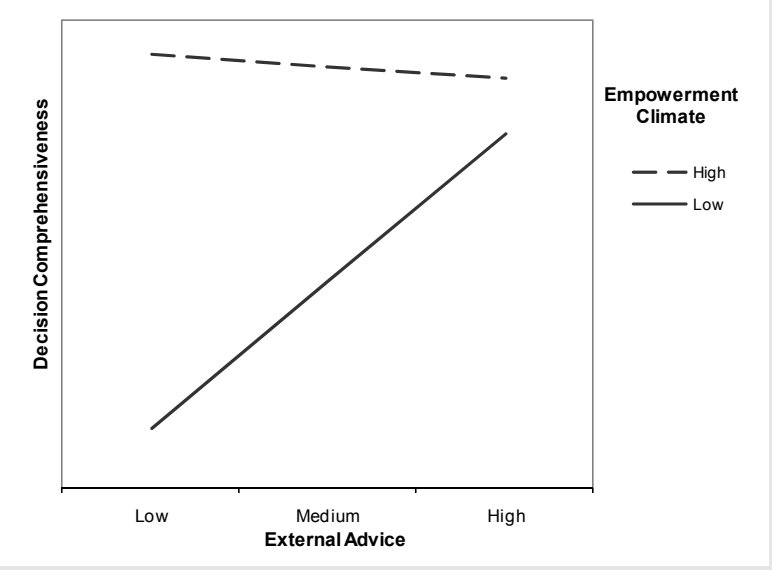
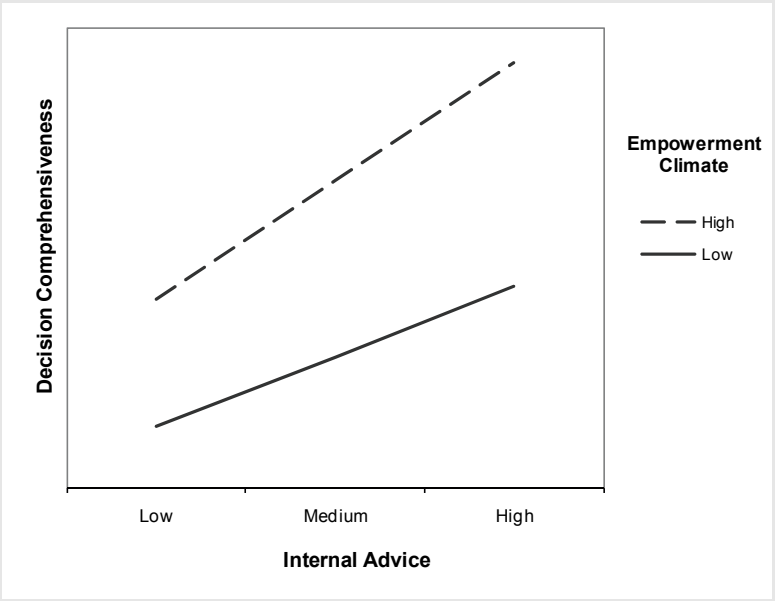


Figure 4-1 Interaction Effects (continued)

c) Internal Advice x Empowerment Climate



Our first main finding contributes to theories of information sourcing and processing in TMTs. Upper echelon theory argues that senior executives act on the basis of personalized interpretations of the information that reaches them (Carpenter, Geletkanycz, & Sanders, 2004; Hambrick, 2007; Hambrick & Mason, 1984). We argued that combining strong embededdeness in both internal and external advice relationships may be detrimental for the comprehensiveness of the decision making process. However, this hypothesis was not supported and the interaction between internal and external advice seeking had a positive association. TMTs that succeed in maintaining high levels of both types of advice seeking are able to fend off the consequences of social identity and competitive behaviors of internally and externally oriented members of the team (e.g. Menon & Pfeffer, 2003). The implication of a balanced level of external and internal advice seeking is manifested as an additional benefit of comprehensiveness above the direct effects of each of the two. Combining external and internal information may have synergistic effect for decision comprehensiveness also through an integration mechanism. In a classic strategy design perspective, new alternatives and possible courses of action may emerge as a result of matching external opportunities and

threats to internal strengths and weaknesses (e.g. Andrews, 1971). This integration may be organized in a leadercentric or teamcentric fashion (Smith & Tushman, 2005) and future research may explore whether that can impact organizational outcomes.

Another main contribution of this study is to literature on strategic decision making. The rational and political perspectives are the two dominating perspectives on the topic and several authors have advocated transition to more realistic views that do not put these two perspectives against each other but integrate them (Astley & Zajac, 1991; Eisenhardt & Zbaracki, 1992). Following that, we tested a conceptual model that features elements of both. Empowerment climate, representing the way power over decision making is distributed across the hierarchy, creates a context, in which information processes of rational decision making occur. With regard to external advice seeking's contribution to decision comprehensiveness, our findings provided evidence for a substitution effect. TMT external advice seeking seems incompatible with the expectations and practices part of empowerment climate (Seibert et al., 2004). Empowered lower level managers and employees may expect accountability and autonomy over decision making and external advice seeking by the TMT can be seen as a breach of that expected confidence.

On the other hand, internal advice seeking's association with decision comprehensiveness is enhanced by an empowerment climate. Although not very strong, this effect is significant and positive. The explanatory mechanisms can be sought in the practices related to empowerment climate (Blanchard et al., 1995; Seibert et al., 2004). Well defined goals and a clear vision that define the boundaries of autonomous action facilitate lower level managers to communicate relevant and critical information towards the TMT. Empowerment includes also transparency with regard to critical financial, operational, and performance information. This, together with the team accountability dimension, it promotes in lower level managers a sense of competence and impact. By sharing control over decision making, TMTs are able to focus on integrating disparaging views without having to filter the relevant from the irrelevant. This strengthens the overall comprehensiveness of decision making.

For managers, our study offers insights into the role and importance of social sources of knowledge. Both external and internal advice seeking contribute a great deal for the comprehensiveness of the strategic decisions being made in the organization, and using them in combination offers additional benefits. Creating

an empowerment climate will enhance the role of internal advice seeking and can serve as a substitute for external advice seeking. The positive effects of the latter can be observed only in organizations which are low on empowerment climate.

Several limitations of this study deserve discussion. Although our survey technique attempted to achieve aggregated measurements for the TMT, not all TMT members in the responding organizations completed our survey. This may affect construct validity even though we have attempted to reduce such issues by validating our scales through interrater agreement scores and interclass correlations. Another limitation is the cross-sectional design of the study, which prevents us from making a firm conclusion about the direction of causality between the variables we have studied. For instance, TMTs strong on decision comprehensiveness might also be more skilled in creating an empowerment climate, which relies on intensive advice interactions within the firm. Future research could address this shortcoming through a longitudinal setup.

Future studies can also explore the quality of relationships when TMT members seek advice and thus open the black box of TMT advice seeking. Previous research has indicated that managers tend to seek advice from friends and similar others and less advice from acquaintances and dissimilar others (McDonald & Westphal, 2003). The quality of relationships may be underlying executive biases and breakdown of the comprehensive decision making process. Social capital, particularly with the relational and cognitive dimensions, can be used in explaining the occurrence of such behaviors (e,g, Nahapiet & Ghoshal, 1998). Researchers can concentrate also on identifying organizational policies and conditions that stimulate advice seeking of managers.

Although designed to complement existing studies on TMT processes, this study can be extended in the future by putting more attention to other TMT processes. The structure of strategic decision making process includes the phases of issue identification, option development and option selection (Mintzberg et al., 1976). Besides juxtaposing teamcentric with leadercentric integration mechanisms (Smith & Tushman, 2005), future research can explore the dynamics of executive roles related to involvement in the identification and development phases of the decision making process as well.

CHAPTER 5.

IMPLICATIONS AND CONCLUSIONS

5.1. Introduction

This dissertation set out to elicit antecedents of exploratory innovation by combining social capital and upper echelon perspectives. The rationale for studying exploratory innovation lies in the understanding that introducing new products and services as well as organizational changes that radically change an organization's technological or market trajectory is a critical factor for its long-term adaptation and survival (Benner & Tushman, 2003; Dougherty, 1992; Jansen et al., 2006; March, 1991). Existing theories converge around two main firm-based antecedents for exploratory innovation in inexperienced firms: performance decline and organizational slack (Cyert & March, 1963; Greve, 2007; McDonald & Westphal, 2003; Voss et al., 2008). The failure of local search as a way to solve organizational problems after disappointing results underlies the former, while the establishment of units that utilize excessive resources the latter mechanism for increasing exploratory innovation.

The manifestation of these mechanisms suggests that firms that do not possess slack resources and perform well are likely to become victims of inertia and fail to renew themselves (Leonard-Barton, 1992). Although that may refer to a

significant portion of organizational reality, this dissertation sought to uncover if *other* factors may influence firms to develop exploratory innovation independently from slack and below-aspiration performance.

To this end, a behavioral and learning approach was taken and four elements of exploratory innovation were delineated to support the analysis. Specifically, these are the notions of search routines, learning of divergent knowledge, environmental sensing, and decision making. These elements were used to develop a framework that combined insights from social capital and upper echelon theories into a model of antecedents, mediators and moderators of exploratory innovation (Figure 1-2).

For this dissertation, three empirical studies were developed that treat different aspects of the framework (Table 5-1). The studies by no means attempt to be exhaustive, but rather aim at making specific contributions to the literatures of exploratory innovation, social capital and upper echelon theory. The dissertation overall focused on organizational and upper echelon social capital as antecedents of exploratory innovation and accounted for the effects of organizational moderators. In study 1, the focus was on social capital on interorganizational (external) and intraorganizational (internal) level. External and internal firm connectedness was linked with exploratory innovation and learning mechanisms in highly connected firms accounted for the creation of a capability for knowledge acquisition. In study 2, social capital on TMT level was introduced and the role of TMT heterogeneity, an organizational moderator, was studied. External and internal advice seeking behaviors of top management teams differed substantially in terms of the cognitive and social identity processes that define the managers' attitudes towards knowledge. Study 3 examined further the strategic decision making process. Empowerment climate, a construct measuring the degree TMTs share decision making responsibility with lower level managers, moderated the relationship of external and internal advice seeking with decision comprehensiveness.

Table 5-1 summarizes the research question of each of the studies, the theoretical mechanisms used to hypothesize the relationships and the level of analysis. It can be noted that organizational social capital can be studied at multiple levels. The three studies in this dissertation focused on group level, firm level and inter-firm level. Across these levels, positive effects were found between both external and internal social capital and exploratory innovation. Specific contingent factors in the composition of the TMT and decision making power

distribution provided a sense of possible boundaries to these positive effects. Identifying such boundary conditions is a potentially fruitful area for future research.

Table 5-1 Overview of the Empirical Studies

Study	Main Research Question	Leading Causal Mechanisms	Level of Analysis	Empirical Context
Study 1	Role of external and internal organizational connectedness for exploratory innovation	Knowledge-based view, Capabilities, Organizational Learning	Firm and Inter-firm	Dutch manufacturing, construction, service and other industries
Study 2	Role of TMT advice seeking for organizational exploratory innovation	Management Cognition, Social Identity	Firm	Dutch SMEs
Study 3	Contribution of TMT advice seeking to decision comprehensiveness in different power contexts	Information processing, Power	TMT	Representative sample of Dutch commercial enterprises

5.2. Summary of the findings of the studies

Tables 5-2 through 5-4 sum up the hypotheses and the extent to which they were supported by the empirical findings of the studies. In the following, the hypotheses and the results are reflected upon.

Study 1 External and Internal Knowledge Sources and the Capability of Knowledge Acquisition

Study 1 (Table 5-2) found strong support for the relationship between both external and internal connectedness and exploratory innovation. Divergent knowledge can be found outside the organizational boundaries through the realization of strategies of interorganizational cooperation and connectedness as previous literature has indicated that for the chemical and biotechnology industries (e.g. Ahuja, 2000; Powell et al., 1996). Additionally, building intraorganizational social capital through increasing connectedness across departments, functions, and units can stimulate the exchange and combination of tacit and complex knowledge, which supports exploratory innovation (e.g. Hansen, 1999; Szulanski, 1996; Tsai, 2001). Firms with a developed knowledge acquisition capability also excelled in exploratory innovation. Interestingly, knowledge acquisition capability partially mediated only the relationship between internal connectedness and exploratory innovation. Although externally connected firms were also likely to develop such capability, the effect of external connectedness on exploratory innovation remained rather direct than mediated.

Table 5-2 Results of Study 1 External and Internal Knowledge Sources and the Capability of Knowledge Acquisition

Hypothesis	Support
H1-1: External connectedness is positively associated with exploratory innovation.	Supported
H1-2: Internal connectedness is positively associated with exploratory innovation.	Supported
H1-3: Knowledge acquisition capability mediates the relationship between external connectedness and exploratory innovation.	Not supported
H1-4: Knowledge acquisition capability mediates the relationship between internal connectedness and exploratory innovation.	Partially supported

Study 2 TMT Advice Seeking and Exploratory Innovation: Moderating Role of TMT Heterogeneity

Social capital investigated on TMT level also showed strong association with exploratory innovation (Table 5-3). In this study, it was argued that the value of social capital can be utilized through active and ongoing pursuit of advice by upper echelon executives. TMT advice seeking contributed to exploratory innovation both through TMTs' external environmental sensing as well as through maintaining awareness about divergent knowledge residing inside the organization that can be translated into exploratory innovation strategies (Day, 1994; Volberda et al., 2001). The study found independent, additive relationships of external and internal TMT advice seeking with exploratory innovation. Interestingly, external advice seeking had no relation to exploratory innovation when the TMT had a heterogeneous composition, which did not confirm Hypothesis 2-3. Internal advice seeking's relationship with exploratory innovation was on the other hand enhanced by TMT heterogeneity.

Table 5-3 Results of Study 2 TMT Advice Seeking and Exploratory Innovation: Moderating Role of TMT Heterogeneity

Hypothesis	Support
H2-1: TMT external advice seeking will be positively related to a firm's exploratory innovation.	Supported
H2-2: TMT internal advice seeking will be positively related to a firm's exploratory innovation.	Supported
H2-3: TMT heterogeneity moderates the relationship between TMT external advice seeking and exploratory innovation, such that TMT external advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.	Not supported
H2-4: TMT heterogeneity moderates the relationship between TMT internal advice seeking and exploratory innovation, such that TMT internal advice seeking is more positively associated with exploratory innovation as TMT heterogeneity increases.	Supported

Table 5-4 Results of Study 3 TMT Advice Seeking and Decision Comprehensiveness: The Role of Empowerment Climate

Hypothesis	Support
H3-1: TMT external and internal advice seeking behaviors will have a joint negative relation with decision comprehensiveness, such that an increase in TMT internal advice seeking will have a negative relation with decision comprehensiveness when external advice seeking is high.	Not supported
H3-2: Empowerment climate will moderate the relationship between external advice seeking and decision comprehensiveness, decreasing the association with decision comprehensiveness when empowerment climate is high.	Supported
H3-3: Empowerment climate will moderate the relationship between internal advice seeking and decision comprehensiveness, decreasing the association with decision comprehensiveness when empowerment climate is high.	Not supported
H3-4: Empowerment climate will moderate the joint association of external and internal advice seeking with decision comprehensiveness in such a way that when empowerment climate is low and internal advice is high, external advice seeking will have the strongest positive relation with decision comprehensiveness.	Not supported

Study 3 TMT Advice Seeking and Decision Comprehensiveness: The Role of Empowerment Climate

Study 3 investigated further the contribution of TMT advice seeking to the process of decision making (Table 5-4). Decision comprehensiveness, or the degree of rationality in strategic decision making, was supported by both types of TMT advice seeking. The findings of this study showed that external and internal advice seeking reinforced each other and a complementary positive effect was observed, even though it was argued for a negative relationship in Hypothesis 3-1. The use of both external and internal advice was shown to be beneficial for the generation of multiple alternatives as decision options. In this way, TMTs are able

to sense information both from the external and internal environment, for instance about opportunities or threats and about internal capabilities of the organization (e.g. Andrews, 1971). Matching these can provide with novel combinations that can enhance the decision making process.

In this study, it was also found that the relationship between TMT advice seeking and decision comprehensiveness is moderated by the degree of empowerment climate in the organization. Conceptualized on organizational-level, empowerment climate refers to the degree to which decision making authority is concentrated in the upper echelon or is diffused across lower management levels as well (Seibert et al., 2004). External advice seeking by the top management team is less likely to contribute to decision comprehensiveness in organizations with high empowerment climates (Hypothesis 3-2). On the other hand, the process of decision making is enhanced if the TMT relies strongly on internal advice. The complementary effect between external and internal advice seeking was found not to be affected by the presence of empowerment climate.

5.3. Theoretical implications

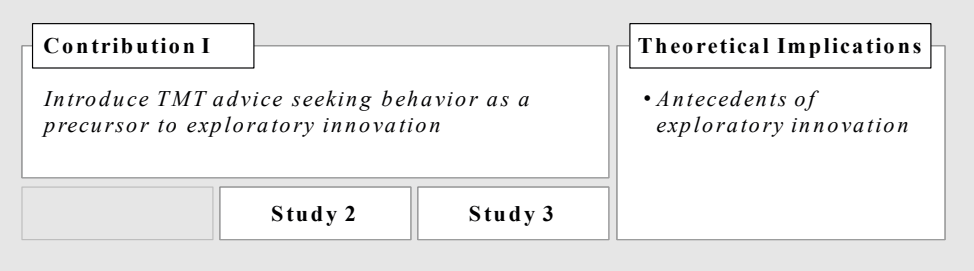
The findings of the studies suggest several contributions to theories on the antecedents of exploratory innovation, the role of the upper echelon, and organizational social capital.

Contribution I. Introduce the concept of TMT advice-seeking behavior

The concept of TMT advice-seeking behavior emerged as signifying the role of the upper echelon in the conversion of the benefits of organizational social capital for exploratory innovation (Figure 5-1). This concept allows focusing on a specific behavior of the TMT as a whole rather than that of individual executives (c.f. McDonald & Westphal, 2003; Menon et al., 2006). As evidenced from previous literature, this behavior is prevailing in the activity of senior executives (Arendt et al., 2005; Mintzberg, 1973). It embraces search routines (McDonald & Westphal, 2003), environmental sensing (Elenkov, 1997), reaching out to divergent knowledge through boundary spanning (Rosenkopf & Nerkar, 2001), and as shown in Study 3, relates to decision comprehensiveness. The contribution of the studies of this dissertation is that advice seeking is examined on a TMT

rather than individual level (c.f. Arendt et al., 2005; McDonald et al., 2008; McDonald & Westphal, 2003).

Figure 5-1 Contribution I



Study 2 demonstrated the role of TMT advice seeking on exploratory innovation. This extends previous studies on exploration that focus on exploration as search behavior only (e.g. Gavetti & Levinthal, 2000; Rosenkopf & Almeida, 2003; Rosenkopf & Nerkar, 2001; Stuart & Podolny, 1996). Study 2 showed that exploratory search by TMTs is associated with exploratory innovation as organizational outcome as well.

The concept of advice seeking implies that in order for its benefits to be realized, social capital needs to be activated, i.e. managers need to actively pursue advice that can improve the accuracy of their decisions and lead to exploratory innovation (Study 2, 3) (Bonaccio & Dalal, 2006). Contrasting this to the findings of Study 1, it can be concluded that connectedness alone maybe insufficient without an actively engaged TMT that can transform and integrate the pieces of divergent strategic knowledge into a strategic choice to pursue exploratory strategy.

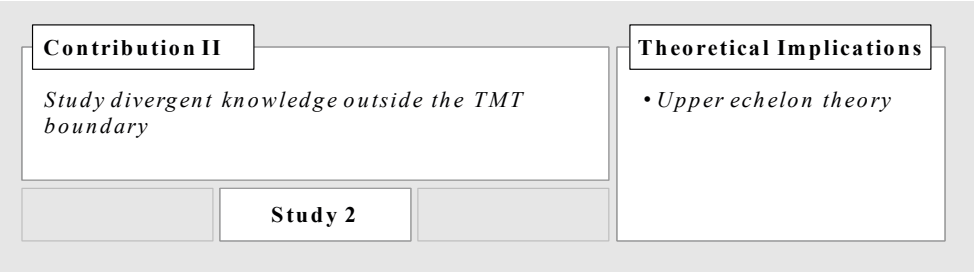
Advice seeking is also concrete management behavior and can be used for monitoring purposes by managers. Figure 5-1 summarizes contribution I of this doctoral dissertation.

Contribution II. Knowledge beyond TMT boundary

Upper-echelon research is mostly concerned with the contribution of demographic and compositional characteristics of individuals or groups of senior

executives (Hambrick et al., 1996; Lubatkin et al., 2006; Simons et al., 1999). How senior executives source their knowledge remains a black box in that area of research. The studies in this dissertation probe beyond individuals and groups of senior level executives and develop propositions with regard to the interactions outside the team – internally within the organization or externally with other parties.

Figure 5-2 Contribution II



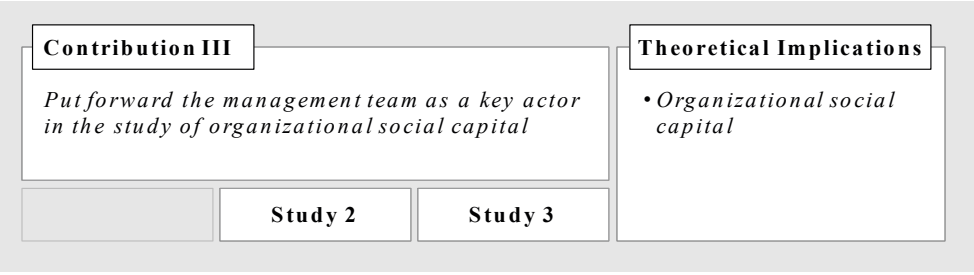
Researchers have discussed in previous studies the role of TMT heterogeneity for various organizational outcomes (Hambrick et al., 1996; Kor, 2006; Murray, 1989; Rodan & Galunic, 2004). In the context of exploratory innovation, Study 2 showed that heterogeneous teams do not rely on external advice seeking to improve a firm's exploratory innovation, while internal advice seeking enhances their ability to leverage the divergent knowledge available within the team. There was evidence that top management teams manage their knowledge sources differently depending on their composition. In essence, searching for divergent knowledge within the team is in line with the tendency to "satisfice" when searching for solutions to problems (March & Simon, 1958; Winter, 2000). Heterogeneous teams achieve a multiplicity effect of their social capital on exploratory innovation, as their networks are also less overlapping (De Dreu & West, 2001).

Contribution III. TMT as a key player in organizational social capital

This dissertation research argues for a special attention to senior executives when organizational social capital is discussed. Existing studies about the role of social capital on organizational level have often considered organizations as

homogeneous collectivities (e.g. Tsai, 2001, 2002). In contrast, traditional behavioral perspectives see organizations as "groups of groups" (Simon, 1957). The findings of this dissertation research suggest that top management teams deserve to be set apart. Not only do they operate at the boundary of the organization, which has specific implications about their use of social capital, but they can also directly contribute to exploratory innovation through coordinating information and allocating resources (Study 2, Study 3) (Bower, 1970; Burgelman, 1983; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). The studies in this dissertation follow on previous works that investigate this boundary-spanning role of senior executives (Ancona & Caldwell, 1992; Rosenkopf & Nerkar, 2001). Figure 5-3 summarizes this contribution.

Figure 5-3 Contribution III



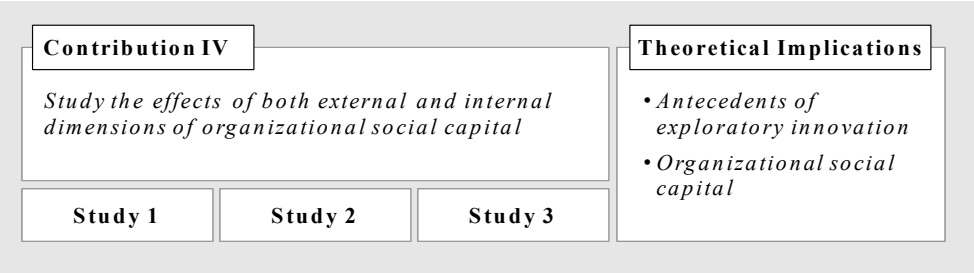
Contribution IV. Effects of external and internal dimensions of organizational social capital

Although scholars have pleaded for studying the effects of both external and internal organizational social capital, few studies have actually done so (Adler & Kwon, 2002; Gupta et al., 2005). In the studies of this dissertation, both dimensions are examined on organizational (Study 1), and TMT-level (Studies 2 and 3). Specifically, the studies test whether firm or TMT preferences for one or the other (Menon & Pfeffer, 2003) can have a differential impact on exploratory innovation. The findings of the studies contribute to organizational social capital and exploratory innovation literature (Figure 5-4).

Internal social capital, both at organizational and TMT level, appears to have a stronger relationship with exploratory innovation than external social capital. Although external social capital also contributes to exploratory innovation, the

strength of the association of internal social capital is much higher and is also less subject to influences by the moderator constructs. This pattern can be related to the debate about the sources of organizational advantage over market forms of coordination of economic activity (Moran & Ghoshal, 1999; Williamson, 1975). These findings may inform also literature on organizing innovation arguing for more attention on how external and internal social capital may influence choices on organizational boundary, inter-firm collaboration and open forms of organizing innovation (Chesbrough, 2003; Lichtenthaler & Ernst, 2006; Lichtenthaler & Lichtenthaler, 2009).

Figure 5-4 Contribution IV



The studies in this dissertation explored also how external and internal social capital might relate to each other. Interestingly, Studies 1 and 2 found additive effects of the two dimensions for their association with exploratory innovation, while Study 3 found a joint association with decision comprehensiveness. External and internal social capital seem to reinforce each other while their direct effect in decision making is additive.

Altogether, a theme that emerges from the studies is that although internal and external connectivity exhibit differences between each other, there are also a lot of commonalities, which justify integrating the "bridging" and "bonding" views on organizational social capital (Adler & Kwon, 2002).

Besides the main effects of the organizational social capital variables and the mediating counterparts of knowledge, the studies contribute with important boundary conditions represented by the organizational moderators in the models. For instance, the role of TMT heterogeneity (Study 2) emphasized how internal formal management team configuration can enhance the value of internal social

capital but decrease the value of external social capital. Team composition may affect how social capital on higher level operates which justifies the attention to multi-level analytical approach. In study 3, the role of empowerment climate was investigated and suggested that organizational policies and cultures of power distribution also play a role in how organizational social capital operates.

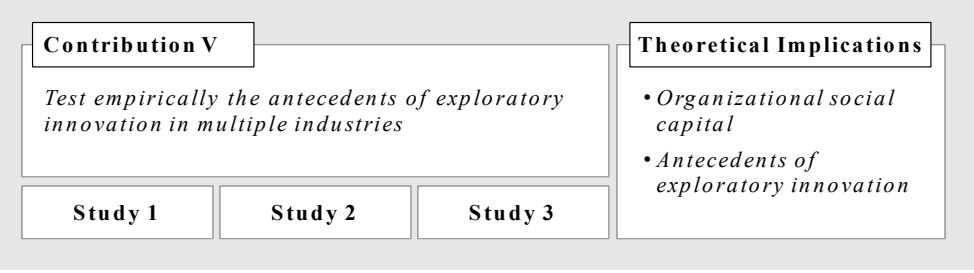
Another key perspective that relates to the phenomenon is that of learning and capabilities. Study 1 found that actively connected firms tend to develop a capability for knowledge acquisition manifested in structures, routines and processes directed at managing knowledge. The study adds to organizational learning literature by arguing that experience with social capital has also learning effects.

Contribution V. Empirical tests in multiple industries

The studies contribute with the strength of empirical evidence gathered in the context of a small country with a dynamic and advanced economy. Much research in management is criticized for being US-centric. The studies in this dissertation offer a complementary perspective, the results of which are generalizable to commercial organizations in the Dutch economy.

Empirically, a contribution is made to studies on social capital that use a social network methodology. This methodology is limited by the need to specify the boundary of the network, for instance to a single organization or to networks of organizations. The studies in this dissertation use survey methodology which allows measurement of both external and internal social capital.

Figure 5-5 Contribution V



5.4. Implications for practice

Theory developed by using behavioral and learning approach offers the advantage of encouraging the creation of techniques and tools for effective management and organizational change. The findings of the studies in this dissertation carry several implications for management practice and innovation policy.

The studies highlight the importance of managerial awareness with regard to the value of organizational social capital, both internal and external to the firm. This awareness can be promoted by employee and management development programs that focus not only on individual characteristics and contributions, but also on the fabric of social relationships woven among individuals. The programs can accentuate the role of connectedness for the acquisition, transfer and deployment of divergent knowledge. This dissertation argued for pursuing exploratory innovation regardless of the presence of slack and performance decline. This can be achieved by attention to search routines, divergent knowledge, environmental sensing and decision making mechanisms. Organizations can consider institutionalizing knowledge acquisition capabilities through for instance dedicated alliance functions and cross-functional teams. Sociographic methods can be used to diagnose and visualize external and internal organizational social capital. Such exposure to patterns of social relationships has been shown to be an effective tool for learning and influencing the structuring of organizational connectedness (Janicik & Larrick, 2005).

For senior managers, a twofold role is designated in this dissertation. First, their task is to instill the aforementioned awareness about social capital in organizational artifacts. This can be achieved through mission statements, goal setting, internal communication or structures with dedicated functions to the problems. Second, top management teams' role comprises their involvement in strategic decision making for exploratory innovation and in managing their own social capital. TMT's advice seeking behavior is a particularly relevant point for managerial attention. The findings of studies 2 and 3 delineated specific conditions when external and internal advice seeking can contribute to exploratory innovation and comprehensive decision making process. A heterogeneous top management team is a strong factor for pursuing exploratory innovation. Executive selection policies can accentuate hiring TMT members that possess diverse functional and educational experience. Divergent knowledge available within the TMT can contribute strongly to the firm's exploratory innovation and should be promoted.

External advice can be avoided or used for strategy implementation or other non-strategic purposes. On the other hand, TMTs with homogeneous composition can use external advice to compensate for their lack of divergent knowledge within the team. In both cases, maintaining advice linkages within the firm with lower level managers is beneficial and should be encouraged in management development programs and TMT trainings. Internal sources of advice can provide crucial information with regard to the feasibility of exploratory ideas and be themselves origins of such ideas. In this respect, encouraging autonomous decision making of lower level managers, sharing strategic information with them and setting accountability to teams rather than senior managers only, develops a climate of empowerment which plays a positive role for decision comprehensiveness. This form of trust stimulates empowered managers to share their ideas for change and support the decision making process.

Innovation policy initiatives on national level such as the Dutch Innovation Platform or the 'Kennis en Innovatie Agenda' can also be informed by the findings of this dissertation. Such initiatives are widespread across nearly all advanced economies, aiming at stimulating economic growth through innovation. Much of the discussion in such projects is centered around monetary investments in research and development (R&D) and goals related to the national education and research infrastructure. In other words, a large proportion of attention is given to the development of financial and human capital while the development of social capital has yet to be emphasized more strongly. By highlighting the processes and behaviors that occur at organizational and TMT level, the studies in this dissertation suggest implications for all three forms of national capital.

With regard to investments of financial capital, such policy initiatives should acknowledge that although additional R&D investments can provide organizations with slack, the evidence shows that firms may use that slack to explore only if they perceive environmental threats. Positive performance can stifle exploration in favor of exploitation (Gilbert, 2005; Simsek et al., 2007; Voss et al., 2008). Thus, investments in R&D should be considered not as an exclusive precursor to exploratory innovation. Policies should include indicators on managerial behaviors related to environmental sensing and search for divergent knowledge.

Considering the development of human capital, the attention to education and scientific infrastructures neglects organizational learning, i.e. learning that occurs to individuals and collectives while they are performing their jobs. This dissertation shows that organizations that are able to develop knowledge

acquisition capabilities utilize learning through social capital. Programs for lifelong learning too often focus on formal training programs only, while a large part of organizational learning happens on the job and through both formal and informal channels of internal and external connectedness.

Finally, if social capital investments are considered in national innovation policies, issues related to organizational change and employment levels can be addressed. A key argument of this dissertation has been that firms are able to adapt by developing exploratory innovation through the use of social capital. If such strategies can work, then existing organizations can be an alternative to "creative destruction" through entrepreneurship. Public policy should consider stimulating the development of organizational social capital that can lead to exploratory innovation.

5.5. Limitations and future research directions

The studies in this dissertation were conducted within the constraints of numerous limitations. Addressing these shortcomings provides opportunities for future research. New theoretical challenges emerge as well. Both of these are reflected upon below. Some of the most pertinent ones include clarifying the link between social capital and exploratory innovation, extending the multi-level framework, exploring organizational antecedents of social capital and focusing on the process of strategic decision making that leads to exploratory innovation in organizations.

Clarifying further the relationship between social capital and exploratory innovation

Although the studies in this dissertation contributed with a measurement of social capital on organizational and TMT levels, the focus of these measures has been on the degree of connectedness and the degree of advice seeking, which represent the structural dimension of social capital. Structural social capital concentrates on the patterns of linkages between actors and the role they have on particular outcomes (Granovetter, 1992; Nahapiet & Ghoshal, 1998). Yet, the value of social capital can also be a function of the quality of relationships between actors, e.g. whether they are friendship relations or just formal, whether there is trust and respect involved or whether there are social norms that guide the actors in their behavior (Ingram & Roberts, 2000; Nahapiet & Ghoshal, 1998).

Much research of the effects of the relational dimension focuses on trust (McEvily, Peronne, & Zaheer, 2003) and some studies have found for instance that trust can mediate the role of structural social capital for resource exchange and combination and thus innovation (Tsai & Ghoshal, 1998). Future research may explore how other aspects of the relational dimension may affect how social capital (fails to) lead to exploratory innovation. For instance, social norms with regard to advice seeking from particular advisor sources may preclude effective exploration strategies (Bendor & Swistak, 2001; Coleman, 1990).

Some research has indicated possible negative effects of social capital (Leenders & Gabbay, 1999): for instance diminishing returns as the size of the networks grows (McFadyen & Canella Jr., 2004). In the empirical samples used for the studies in this dissertation, no such effects were observed (including after conducting additional tests for curvilinear relationships). This could be explained by the measurement approach taken in the studies. Network size was not measured by an absolute number, but by self-reported measures of degree of connectedness. Yet, this dissertation suggested that group composition can moderate and nullify a positive relationship between external connectedness and exploratory innovation. Later studies can explore why and on what conditions negative effects of social capital on exploratory innovation can emerge.

Another limitation is the cross-sectional character of the studies. This excluded the possibility to draw conclusions about the directionality of the studied relationships. Nahapiet & Ghoshal (1998) argued that social capital and knowledge creation co-evolve with time. Although the existence of practices, processes and codified knowledge is considered as evidence for learning that has occurred (Argote, McEvily, & Reagans, 2003), our conceptualization of knowledge acquisition capability (Study 1) may benefit from longitudinal methodology to give an answer to the causality problem.

The role of social capital was also conceptualized as independent of the role of the other two determinants of exploratory innovation in inexperienced firms: organizational slack and performance decline (Cyert & March, 1963; Greve, 2007). It can be conceived that such relationship is not fully independent. Although it was controlled for indicators of slack and previous performance, future studies may investigate whether social capital's role for exploratory innovation is valid at different levels of slack and performance. Future empirical studies need to test if a substitution effect is present.

Studying multiple levels of social capital and their influence on exploratory innovation

Although set at multiple levels of analysis, the studies focus primarily on the organizational and TMT levels. Research can be extended to include other levels of analysis as well (Gupta, Tesluk, & Taylor, 2007). The individual level of analysis has been considered germane by an ongoing stream of literature (Brass, Galaskiewicz, Greve, & Tsai, 2004). Exploration can emerge as an insight or idea, which individual creates through a process of intuiting (Crossan et al., 1999). Future research should link theoretical insight from creativity research with social capital, especially at the level of top management teams. The cognitive processes that enable some individual TMT members to see opportunities and others to ignore them deserves more attention (Gavetti & Levinthal, 2000). The studies in this dissertation had to contend with the insight that active advice seeking sets some TMTs apart in terms of their potential to contribute to their firm's exploratory innovation.

Continuing such a multi-level approach should enable bridging macro views of information diffusion and adoption of innovation with the micro lens of strategic decision making in organization as a cognitive process of the TMT (Abrahamson & Fairchild, 1999; Abrahamson & Rosenkopf, 1997). Specific structural positions in an inter-firm network can enable some TMTs to be aware of a large volume of information. Yet, as the studies in the current dissertation show, external connectedness contributes less than high levels of internal social capital.

Particularly worthwhile pathway for future empirical research is the interrelatedness between different levels. Recent theoretical advances have suggested that social capital of organizations is shaped through nested interactions among individuals, the groups they belong to and the interorganizational arrangements they take part in (Hagedoorn, 2006). External and internal networks may have optimal joint configurations that enable positive group and organizational outcomes (Oh et al., 2006). Similarly to the findings of Study 3, positive social capital among individuals in a group may enable exploratory innovation if combined with organization-wide social capital enhancing climates.

Exploring organizational antecedents of social capital

After acknowledging the positive effects of organizational internal and external social capital, it is relevant to focus on factors that can engender it.

Researchers have argued, for instance, that employee behaviors that go beyond the formally prescribed roles can facilitate the development of organizational social capital (Bolino, Turnley, & Bloodgood, 2002). A model based on rational theory has emerged arguing that collegial networks of advice social capital are formed on the basis of the perceived benefits and costs of establishing an exchange relationship, the accessibility of partners and the risks involved (Nebus, 2006). Senior managers tend to choose advisers from their strong friendship ties rather than from their weak ties (Arendt et al., 2005; McDonald & Westphal, 2003). Further research is needed to uncover other organizational antecedents that foster the development of social capital. Especially important are those antecedents that are within the control of managers, such as incentive systems, organizational structures and coordinating mechanisms. Appropriate to study in this respect are different forms of leadership: transactional and transformational, which can impact the development of social capital (Elenkov & Manev, 2005; Somech, 2006). Research in this direction may enable managers with tools and frameworks that can allow them to maximize the potential and value existing in the bridging and bonding types of relationships (Adler & Kwon, 2002).

Examining the role of strategic decision making for exploratory innovation

Study 3 looked at how TMT advice seeking contributes to a comprehensive decision making process. The link with exploratory innovation remains to be empirically tested, especially in view of the mixed results of decision comprehensiveness's role on organizational performance (Forbes, 2007; Fredrickson, 1984; Fredrickson & Mitchell, 1984; Miller, 2008). Future research should consider the extent to which decision comprehensinvess mediates the relationship between social capital and exploratory innovation.

The context of strategic decision making deserves further investigation too. The studies focused on how TMTs actively search for advice and develop a comprehensive decision making process. In certain situations, for example in industries with low managerial discretion (Hambrick, 2007; Hambrick & Finkelstein, 1987), TMTs may be constrained in turning the advice they receive into organizational action. Little is known about the antecedents of managerial discretion too. Although it is commonly believed that discretion is influenced by individual and environmental characteristics (Hambrick & Finkelstein, 1987), new insights can be drawn from the understanding that a managers' informational

environment is social (Forbes, 2007) (see also Table 1-1). In this respect, a comparison between social and other sources of information is encouraged. Certain traits of advisers, such as their willingness to take risks, may also impact what choices TMTs make (Bonaccio & Dalal, 2006). Later studies can investigate how managerial discretion and adviser characteristics influence the strategic decision making process.

Finally, the studies focusing on TMT social capital assume that TMTs can act as coherent teams. Hambrick (1994) discussed that there might be significant variation in the "teamness" of upper echelon executives, putting forward the concept of behavioral integration (Lubatkin et al., 2006; Simsek et al., 2005). Although the studies were empirically focused on predominantly smaller organizations where fragmentation among division heads is less likely, it is worthwhile to pursue in the future an empirical approach that accounts for the degree of behavioral integration.

5.6. Conclusion

The aim of this dissertation was to use combined insights from social capital and upper echelon theories to extend the literature on exploratory innovation. With all the challenges for future research lying ahead, the studies in this dissertation contributed with insights on the mediating mechanisms as well as organizational moderators about that link. March & Simon contended that most organizations are hierarchies, with "generally more intensive communication within boxes at any level than between different boxes at that level" (1958, p. 3). This dissertation showed that examining the variation of intensity of communication between the different boxes and outside the organizational boundary is a worthwhile endeavor.

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NEDERLANDSE SAMENVATTING

Theoretisch kader en empirische studies

Exploratieve innovatie is innovatie gericht op nieuwe en opkomende markten of gebaseerd op radicaal nieuwe technologieën (Benner & Tushman, 2003; He & Wong, 2004; Jansen, Van Den Bosch & Volberda, 2006). De introductie van exploratieve innovatie bij bedrijven is een middel om nieuwe technologische trajecten of nieuwe klantsegmenten te bereiken. Het bepalende criterium is de nieuwheid ten opzichte van de bestaande kennisbasis van het bedrijf (Dougherty, 1992; Greve, 2007; Jansen et al., 2006; Rosenkopf & Nerkar, 2001). De mate van nieuwheid is bepalend voor de intensiteit van de organisatorische inspanningen die nodig zijn om veranderingen aan te brengen voor de verbetering van de organisatorische fit. Exploratieve innovatie is daarom een belangrijk instrument voor strategische vernieuwing van organisaties.

Bestaande studies benadrukken economische stimuli zoals dalende bedrijfprestaties of de aanwezigheid van onbenutte resources. De hamvraag die blijft is hoe organisaties exploratieve innovatie ontwikkelen vòòrdat hun prestaties

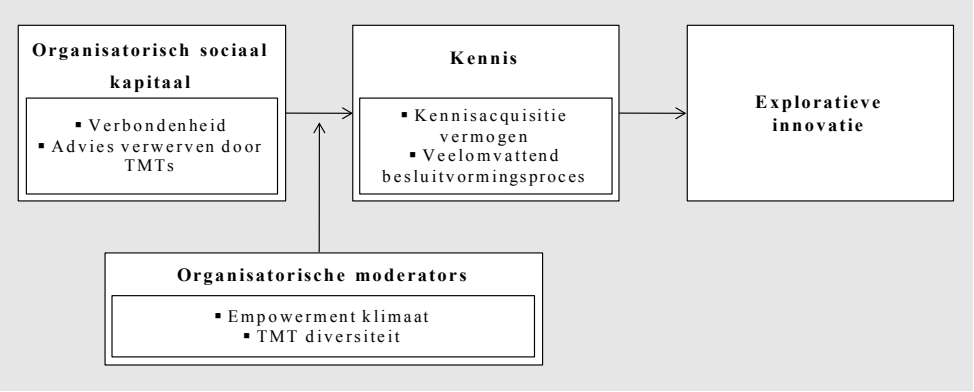
verslechteren, dat wil zeggen, voordat het te laat is, of ongeacht de beschikbaarheid van onbenutte resources.

Om dit probleem te onderzoeken is in dit proefschrift een theoretische benadering gekozen gebaseerd op gedrags- en leertheorieën. We baseren de analyse van exploratieve innovatie op de opvatting dat organisaties probleemgerichte en probleem-oplossende entiteiten zijn die met complexe situaties moeten omgaan (Cyert & March 1963; March 1991; March & Simon, 1958; Simon, 1947 [1997]). Deze situaties zijn niet volledig kenbaar, maar zijn tenminste interpreteerbaar. Belangrijke processen wat dat betreft zijn: *zoeken*, *leren* en *beslissen* (Cyert & March 1963; Levinthal & March, 1993; Thompson, 1967). In het geval van exploratieve innovatie, kan leren specifiek verwijzen naar de verwerving en toepassing van afwijkende kennis en de activiteiten voor het waarnemen van veranderingen in de organisatorische omgeving (Cohen & Levinthal, 1990; Crossan et al., 1999; Greve, 2007; Sidhu et al., 2004). Zoeken, leren van afwijkende kennis, leren door middel van het waarnemen van de omgeving en besluitvorming vormen het kader voor het onderzoek naar de antecedenten van exploratieve innovatie. In Figuur 1-1 worden deze vier vragen weergegeven.

Figuur 1-1 Hamvraag in onderzoek naar exploratieve innovatie

Dit proefschrift brengt twee theoretische perspectieven naar voren die gerelateerd zijn aan exploratieve innovatie en inzichten geven in de vier bovengenoemde deelvragen. Dit zijn de theoretische perspectieven van de sociaal kapitaal en upper echelon theorie. Figuur 1-2 geeft een overkoepelend kader voor de studies in dit proefschrift weer. Concepten uit de organisatorische sociaal kapitaal en upper echelon theorieën vormen de antecedenten van exploratieve innovatie. Kennis-gerelateerde variabelen mediëren deze relatie en het effect ervan wordt beïnvloed door organisatorische moderatoren.

Figuur 1-2 Overkoepelend kader voor de studies in dit proefschrift



Voor dit proefschrift zijn drie empirische studies verricht die verschillende aspecten uit het kader behandelen. De studies maakten gebruik van verschillende data bronnen zoals secundaire gegevens en enquêtes. De enquêtes zijn gestuurd naar CEO's van Nederlandse bedrijven met meer dan 20 werknemers uit diverse sectoren willekeurig getrokken uit de populatie van Nederlandse commerciële organisaties. De enquêtes werden uitgevoerd in 2005, 2007 en 2009. Studie 2 is specifiek gericht op middelgrote en kleine ondernemingen (MKB's).

De studies beogen bij te dragen aan de literatuur van exploratieve innovatie en aan de sociaal kapitaal en upper echelon theorie. In studie 1 lag de nadruk op sociaal kapitaal op interorganisatorisch (extern) en intraorganisatorisch (intern) niveau. Externe en interne verbondenheid was met exploratieve innovatie gekoppeld en leermechanismen bij bedrijven met hoog sociaal kapitaal zorgden voor een sterk vermogen voor kennisacquisitie. In studie 2 werd sociaal kapitaal

op het niveau van het top management team (TMT) geïntroduceerd en de rol van TMT diversiteit werd bestudeerd als organisatorische moderator. Cognitieve- en socialeidentiteitsprocessen verklaarden de verschillen in de houdingen van managers ten aanzien van kennis. Studie 3 onderzocht vervolgens het strategische besluitvormingsproces. Empowerment klimaat, een concept dat meet hoeveel verantwoordelijkheid TMTs met lagere managers delen, modereerde de verhouding tussen intern en extern advies en hoe veelomvattend het besluitvormingsproces is.

Bijdragen

De bevindingen van de studies suggereren een aantal bijdragen aan theorieën over de antecedenten van exploratieve innovatie, de rol van de upper echelon en organisatorisch sociaal kapitaal.

Bijdrage I. Introduceren van het concept van advies-zoekend gedrag van het TMT

Het concept van TMT-advieszoekend gedrag is van belang voor de bestudering van organisatorisch sociaal kapitaal in exploratieve innovatie. Dit concept maakt het mogelijk om op specifiek gedrag van het TMT te focussen in plaats van op dat van individuele managers (zie McDonald & Westphal, 2003; Menon et al., 2006). Zoals aangegeven in eerdere literatuur is dit gedrag alomtegenwoordig in de activiteiten van senior executives (Arendt et al., 2005; Mintzberg, 1973). Het omvat zoekroutines (McDonald & Westphal, 2003), waarnemen van de omgeving (Elenkov, 1997), bereiken van afwijkende kennis (Rosenkopf & Nerkar, 2001) en zoals aangegeven in studie 3, heeft het betrekking op het besluitvormingproces.

Bijdrage II. Kennis verder dan de TMT grens

Upper echelon onderzoek is vooral gefocust op de bijdrage van demografische en compositiekenmerken van individuen of groepen van senior executives (Hambrick et al., 1996; Lubatkin et al., 2006; Simons et al., 1999). Hoe senior executives hun kennis verkrijgen blijft evenwel een black box in dat gebied van onderzoek. De studies in dit proefschrift gaan verder dan de individuen en groepen

van senior executives en ontwikkelen proposities met betrekking tot de interacties van TMT, zowel intern, binnen de organisatie, als extern, met andere partijen.

Bijdrage III. TMT als belangrijke speler bij organisatorie- sociaal kapitaal

Dit proefschrift pleit voor speciale aandacht voor senior executives bij organisatorie- sociaal kapitaal. Bestaande studies over de rol van sociaal kapitaal op organisatorisch niveau hebben organisaties vaak als homogeen collectiviteiten beschouwd (bijv. Tsai, 2001, 2002). De bevindingen van dit proefschrift suggereren dat het TMT in dit verband afzonderlijk bestudeerd moet worden. Niet alleen fungeren TMT's als grensoverbruggers in de organisatie, wat ook specifieke gevolgen heeft voor hun gebruik van sociaal kapitaal, maar TMT's kunnen ook direct aan exploratieve innovatie bijdragen door middel van coördinatie van informatie en toewijzing van resources (Studie 2, Studie 3) (Bower, 1970; Burgelman, 1983; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

Bijdrage IV. Effecten van de externe en interne dimensies van organisatorisch sociaal kapitaal

Hoewel onderzoekers gepleit hebben voor het bestuderen van de effecten van zowel extern als intern organisatorisch sociaal kapitaal, hebben weinig studies dat daadwerkelijk gedaan (Adler & Kwon, 2002; Gupta et al., 2005). In de studies van dit proefschrift zijn beide dimensies onderzocht op organisatorisch (Studie 1), en TMT-niveau (studies 2 en 3). De studies testen in het bijzonder of managers voorkeur voor de ene of de andere (Menon & Pfeffer, 2003) een differentieel effect op exploratieve innovatie kan hebben. De bevindingen van de studies dragen daarmee bij aan de organisatorisch sociaal kapitaal en exploratieve innovatie literatuur.

Bijdrage V. Empirische tests in meerdere sectoren

De studies dragen bij aan het empirisch inzicht in het kader van een dynamische en geavanceerde economie. Veel onderzoek in management wordt bekritiseerd omdat het VS-centric is. De studies in dit proefschrift bieden een aanvullend perspectief, waarvan de resultaten generaliseerbaar zijn naar commerciële organisaties in de Nederlandse economie.

Implicaties voor de praktijk

Theorie ontwikkeld op behavioristische en leertheoretische grond heeft als voordeel dat het de ontwikkeling van gefundeerde technieken en hulpmiddelen bevordert voor management en organisatorische verandering. De bevindingen van de studies in dit proefschrift bevatten verschillende implicaties voor de managementpraktijk en innovatiebeleid.

De studies benadrukken het belang van bestuurlijke bewustwording met betrekking tot de organisatorische waarde van sociaal kapitaal, zowel intern als extern. Deze bewustwording kan worden bevorderd door medewerker- en management-developmentprogramma's die de aandacht niet alleen vestigen op de individuele kenmerken en bijdragen, maar ook op het netwerk van sociale relaties tussen individuen. Dergelijke programma's kunnen de rol van verbondenheid accentueren voor de verwerving, de overdracht en de inzet van afwijkende kennis. Organisaties kunnen de institutionalisering overwegen van de mogelijkheden om kennis te verwerven, bijvoorbeeld via speciale alliantiefuncties en cross-functionele teams. Sociografische methodes kunnen worden gebruikt om extern en intern organisatorisch sociaal kapitaal te diagnosticeren en te visualiseren.

Aan senior managers wordt een tweeledige rol toegekend in dit proefschrift. Ten eerste is het hun taak de organisatie van bovengenoemde bewustwording over sociaal kapitaal te doordringen. Dit kan worden bereikt door middel van mission statements, het stellen van doelen, interne communicatie of structuren met speciale functies voor de problematiek. Ten tweede bestaat de rol van TMT's uit hun betrokkenheid bij de strategische besluitvorming over exploratieve innovatie en het beheer van hun eigen sociaal kapitaal. Het verwerven van advies door TMT's is met name een relevant aandachtspunt voor bestuurlijke aandacht. De bevindingen van studies 2 en 3 omschrijven specifieke voorwaarden voor wanneer het zoeken naar interne en externe adviezen kan bijdragen aan innovatie en veelomvattende besluitvormingsproces.

Innovatiebeleidsinitiatieven op nationaal niveau, zoals het Nederlandse Innovatieplatform of de 'Kennis en Innovatie Agenda', kunnen ook kennis nemen van de bevindingen van dit proefschrift. Dergelijke initiatieven, wijdverbreid in bijna alle geavanceerde economieën, zijn gericht op het stimuleren van economische groei door innovatie. Een groot deel van de discussie binnen dergelijke projecten draait om de investeringen in research and development (R & D) en doelen met betrekking tot de nationale onderwijs- en

onderzoeksinfrastructuur. Met andere woorden, een groot deel van de aandacht wordt besteed aan de ontwikkeling van financieel en menselijk kapitaal, terwijl de ontwikkeling van sociaal kapitaal nog sterker moet worden benadrukt.

Met betrekking tot investeringen van financieel kapitaal, moeten dergelijke beleidsinitiatieven erkennen dat, hoewel R&D-investeringen organisaties onbenutte resources op kunnen leveren, er uit het bewijsmateriaal blijkt dat ondernemingen zulke resources alleen gebruiken voor exploratief onderzoek als ze zich vanuit hun omgeving bedreigd weten. Positieve prestaties kunnen exploratie opgeven ten gunste van exploitatie (Gilbert, 2005; Simsek et al., 2007; Voss et al., 2008). Daarom moeten de investeringen in R&D niet worden beschouwd als een voorloper van exclusieve exploratieve innovatie.

Dit proefschrift laat zien dat organisaties die in staat zijn om kennisverwervende vermogens te ontwikkelen, leren door hun sociaal kapitaal te benutten. Programma's voor levenslang leren leggen te vaak de nadruk op formele opleidingen alleen, terwijl een groot deel van organisatorisch leren gebeurt op de werkvloer en door middel van zowel formele en informele kanalen van interne en externe verbondenheid.

Ten slotte, als investeringen in sociaal kapitaal ook worden meegenomen in het nationale innovatiebeleid, kunnen kwesties in verband met organisatorische veranderingen en werkgelegenheid worden aangepakt. Een belangrijk argument in dit proefschrift is dat ondernemingen in staat zijn zich aan te passen door het ontwikkelen van exploratieve innovatie middels het gebruik van sociaal kapitaal. Indien dergelijke strategieën kunnen werken, dan kunnen bestaande organisaties een alternatief zijn naast de "creatieve destructie" door ondernemerschap. Nationaal innovatiebeleid zou het stimuleren van de ontwikkeling van tot exploratieve innnovatie leidende organisatorisch sociaal kapitaal moeten overwegen.

About the Author

Alexander Alexiev is a graduate (cum laude) from the research master program of the Erasmus Research Institute of Management (ERIM). Prior to joining ERIM, he obtained undergraduate degrees in International Business Administration from Erasmus University Rotterdam and Sofia University St Kliment Ohridski. Next to his research, he has taught undergraduate and Master courses at the Rotterdam School of Management, Erasmus University. His dissertation research includes a forthcoming publication in the *Journal of Management Studies* and has been presented at numerous international conferences in the field. In his work, Alexander Alexiev explores how organizations can timely avoid failure by embracing innovation beyond their existing technological and market trajectories. The focus in his studies is on management behaviors and organizational features that can support organizational learning, especially those malleable by an organization's strategic top.

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EXPLORATORY INNOVATION: THE ROLE OF ORGANIZATIONAL AND TOP MANAGEMENT TEAM SOCIAL CAPITAL

One of the most difficult challenges for organizations is to innovate beyond their existing technological and market trajectories. Despite being complex, exploratory innovation is needed for the long-term survival of the enterprise. Existing studies point to economic triggers that can foster its pursuit: decline of firm performance or availability of slack resources. However, these factors may still fail to ensure adaptation if organizations are unable to act on emerging opportunities or to respond timely to environmental threats.

This dissertation advocates a behavioral and learning approach to study exploratory innovation. The concept is dissected into four organizational issues and processes: creation of search routines, learning of divergent knowledge, environmental sensing and strategic decision making. A framework for the antecedents, mediators and moderators of exploratory innovation is developed by combining insights from organizational social capital and upper echelon literature.

The empirical studies that examined specific relationships from the framework demonstrated the significance of organizational and top management team (TMT) social capital as antecedents of exploratory innovation. Firms that explore often possess also a capability for knowledge acquisition. TMTs tap into their social capital by engaging in external and internal advice seeking. Findings show that external advice seeking can promote exploratory innovation in firms with homogeneous TMTs and comprehensive decision making in organizations with less empowered lower-level managers.

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Tel. +31 10 408 11 82
Fax +31 10 408 96 40
E-mail info@erim.eur.nl
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