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Internal Antecedents of Management Innovation

A PhD dissertation by

Mie Harder

April 28, 2011

Department of Strategic Management and Globalization (SMG)

Copenhagen Business School

PREFACE

This dissertation explores the internal antecedents of the phenomenon labeled management innovation. Management innovation refers to the implementation of new management practices, processes, techniques or structures that alter the way the work of management is performed. In other words, management innovation refers to changes in what managers do and how they do it.

The field of strategic managements is first and foremost concerned with explaining superior firm performance. Why do some firms consistently outperform others? Different explanations of superior firm performance have surfaced over the years. Some scholars have focused on the alignment between the firm and the demands of its environment. Others have focused on the strategic positioning of the firm vis-à-vis its competitors, customers, suppliers and other competitive forces. Later work has focused on the ability of firms to build, modify and leverage strategic resources and capabilities. Especially those resources and capabilities that are valuable, rare and difficult to imitate are expected to lead to sustainable competitive advantage.

This dissertation contributes to strategic management research by addressing a potential source of competitive advantage that has been somewhat overlooked in strategy research. The dissertation claims that management practices and structures can in themselves constitute strategic resources. In particular, the ability to identify the need or opportunity for improved performance and develop and implement innovative managerial solutions in response may lead a firm to superior performance. These ideas are developed and studied in the four papers included in the dissertation.

A number of people have in one way or another contributed to the writing of this dissertation. Above all, I am thankful to my main supervisor, professor Nicolai Foss, who has

supplied me with constructive, critical, extremely competent and encouraging guidance throughout the process. Also, I am thankful to my second advisor, professor Torben Pedersen, for his knowledgeable feedback and critique on the many preliminary versions of the papers that have eventually evolved into this thesis. Furthermore, I am grateful to my colleagues at the Department of Strategic Management and Globalization (SMG) for providing a supportive and inspirational work environment. I am especially thankful to Larissa Rabbiosi for help and advice on working with STATA. Also, I am grateful for the feedback I have received from my colleagues at various paper seminars. Lastly, I would like to thank my discussant Toke Reichstein (CBS) for valuable comments on a preliminary version of paper II at the Strategic Entrepreneurship Conference at CBS, November 11th 2010, as well as the members of my pre-defense committee, Nils Stieglitz (Syddansk Universitet) and Torben Andersen (SMG), for their constructive feedback at my pre-defense October 6th 2010. Of course, any remaining shortcomings are solely my responsibility.

Mie Harder

Frederiksberg, January 28, 2011

CONTENTS

INTRODUCTION: WHY SHOULD WE STUDY MANAGEMENT INNOVATION?[1][2]

Firms frequently renew their administrative systems, change organizational structure, experiment with reward systems, reconfigure organizational design and find new ways of making decisions, coordinating activities and motivating employees. Sometimes such changes amount to *innovations*, that is, ways of doing things that are new as a minimum to the firm, but occasionally even to the world. Classic examples of such innovations are the invention and implementation of the multi-divisional form at General Motors and DuPont after the Second World War (Chandler, 1962); Oticon's spaghetti organization (Foss, 2003); 3M's incubator model (Figueroa & Conceicao, 2000; Nonaka & Takeuchi, 1995); Toyota's quality circles (Adler, Goldoftas & Levine 1999; Mol & Birkinshaw, 2006); etc. These examples cut across time and place: DuPont and General Motors invented and implemented the multidivisional form (the M-form) in the 1920s; Oticon implemented its highly decentralized "spaghetti organization" in 1991; in the 1980s 3M was one of the first firms to refine the role of the firm as an incubator and financier of spin-offs; and Toyota's experience with quality circle organization goes back to the 1950s. Note also that an important reason why these examples have achieved notoriety is that they have been identified as main causes of the subsequent (i.e. post implementation of the relevant innovation) performance successes of these firms.

Innovation is widely acknowledged to be a driver of economic growth and a source of competitive advantage to firms (Abernathy & Utterback, 1978; Abernathy & Clark, 1985; Damanpour, Szabat & Evan, 1989; Drucker, 1985; Nonaka & Takeuchi, 1995; Schumpeter, 1934). A number of historical examples of management innovations, not the least the examples mentioned above, indicate that firms actively develop and implement not only

[1] Parts of this chapter are reused from an earlier unpublished review paper by Mie Harder & Nicolai Foss titled "Management Innovation: A mapping of research and open issues", Department of Strategic Management and Globalization, Copenhagen Business School.

[2] Please see references pertaining to the introduction and concluding chapters at pp. 200-206

product and technological innovations but also innovative management practices and structures as a means to achieve competitive edge. Also, there seems to be a growing awareness among managers of the importance of management innovation. For example, in an interview with Foss, Pedersen, Pyndt and Schultz (2011), CEO of the Danish toy manufacturer LEGO Jørgen Vig Knudstorp explained how he views organizational design and management processes as a source of value creation: "It is all about decision rights – who has the right to do what, at which time, how, where, etc. with Lego's corporate assets? To think about it in this way is one way of linking day to day management issues with longer term goals of value creation" (interview May 6, 2008). Since management innovations are generally more systemic and difficult to imitate than technological innovations, it is reasonable to assume that they may be an important source of competitive advantage to firms (Barney, 1991; 1996; Teece & Pisano, 1994).

Yet, most studies of innovation have focused on the development of new technologies, products or services. In spite of what would seem to be the obvious importance of management innovation to firms, industries and perhaps even whole economies, rather little research exists on management innovation in terms of fundamental conceptualizations of the phenomenon, its antecedents and its consequences. In fact, it is only recently that the concept of management innovation has been explicitly introduced in the management literature and treated as an important phenomenon in its own right. In other words, while management innovation may to some extent be illuminated by extant literatures such as innovation studies and organization theory, it is not fully explainable by any of these literatures in isolation. The pioneer efforts in establishing management innovation as a distinct field of study have been carried out by Julian Birkinshaw, Gary Hamel and Michael J. Mol (e.g. Birkinshaw, Hamel & Mol, 2008; Hamel, 2006; Mol & Birkinshaw, 2007; 2009). In their work, management innovation refers to the introduction of new management practices, processes, techniques or

organizational structures. As this suggests, management innovation is a subject field that spans organizational theory and innovation theory. It goes beyond, for example, the literature on new organizational forms (e.g. Romanelli, 1991) in including a broader set of phenomena than organizational form, and it goes beyond the traditional organizational innovation literature (e.g. Abernathy & Utterback, 1978; Abernathy & Clark, 1985; Damanpour, 1987; Damanpour, 1991; Schumpeter, 1934; Utterback & Abernathy, 1975; Wolfe, 1994) in focusing more specifically on innovations in management structures and practices.

However, despite recent efforts there are still large gaps in our knowledge of management innovations. No agreed-upon model or even conceptualization of management innovation has emerged, and little systematic research has examined the antecedents or the performance consequences of management innovations. In fact, the generative mechanisms linking not only antecedents and management innovation (Birkinshaw et al., 2008), but also management innovation and performance consequences are ill understood. In summary, there are at least two important reasons why scholars should study management innovation. First, a number of historical accounts of management innovations indicate that this type of innovation may play an important role in building and sustaining competitive advantage. Also, since management innovations are typically more systemic, less observable and more difficult to imitate than technological innovations, they may be especially important in explaining superior firm performance. In other words, management innovation is arguably an important phenomenon for strategic management research. Second, as indicated above very little systematic knowledge about management innovation exist. Hence, scholars should study management innovations because we know too little about them.

While, it also crucial to expand our knowledge of the processes involved in developing and implementing management innovations as well as the performance consequences of such innovations, this dissertation focuses on antecedents. What leads some firms to implement

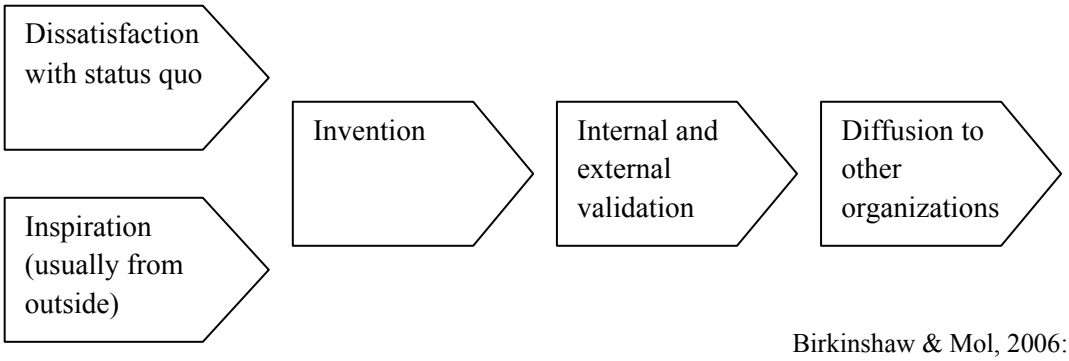
management innovations while others do not is an important question for managers and scholars alike. As an academic endeavor, it is important to study innovation antecedents in order to better understand firm behavior and to make predictions about future innovation performance. From a practitioner perspective, a more complete understanding of the antecedents of management innovation may have important implications for the activities and strategies undertaken to promote innovation outcomes.

THE MANAGEMENT INNOVATION LITERATURE

Birkinshaw, Hamel and Mol (2008, p. 825) define management innovation as "the invention and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals." They identify four distinct perspective on management innovation (i.e., institutional, fashion, cultural and rational perspectives) that differ in terms of the questions they pose, levels of analysis, and antecedents and outcomes of management innovation. Per implication these different perspectives are all consistent with the definition of management innovation put forward by Birkinshaw, Hamel and Mol.

In an earlier paper, Birkinshaw and Mol (2006) proposed a stage model of the management innovation process based on analyses of eleven cases of recent management innovations (see figure 1). They find that the invention of a new management practice, process or structure is preceded by a combination of internal dissatisfaction with the status quo and inspiration from outside the company. Following invention, the innovation goes through a process of internal and external validation and, finally, the innovation may be diffused to other organizations. In the following, I will use this model as a way of classifying the existing literature on management innovation.

Figure 1. Stage model of management innovation



Birkinshaw & Mol, 2006: 85

I identify three major categories of literature. The first category is concerned with the antecedents of management innovations and refers to the "dissatisfaction" and "inspiration" stages of Birkinshaw and Mol's (2006) model. The second grouping is concerned with the stages of invention, implementation and validation. Although, implementation is not mentioned specifically by Birkinshaw and Mol (2006), we find that it is related to the internal validation phase in their model. In this category will also be included studies addressing performance consequences of management innovation, since this issue can be regarded as a form of validation. Lastly, there is a grouping of literature concerned with how innovations are diffused within populations of firms. Although the borders between these categories may not always be clear cut, I suggest that this partitioning of the literature is a meaningful starting point for the review.

Scanning the research databases such as Web of Science for papers on management innovation yields quite few papers that are concerned specifically with management innovation (examples include: Birkinshaw et al., 2008; Birkinshaw & Mol, 2006; Damanpour, Walker & Avellaneda, 2009; Hamel, 2006; Lazonick & Teece, 2010; McCabe, 2002; Mol & Birkinshaw, 2006, 2007, 2009; O'Mahoney, 2007; Stata, 1989; Vaccaro, Jansen, Van Den

Bosch & Volberda, 2010) However, although relatively few publications use the notion of management innovation, there are a number of papers addressing diffusion patterns of specific management innovations. Also, detailed historical accounts have been provided on specific management innovations (e.g. Chandler, 1962). In the following, contributions in each of the three categories will be reviewed separately. Please note that some publications may pertain to more than one category.

Antecedents

The majority of recent papers on management innovation fall into this category. Birkinshaw et al. (2008), Hamel (2006), Birkinshaw and Mol (2006), Mol and Birkinshaw (2009), and Vaccaro et al. (2010) all address how management innovations come about and under what conditions firms introduce new management practices. Also, Chandler (1962) provides a historical account of the emergence of the multidivisional structure in four companies. Although he does not address the general topic of management innovation, his findings suggest that a sense of crisis spurred the invention of the multidivisional form in DuPont, Standard Oil of New Jersey, General Motors, and Sears. Furthermore, he notes that the managers driving the innovation process in the respective companies were all relatively young and had not been long in the positions they held at the time. Similarly, based on historical examples, Kossek (1987) suggests that companies' propensity to adopt new HRM practices is affected by external pressures or crises and by normative pressures to mimic behaviors of external reference groups.

Birkinshaw and Mol (2006) was briefly reviewed in the above section. Considering the other recent contributions, Hamel (2006) focuses on the processes preceding invention and proposes a practical methodology for companies seeking to improve their management innovation skills. Based on accounts of major management innovations in companies such as

General Electric, DuPont, Proctor & Gamble, Visa and Linux, Hamel (2006) suggests that managers should commit to a big problem, search for novel principles, deconstruct management orthodoxies and draw analogies from atypical organizations in order to increase the odds of a "Eureka!" moment (p. 76). The paper targets practitioners and provides advice such as "If you want to build an organization that unshackles the human spirit, you're going to need some decidedly unbureaucratic management principles" (p. 80) and "To fully appreciate the power of a new management principle, you must loosen the grip that precedent has on your imagination" (p. 81). While this may be intuitively correct, these contentions are based on common sense and anecdotal evidence rather than on theoretical argumentation or empirical findings. The propositions may, however, be an inspiration for future studies.

Second, Birkinshaw et al. (2008) propose a framework for the management innovation process. They identify four phases in the innovation process (motivation, invention, implementation, and theorization & labeling), which are somewhat consistent with the model proposes by Birkinshaw and Mol (2006). Then, for each phase, they identify the roles and activities of key internal and external change agents. The model builds on an evolutionary perspective in which "[..] changes perceived in the environment (motivation) lead to variations in management practices (invention), some of which are then subject to internal selection (implementation) and retention (theorization and labeling)" (Birkinshaw et al., 2008, p. 831). As such, Birkinshaw et al. (2008) address both the antecedents as well as the invention/implementation/validation themes. Regarding antecedents, the model suggests that the identification of a novel problem, or a new threat or opportunity, and an organizational context supportive of new thinking drives the motivation for developing management innovations. While these issues may be an inspiration for future research, no empirical validation is provided by Birkinshaw et al. (2008).

Third, Mol and Birkinshaw (2009) define management innovation as the introduction of management practices that are new to the firm and intended to enhance firm performance. They use reference group literature to derive hypotheses about the antecedents of management innovation. Based on data from the UK Innovation Survey, they find that firm size, access to internal and external knowledge sources and the level of education of the workforce significantly impacted the adoption of new management practices. A limitation of these findings pertains to the measurement of management innovation. Managers were asked if their companies made "major changes" in for example management techniques, organizational structures or corporate strategies during 1998-2000. However, it may be questioned whether making *major changes* is a valid proxy for management innovations. Indeed, this measure is incoherent with the definition of management innovation provided by Birkinshaw et al. (2008), which states that an innovation must be "new to the state of the art". In other words, it has to be something more than the implementation of an "off the shelf" management technique that may be new to the firm but is common practice elsewhere.

Finally, Vaccaro et al. (2010) investigate the role of leadership behavior as a key antecedent of firm level management innovation. They define management innovation as management practices, processes and structures that are new to the organization. The study is based on a survey design and uses a 6-item measure to capture changes to management practices. The items include: 1) "rules and procedures within our organization are regularly renewed"; 2) "we regularly make changes in our employees' tasks and functions"; 3) "our organization regularly implements new management systems; 4) "the policy with regard to compensation has been changed in the last three years"; 5) "the intra- and inter-departmental communication structure within our organization is regularly restructured; and 6) "we continuously alter certain elements of the organizational structure". Vaccaro et al. (2010) investigate transactional and transformational leadership and finds that both types are

positively associated with management innovation. Furthermore, they find that organizational size moderates the relationship between leadership and management innovation in such a way that smaller organizations benefit more from transactional leadership, whereas larger organizations benefit the more from transformational leadership. However, while the measure used by Vaccaro et al. (2010) may be more encompassing and accurate in terms of the content of management innovation compared to earlier measures by e.g. Mol and Birkinshaw (2009), most of the items still essentially measure "change" rather than "innovation". It is not evident that continuous alteration or regular renewal of organizational elements actually amount to innovation that is new to the organization.

Overall, reviewing the literature reveals that research on management innovation needs to strengthen its understanding of antecedents along the following ways. First, empirically much more knowledge is needed concerning what triggers management innovation. Second, there is no clear behavioral model of management innovation. For example, while Hamel (2006) propose a normative model for generating management innovation, Mol and Birkinshaw (2009) propose a reference group model for understanding management innovation and Birkinshaw et al. (2008) draw upon an evolutionary perspective. However, other models are surely possible, such as rational choice models, models of satisficing search and so forth.

Invention, Implementation and Validation

Getting a clear grasp of when invention of a new management practice takes place is difficult. According to Birkinshaw et al. (2008) invention refers to variations in management practices. However, it is not clear whether any new idea developed by an individual constitutes such a variation, or whether ideas need be substantiated before an invention has occurred. However, the invention phase precedes testing, which according to Birkinshaw et

al. (2008) pertains to implementation. Therefore, invention remains an elusive concept and, accordingly, few scholars have made attempts at describing this phase. Following the model presented by Birkinshaw et al. (2008), problem-driven search, idea linking and idea contextualizing drives invention (variations in management practices). Similarly, Birkinshaw and Mol (2006) describes invention as the phase where "[t]he management innovator brings together the various elements of a problem (that is, dissatisfaction with the status quo) with the various elements of a solution (which typically involves some inspiration from the outside, plus a clear understanding of the internal situation and context)" (p. 85). More theoretical and empirical work needs be done in order to understand what actually takes place during invention and to justify categorizing invention as a separate phase distinct from antecedents and implementation (and testing).

The implementation and validation phases consist of "[..] all activity on the "technical" side of the innovation after the initial experiment up to the point where the new management innovation is fully operational" (Birkinshaw et al., 2008, p. 836) and involve overcoming potential resistance to the innovation and growing internal acceptance (Birkinshaw & Mol, 2006). According to Birkinshaw et al. (2008), trial-and-error, idea refining and idea testing drives the implementation process. Regarding validation, Birkinshaw and Mol (2006) suggest that early victories and a clear champion or a respected senior executive sponsor are important for internal credibility. On the other hand, business school academics, consultants, media or industry associations may drive external validation.

No empirical studies have attempted to develop or test a general approach to implementing management innovations. However, some indication is provided by case studies addressing the implementation of specific innovations. For example, Stjernberg and Philips (1993) study the implementation of structural innovations in eight companies over a period of 10-20 years. They find that building internal and external legitimacy is crucial for

creating and sustaining structural changes. Specifically, they find that legitimacy is closely tied to the change agents sponsoring the innovations. Also, based on a case study of employee resistance to implementation of TQM, Knights and McCabe (2000) suggest that political conflicts and contradictory demands on employees may lead to resistance or unintended interpretations of corporate policies. Finally, McCabe(2002) analyzes resistance to change in a case company and proposes a cultural understanding of management innovation. In this perspective, management innovation is viewed as a complex process that more often than not reproduces existing relations of power and inequalities within the organization. McCabe (2002) suggests that the social context of the organization is important in understanding innovation and that the outcome of innovation processes is never certain.

The final issue relating to validation concerns the performance consequences of management innovations. This positive performance effect is typically assumed rather than studied (e.g. Hamel, 2006; Birkinshaw & Mol, 2006; Stata, 1989). This widespread presumption that innovations will benefit organizations has been labeled the *proinnovation bias* (e.g. Abrahamson, 1991). However, Mol and Birkinshaw (2009) find that new-to-the-firm management innovations have a positive impact on future productivity growth of firms. The methodological limitations of this study, as discussed above, nevertheless limit the value of these findings.

In sum, management innovation research needs to pay more systematic attention to, particularly, organizational and individual level determinants of the invention, validation and implementation of management innovations. As such, several political and psychological barriers to implementation may moderate the success of management innovation efforts.

Diffusion

Of the three categories treated in this review, the diffusion of management innovations is the most studied theme. There is a substantial amount of literature on how innovations diffuse over time and across populations of firms, industries and countries. One part of this literature focuses on the diffusion patterns of a specific innovation. For example, Teece (1980) found that a simple deterministic model commonly used to represent the diffusion of technological innovations also performed well in predicting the diffusion pattern of the multidivisional structure (the M-form). However, the speed of diffusion of the M-form was a lot slower than that of the technological innovations it was compared to. A few years later, Fligstein (1985) found that companies adopting the multidivisional form generally did so when competitors shifted structure, when internal power dependencies favored the change, and when they were pursuing multiproduct strategies. These findings conformed to predictions in Chandler's (1962) strategy-structure theory, the power perspectives promoted by Pfeffer (1981) and the organizational-homogeneity theory by DiMaggio and Powell (1983). More recently, Guler, Guillén and Macpherson (2002) used neoinstitutional theory and social network theory to examine the cross-national diffusion of ISO 9000 certification. Also, the diffusion and adoption of total quality management, management by objectives, sensitivity training, quality circles and self-managed teams have received attention from scholars (e.g. Abrahamson & Fairchild, 1999; Ehigie & McAndrew, 2005; Gibson & Tesone, 2001).

Another part of this literature focuses on developing general theories of the diffusion of management innovations. Whereas general theories of the diffusion of technological innovations abound (see e.g. Rogers, 2003), there are relatively fewer contributions addressing general patterns of diffusion of management innovations. A few exceptions include Massini, Lewin and Greve (2005), Abrahamson (1991, 1996), O'Mahoney (2007),

and Ansari, Fiss and Zajac (2010). Massini et al. (2005) studied the patterns of adoption of new organizational routines and explained that innovators and imitators differ because of their choices of reference groups. Abrahamson (1991, 1996), on the other hand, studies how innovations can become management fads or fashions. He proposes four perspectives on the processes (e.g. imitation and external pressures) that impel the diffusion (or rejection) of innovations among populations of firms. In doing so, he argues that factors other than the efficiency of the innovation may determine whether it is diffused or rejected. O'Mahoney (2007) draws on two qualitative case studies of BPR implementation and uses a theory of memetics to help explain the diffusion of management innovations as a dynamic evolutionary process. Finally, Ansari et al. (2010) provide a framework for studying how corporate practices vary during diffusion processes.

RESEARCH AIM

The overall research question addressed in the dissertation is: *What are the internal antecedents of management innovation at the firm level?*

The dissertation aims at furthering our knowledge about management innovation in three ways. First, the project will attempt to develop a theoretical framework and terminology for studying management innovation. This involves clarifying definitions and attributes of management innovation. Second, the project will address some of the weaknesses of empirical measurements in earlier studies with particular focus on establishing a more valid measure for management innovation. Third, the dissertation includes empirical studies of a) the determinants of management innovation; b) the determinants of management innovation pervasiveness; and c) the determinants of management innovation and product innovation, respectively. In accordance with the brief review above, this dissertation addresses the stream of literature focusing on management innovation antecedents. In the following, a few

problems and open issues that will be addressed in the dissertation are discussed. The research questions and findings of each of the papers in the dissertation, then, is discussed in the next section.

The Degree of Newness Issue

As might be expected of an emerging field, some disagreement exists concerning the exact definition of the core construct. For example, Birkinshaw and Mol (2006) define management innovation as "the implementation of new management practices, processes and structures that represent a significant departure from current norms" (p. 81). A similar formulation is used by Hamel (2006) who states that "[a] management innovation can be defined as a marked departure from traditional management principles, processes, and practices or a departure from customary organizational forms that significantly alters the way the work of management is performed" (p. 75). A few year later, Birkinshaw, Hamel and Mol (2008) narrow the definition by emphasizing the degree of newness required. They define management innovation as "[..]the invention and implementation of a management practice, process, structure or technique that is new to the state of the art and is intended to further organizational goals" (p. 826). However, in another paper, Mol and Birkinshaw (2009) employ a significantly wider definition, namely "[..]the introduction of management practices that are new to the firm and intended to enhance firm performance" (p. 1269).

The most important disagreement among the definitions in the literature concerns the extent of newness required for something to be labeled a management innovation. At the most radical end is the term "new to the state of the art". This type of definition may be problematic for two reasons. First, relatively few management innovations are, in fact, new to the state of the art. Second, management innovations that are new to the state of the art are typically very idiosyncratic and, thus, dissimilar to other innovations. Therefore, this very narrow definition

risks limiting scholars to research approaches that are inductive, qualitative and difficult to generalize from.

The middle-way represented in these definitions is the notion of "a significant departure from current norms, traditional management principles or customary organizational forms". This is significantly broader than "state of the art" definitions. However, for practical purposes, what is considered customary and traditional would need to be defined. The broadest definition proposed uses the notion of "new to the firm". This definition may be problematic, since it allows any alteration of management practices to be considered an innovation. Finally, a weakness in all of these definitions is that they only look at one specific point on the newness continuum. A more complete framework for studying management innovation may distinguish between different types of innovations with different degrees of newness. In conclusion, a clarification of definitions is needed in order to enable cumulative and generalizable studies.

Management Innovation Attributes

Systematic investigations of innovation characteristics or attributes have been mostly absent in the management innovation literature. In studies of other types of innovation, it is widely recognized that an understanding of innovation characteristics is a prerequisite for building cumulative and generalizable knowledge (Damanpour, 1991; Damanpour, 1996; Light, 1998; Wolfe, 1994). Subdividing innovation into groups that share certain characteristics allows researchers to better understand the individual, organizational or contextual factors that may be more or less important for different types of innovations and, hence, it may increase construct clarity (Suddaby, 2010). Numerous studies of technological innovation have shown that innovation characteristics influence innovation adoption (Damanpour & Schneider, 2009; Wolfe, 1994; Zaltman, Duncan & Holbek, 1973). For

example, a review of 75 studies identified three innovation characteristics (compatibility, relative advantage and complexity) that have a consistent and significant effect on innovation adoption (Tornatzky & Klein, 1982). Pelz and Munson (1982) also found that innovation attributes such as the originality and the complexity of an innovation influenced the sequence of innovation stages. The more complex or uncertain an innovation, the more disorderly the observed innovation process in firms. Hitherto, no publications have applied or measured any of these innovation attributes in empirical studies of management innovations. It may, however, prove valuable as a supplement to the discussion of newness.

Empirical Issues

As discussed in the brief review above, there are a number of weaknesses associated with the measurements used for management innovation in the extant literature. Although more rigorous empirical studies have emerged recently (e.g. Damanpour et al., 2009; Mol & Birkinshaw, 2009; Vaccaro et al., 2010), much of the existing literature on management innovation is somewhat anecdotal and based on historical accounts of major breakthrough innovations. Only the stream of literature focusing on diffusion has been systematically subjected to quantitative methods, namely in studies of diffusion patterns of specific innovations such as the M-form, Total Quality Management, and ISO 9000 certification (Abrahamson & Fairchild, 1999; Ehigie & McAndrew, 2005; Gibson & Tesone, 2001; Guler et al., 2002; Teece, 1980), and of management fads and fashions (Abrahamson, 1991, 1996). There is little systematic research into how new management innovations are generated and implemented or why companies exhibit different levels of management innovativeness. Few attempts have been made to explain what distinguishes the management innovators from other organizations that face similar institutional and environmental pressures. In other words, what are the internal factors (e.g. pertaining to organizational design, leadership, culture or power dependencies) that enable some organizations to innovate when others do not.

This gap in our understanding of the antecedents of management innovation is most evident when considering the innovations that are new to the state of the art or new to the world. This type of innovation represents the true novelties and involves a large degree of uncertainty for the innovating firms. While management innovations that are new to the firm, of course, also involve substantial risk and uncertainty for the adopting organization, new to the world innovations should be of particular interest to management scholars. First, due to their rareness and novelty, these innovations are an important potential source of competitive advantage to firms (Birkinshaw et al., 2008). Second, the causal drivers, processes and consequences associated with new to the world innovations are likely to differ from those associated with adopting innovations that are already developed and implemented elsewhere. The role of internal and external change agents (e.g. managers and consultants), the influence of organizational design, internal R&D, industry collaboration, university collaboration etc. are likely to be different for the truly novel management innovations as compared to the "off the shelf" innovations present on the consultancy and management fashion market (Birkinshaw et al., 2008).

Obviously, it is difficult to apply quantitative methods to the study of new to the world innovations, since these occur more rarely. Probably for this reason, no empirical studies have yet attempted to measure new to the world or even new to the industry management innovation in a quantifiable manner. Even the measures used to study new to the firm management innovation suffer from content validity issues. For example, Mol and Birkinshaw (2009) asked managers if their companies made "major changes" in management techniques, organizational structures or corporate strategies during 1998-2000, and Vaccaro et al. (2010) investigated continuous alteration or regular renewal of organizational elements rather than innovation, per se. Whether these measures adequately capture changes that are

new to the organization could definitely be questioned. Therefore, there is a need for more valid measures of the core construct in management innovation research.

SUMMARY OF PAPERS AND FINDINGS

The dissertation consists of four papers that explore the internal antecedents of management innovation (see table 1). The theoretical framework employed in the dissertation is based on the behavioral theory of the firm (Cyert & March, 1963; Pierce, Boerner & Teece, 2008; Simon, 1947) and the dynamic capabilities view (Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece & Winter 2007; Teece, 2007; Winter, 2003). The first paper (chapter 2) introduces an overall theoretical framework for understanding management innovation at the firm level. The three other papers (chapter 3-5) present empirical findings based on a survey conducted among the 1,000 largest Danish companies (the data and methods are introduced in each paper). Throughout the papers in the dissertation, management innovation is the unit of analysis. However, data is collected at the level of the firm. As such, firms are the unit of observation.

Table 1. Papers in the dissertation

Chapter	Papers	Abstract
2	Paper I: Management Innovation Capabilities: A typology and propositions for management innovation research	Drawing upon behavioral theory of the firm and the dynamic capabilities framework, the paper proposes a model of the foundations of management innovation. Propositions and implications for future research are discussed.
3	Paper II: Internal Antecedents of	The paper investigates the effects of

	Management Innovation: The effect of diagnostic capability and implementation capability	internal antecedents pertaining to the diagnostic capability and implementation capability of firms on the likelihood of implementing new to the firm and new to the industry management innovation in a sample of large Danish firms.
4	Paper III: Explaining Management Innovation Pervasiveness: The role of internal antecedents	This paper examines a particular characteristic of management innovation: i.e. pervasiveness. Based on the behavioral theory of the firm, the determinants of firms' adoption of pervasive management innovations are explored.
5	Paper IV: Internal Determinants of Product Innovation and Management Innovation: The effect of diagnostic capability and implementation capability	The paper compares the internal determinants of management innovation and product innovation while distinguishing between new to the firm and new to the industry innovation for each innovation type.

Paper I reviews current definitions and conceptualizations of management innovation. Based on the review, a typology categorizing management innovation along two dimensions (radicalness and complexity) is introduced. How a number of known management can be categorized along this two-by-two typology is discussed. This conceptual clarification hopefully can assist in enabling more generalizable studies. Furthermore, the paper introduces

a theoretical model for understanding the foundations of management innovation building on behavioral theory of the firm (Cyert & March, 1963; Pierce et al., 2008; Pitelis, 2007), dynamic capabilities (Helfat et al., 2007; Teece, 2007), and management cognition (Gavetti, 2005; Helfat & Peteraf, 2010; Peteraf & Reed, 2007; Walsh, 1995) literatures. As such, the paper attempts to go beyond the predominantly phenomenon driven approach adopted in much of the extant management innovation literature (e.g. Hamel, 2006; Mol & Birkinshaw, 2007) by developing a more theory driven model of management innovation. The paper introduces the concept of management innovation capabilities which refers to the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. Management innovation capabilities comprise two subtypes of capabilities: diagnostic capability and implementation capability. Propositions and implications for future research are discussed.

Paper II formulates and tests hypotheses regarding a number of variables pertaining to the diagnostic capability and implementation capability of firms and their effect on the likelihood of adopting new-to-the-firm and new-to-the-industry management innovations. The paper does not measure management innovation capabilities or the diagnostic and implementation capabilities, per se, since the data set available does not allow for such an investigation. However, the paper finds that formalized activities directed at developing and implementing management innovations as well as CEO novelty increases the likelihood of innovating in both categories. Also, top management team (TMT) diversity increases the likelihood of adopting new-to-the-industry innovations. The paper does not find a direct effect of performance decline on the likelihood of implementing management innovation, but two variables, TMT diversity and previous experience, positively moderate the relationship between performance decline and new-to-the-industry management innovation. This study is the first of its kind to investigate new to the industry management innovation. Although the

study did not find support for all hypotheses, it constitutes an important first step in gaining a better understanding of the drivers of truly novel management innovations.

Paper III develops and tests hypotheses concerning the determinants of firms' adoption of pervasive management innovations. In paper I complexity is introduces as an important attribute of management innovation. Simon (1962) describes a complex system as "one made up of a large number of parts that interact in a nonsimple way" (p. 468). In the regard, the complexity of a management innovation refers to the decomposability of the new management practices, structure or process and the number of interdependencies and interactions across subparts. However, since such a measure of complexity was not part of the survey, the empirical investigation in paper III is not fully consistent with the theoretical framework outlined in paper I. Rather, the pervasiveness of management innovations (i.e. the percentage of employees affected by a management innovation) is studied. Pervasiveness, like complexity, is associated with higher risk and uncertainty for the adopting organization. The paper finds that performance shortfalls have a direct positive effect on the pervasiveness of adopted innovations. Likewise, there is a direct effect of education level, richness of internal communication and CEO novelty on pervasiveness. This paper, hence, contributes to a deepening of our understanding of management innovation attributes.

Paper IV compares the determinants of two types of innovation: product innovation and management innovation. Specifically, the paper tests whether a number of antecedents that are expected to predict management innovation are also significant determinants of product innovation. Hypotheses are based on the behavioral theory of the firm and on the notions of diagnostic capability and implementation capability. Furthermore, the paper distinguishes between new to the firm and new to the industry innovation for both innovation types. The findings indicate that there are more differences than similarities between the antecedents of the two types of innovation. However, adopting either type of innovation increases the

likelihood of simultaneously adopting the other. While a number of other variables could arguably be included, the paper contributes to our understanding of the differences and similarities between drivers of management innovation and product innovation, respectively.

Please see references pertaining to the introduction and concluding chapters at pp. 200-206

MANAGEMENT INNOVATION CAPABILITIES:

A TYPOLOGY AND PROPOSITIONS FOR MANAGEMENT INNOVATION RESEARCH[3]

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ABSTRACT

Management innovation is the implementation of a new management practice, process, technique or structure that significantly alters the way the work of management is performed. This paper presents a typology categorizing management innovation along two dimensions; radicalness and complexity. Then, the paper introduces the concept of management innovation capabilities which refers to the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. Drawing upon behavioral theory of the firm and the dynamic capabilities framework, the paper proposes a model of the foundations of management innovation. Propositions and implications for future research are discussed.

[3] I would like to thank the members of my pre-defense committee, Nils Stieglitz (Syddansk Universitet) and Torben Andersen (SMG), for their constructive feedback on an earlier version of this paper presented at my pre-defense, October 6th 2010.

INTRODUCTION

The importance of innovation for societies, firms and individuals has long been recognized and intensely studied in various scientific disciplines (Abernathy & Clark, 1985; Imai, Ikujiro & Takeuchi, 1985; Urabe, Child & Kagono, 1988; Wolfe, 1994). Recently, scholars have increasingly devoted attention to what has been labeled management innovation (Birkinshaw, Hamel & Mol, 2008; Hamel, 2006; Mol & Birkinshaw, 2009, 2007). Management innovation refers to the introduction of new management practices, processes, techniques or structures[4] and, arguably, can be an important source of value creation in firms (Hamel, 2006, 2007; Mol & Birkinshaw, 2009). Examples of management innovations include Motorola's six sigma methodology, the multidivisional form at General Motors and Oticon's spaghetti organization (Chandler, 1962; Foss, 2003; Mol & Birkinshaw, 2007). Management innovations are often more systemic and difficult to imitate than technological innovations and involve higher degrees of ambiguity and uncertainty for the adopting organization. Therefore, they can play a significant role in building and sustaining competitive advantage (Barney, 1991; Penrose, 1959; Teece & Pisano, 1994). Also, management innovations will often alter the distribution of decision rights and income rights in an organization. Hence, compared to technological innovation, implementation of management innovations may be more controversial and associated with more resistance. Therefore, a better understanding of management innovation, their characteristics and the conditions under which they can be a source of competitive advantage should be of interest to strategic management scholars.

In fact, the need for organization theory to pay more attention to how new organizational forms and management practices can be a source of sustained competitive advantage was formulated by Arie Lewin and Richard Daft in an editorial essay in

[4] For the sake of readability, the term management practices is used to refer to both practices, processes, techniques and structures throughout the paper

Organization Science almost two decades ago (Daft & Lewin, 1993). However, despite recent efforts the research field is still in a stage of early development and there are large gaps in our knowledge of management innovations. No agreed-upon model or even conceptualization of management innovation have emerged, and little systematic research has examined the antecedents or the performance consequences of management innovations. Scholars have approached the topic from a range of theoretical and methodological perspectives, but a shared definition and a coherent theoretical framework has yet to be developed. In order to enable a cumulative body of knowledge to emerge, there is an immediate need for theoretical and conceptual clarification.

The purpose of this paper is twofold. First, I aim to contribute to the clarification of management innovation as a construct and, second, I attempt to build a model of the antecedents of management innovation based on the concept of management innovation capabilities. Much of the extant literature focuses on drivers, processes or diffusion of specific management innovations such as the m-form or lean management. However, firms may implement new management practices once or twice out of pure luck or coincidence. This type of non-routine change implemented in the face of a force-majeure type situation is labeled "ad hoc problem solving" by Winter (2003). However, for management innovation to contribute to the sustainability of a firm's competitive advantage over time, it needs to be imbedded in organizational skills and routines (Eisenhardt & Martin, 2000; Teece, Pisano & Shuen, 1997). In other words, an ability to continuously implement management innovations is likely to be more important for sustainable competitive advantage than any single occurrence of management innovation in itself. Therefore, this paper introduces management innovation capabilities as a type of dynamic capability enabling firms to continuously develop and reconfigure the managerial resource base necessary to address rapidly changing environments. Adapted from the definition of resource base proposed by Helfat, Finkelstein,

Mitchell, Peteraf, Singh, Teece & Winter (2007), the managerial resource base refers to all the organizational and human assets related to the performance of management activities that a firm owns, controls or has access to.

The structure of the paper is as follows. First, findings and contributions from the literature on management innovation are briefly reviewed. Second, a definition and typology of management innovation are introduced. Third, a model of the foundations of management innovation is introduced and the notion of management innovation capabilities is developed based on a review of related constructs and findings from behavioral theory of the firm (Cyert & March, 1963; Pierce, Boerner & Teece, 2008) and dynamic capabilities (Adner & Helfat, 2003; Barney, 1991; Helfat et al., 2007; Teece et al., 1997; Teece, 2007; Winter, 2003; Zollo & Winter, 2002). Fourth, a set of propositions is formulated and, finally, implications for future research are discussed.

BACKGROUND

Management innovation is still struggling to establish legitimacy as a phenomenon and a research field in its own right. Naturally, definitions and boundaries vis-à-vis other streams of literature remain somewhat fussy. According to Mol and Birkinshaw (2009), three large streams of literature addressing management innovation can be identified.

The first and largest research stream examines the patterns of diffusion of management practices (e.g. Cole, 1986; Kossek, 1987; Teece, 1980). Although few of these contributions explicitly use the term management innovation, there is a substantial amount of literature on how management practices and structures diffuse over time and across populations of firms, industries and countries. Part of this literature focuses on the diffusion patterns of a specific innovation. For example, Teece (1980) found that a simple deterministic model commonly used to represent the diffusion of technological innovations also performed well in predicting

the diffusion pattern of the multidivisional structure. However, the speed of diffusion of the M-form was a lot slower than that of the technological innovations it was compared to. A few years later, Fligstein (1985) found that companies adopting the multidivisional form generally did so when competitors shifted structure, when internal power dependencies favored the change, and when they were pursuing multiproduct strategies. More recently, Guler, Guillén and Macpherson (2002) used neo institutional theory and social network theory to examine the cross-national diffusion of ISO 9000 certification. Also, the diffusion and adoption of total quality management, HRM practices, quality circles and self-managed teams have received attention from scholars (e.g. Abrahamson & Fairchild, 1999; Boer & During, 2001; Ehigie & McAndrew, 2005; Kossek, 1987).

Another stream of diffusion literature focuses on developing general theories of the diffusion of management innovations. Whereas general theories of the diffusion of technological innovations abound (Rogers, 2003), there are relatively fewer contributions addressing general patterns of diffusion of management innovations. One example, though, is Massini, Lewin and Greve (2005) who studied the patterns of adoption of new organizational routines and explained that innovators and imitators differ because of their choices of reference groups. Another example is Ansari, Fiss and Zajac (2010) who extend our understanding of the diffusion processes by highlighting when and how firms are likely to adapt diffused practices to attain organizational fit. Nevertheless, since most of these contributions have focused on specific practices rather than on a generic category of innovations, the diffusion literature offers little guidance in delimiting and defining the concept of management innovation.

The second stream of literature that can be said to address management innovation is the research on management fashions (e.g. Abrahamson, 1991, 1996; Benders & van Veen, 2001; Clark, 2004; Gill & Whittle, 1993; Jackson, 1996; Kieser, 1997). This literature typically

adopts a neo-institutional perspective and focuses on the so-called market for management practices and investigates how innovations can become management fads or fashions. Abrahamson (Abrahamson, 1991; Abrahamson & Fairchild, 1999) proposes four perspectives on the processes (e.g. imitation and external pressures) that impel the diffusion (or rejection) of innovations among populations of firms. In doing so, he argues that factors other than the efficiency of the innovation may determine whether it is diffused or rejected. While this stream of literature provides insights into why and how certain management ideas and practices become popular, it provides little knowledge about how the new practices and structures have come about. What processes lead some companies or individuals to innovate in the first place is not the focus of attention here. Also, management fashions are broadly defined to encompass anything from abstract ideas to very concrete practices and techniques and while all management fashions involve management innovation, hardly all management innovations become fashions. Therefore, this literature only addresses a small part of the relevant issues relating to management innovation.

The third stream of research investigates management innovation from a firm-level perspective. This perspective adopts a more generic view of management innovation. The nature, characteristics, determinants and diffusion patterns of specific innovations is not the focus of attention. Instead, scholars have offered explanations of the organizational, individual and contextual factors leading some companies to implement new management practices as well as the performance consequences of adopting such innovations (e.g. Birkinshaw et al., 2008; Damanpour, Walker & Avellaneda, 2009; Damanpour, 1991; Kimberly & Evanisko, 1981; Kossek, 1987; Lazonick, 2010; Mol & Birkinshaw, 2009).

Kossek (1987), for example, analyzes historical examples of companies adopting new HRM practices and suggests that companies' propensity to innovate is affected by external pressures or crises and by normative pressures to mimic behaviors of external reference

groups. More recently, Birkinshaw et al. (2008) proposed a framework for the management innovation process. They identify four phases in the innovation process (motivation, invention, implementation, and theorization & labeling). The model suggests that the identification of a novel problem, or a new threat or opportunity, and an organizational context supportive of new thinking drives the motivation for developing management innovations. Also, Mol and Birkinshaw (2009) found that firm size, access to internal and external knowledge sources and the level of education of the workforce significantly impacted the adoption of new management practices.

DEFINING MANAGEMENT INNOVATION

As the brief review above indicates, the list of contributions to firm-level research on management innovation is fairly short. Nevertheless, scholars have adopted quite different definitions of the core concept (see Table 1). For example, Birkinshaw et al. (2008) define management innovation as "[t]he generation and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals" (p. 829). In their subsequent empirical study, Mol and Birkinshaw (2009) however define the concept as "management practices that are new to the firm" and later measure it by asking respondents whether their companies have made major changes in a number of areas of business structure and practices. Hamel (2006), from a more practitioner oriented perspective, defines management innovation more broadly as "[..] a marked departure from traditional management principles, processes, and practices or a departure from customary organizational forms that significantly alters the way the work of management is performed" (p. 75). Mol and Birkinshaw (2009) share this focus on the day-to-day work of management and explicitly focuses on changes that take place at an operational level rather than changes of ideas or ideologies. Thus, while the recent literature seems to agree on the content of management innovation (i.e. new management practices, processes,

techniques or structures that change the day-to-day work of management), the extent of newness required for a change to be labeled an innovation is somewhat unclear.

Table 1. Main contributions addressing firm-level management innovation

Reference	Definition of Management Innovation	Theoretical foundation	Method / Key questions
Damanpour et al. (2009)	Administrative process innovations are new approaches and practices to motivate and reward organizational members, devise strategy and structure of tasks and units, and modify the organization's management processes	Socio-technical system theory	Panel data analysis: The consequences of adoption of different types of innovation in service organizations
Mol and Birkinshaw (2009)	The introduction of management practices that are new to the firm and intended to enhance firm performance	Organizational reference group theory, behavioral theory, resource based theory, institutional theory	Survey data analysis: the conditions under which firms introduce new management practices and the effect on future productivity growth
Birkinshaw et al. (2008)	The generation and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals	Intrafirm evolutionary theory	Conceptual: The role of internal and external change agents in the motivation, invention, implementation and theorization & labeling phase of management innovation
Birkinshaw and Mol (2006)	The implementation of new management practices, processes and structures that represent a significant departure from current norms		Historical analysis of major management innovations: stages of management innovation and role of change agents

In the broadest sense, I adopt a definition of management innovation as the implementation of a new management practice, process, technique or structure that significantly alters the way the work of management is performed. In the following, I will discuss how management innovation can be understood vis-à-vis traditional typologies of

innovation, and I will propose a new typology for categorizing and understanding the nuances of management innovations.

Product versus Process Innovation

Innovation research has traditionally employed a range of typologies to understand the different characteristics of innovation (e.g. Damanpour, Szabat & Evan, 1989; Damanpour, 1991; Light, 1998; Wolfe, 1994). Subdividing innovation into groups that share certain characteristics allows researchers to better understand the individual, organizational or contextual factors that may be more or less important for different types of innovations and, hence, it may increase construct clarity (Suddaby, 2010). While the innovation literature abounds with typologies and definitions, the most well-known typology is probably the distinction between product and process innovation (Abernathy & Utterback, 1978; Damanpour & Aravind, 2006; Edquist, Hommen & McKelvey, 2001; Utterback & Abernathy, 1975). Here the determining factor is whether the innovation is an end product in itself (product innovation) or whether it is an innovation in the production or delivery of other end products (process innovation). In this sense, both categories may refer to innovations that are either technical or intangible (e.g. relating to the administrative system or management practices of the organization). Management innovation, generally accepted to be a change in management practices or structures, may be understood as a type of process innovation. Nevertheless, since this category also includes technical innovations such as new production facilities and components, process innovation remains too broad a construct to clearly capture the essential properties of management innovation.

Another similar distinction is the one made between technological and administrative innovation (e.g. Kimberly & Evanisko, 1981). Here, innovations related to the core technology of the organization are labeled as technological, whereas administrative

innovations are those that are only indirectly related to the organization's basic work activity and mainly affect its management system (Damanpour et al., 2009; Damanpour & Evan, 1984). The notion of administrative innovation is probably the closest to the definitions of management innovation adopted in recent literature (e.g. Birkinshaw et al., 2008). However, the administrative innovation construct does not solely focus on the management system. E.g. Kimberly and Evanisko (1981) studied innovation in the hospital sector and define administrative innovations to include "the adoption of electronic data processing for a variety of internal information storage, retrieval, and analytical purposes" (p. 692). This illustrates the general focus on technology in many of the earlier studies of innovation.

Edquist and colleagues (Edquist et al., 2001; Meeus & Edquist, 2006) have suggested combining the two typologies discussed above into a taxonomy with two types of product innovation (goods and services) and two types of process innovation (technological and administrative). According to Damanpour et al. (2009, p. 655), administrative process innovation refers to "new approaches and practices to motivate and reward organizational members, devise strategy and structure of tasks and units, and modify the organization's management processes". Therefore, positioning the management innovation concept vis-à-vis the broader innovation literature, I will suggest that management innovation can be understood as a type of administrative process innovation.

Radicalness

Another typology that has emerged in the innovation literature is the dichotomy between radical and incremental innovations (e.g. Afuah, 1998; Dewar & Dutton, 1986; Ettlie, Bridges & OKeefe, 1984; Greenwood & Hinings, 1996). Where the distinction between product (goods or services) and process (technological or administrative) innovation refers to the outcome or content of the innovation, the discussion of radicalness more directly relates to the

nature of the change brought on by an innovation. A radical innovation is generally said to mark a distinct and risky departure from existing practices and competences, whereas incremental change builds on the existing skill set (Afuah, 1998; Amis, Slack & Hinings, 2004; Ettlie et al., 1984; Greenwood & Hinings, 1996; Poole & Van de Ven, 2004b). Related typologies include the distinction made between competence destroying and competence enhancing change (Abernathy & Clark, 1985; Tushman & Anderson, 1986), single loop and double loop learning (Argyris, 1977), and first order and second order change (Meyer, Goes & Brooks, 1993).

The use of this sort of distinction is surprisingly absent in the management innovation literature. It may, however, prove valuable as a supplement to the discussion of newness. As discussed above, the published work on management innovation can be divided into those who advocate "new to the state of the art" definitions (e.g. Birkinshaw et al., 2008; Hamel, 2006) and those who opt for a "new to the adopting organization" concept (Damanpour et al., 2009; Kimberly & Evanisko, 1981; Mol & Birkinshaw, 2009). In accordance with Mol and Birkinshaw (2009), I will suggest that both perspectives be included in our understanding of management innovation.

Nevertheless, standing alone newness may not be the most relevant characteristic to study if we would like to understand the drivers and consequences of management innovation. Newness gives us a way to distinguish between innovators and imitators, but an innovation may well be new to the world without being radical in the traditional sense of the word. I.e. without representing a large departure from current practice. On the other hand, even though an innovation is only new to the firm, it may still represent a huge paradigm shift for the adopting organization. Therefore, in addition to distinguishing between new to the firm and new to the world (or the state of the art), I suggest that we should also distinguish between incremental and radical management innovations.

The new to the state of the art represents the true novelties, i.e. the management practices and structures never seen before. Oticon's spaghetti organization and the M-form at General Electric (Chandler, 1962; Foss, 2003) are examples of such innovations. These innovations constitute large departures from current practices and norms and represent both competence destroying change and double-loop learning. As such, these are examples of racial new to the world management innovations (Ettlie et al., 1984; Poole & Van de Ven, 2004b). However, for firms subsequently adopting the M-form, the innovation is likely to still represent a departure from current norms and practices of the organization even though it is only new to the firm. Such subsequent adoption of e.g. the M-form may, therefore, be described as a radical new to the firm management innovation. These innovations are already present on the so-called management fashion market (Abrahamson, 1991, 1996) and although they may be adapted slightly to the adopting organization, they constitute imitation more than true novelty.

At the other extreme are the incremental management innovations. These innovations represent minor changes to management practices, processes, techniques or structures that do not fundamentally alter the theories in use (Argyris, 1977) of the organization or render its current competences obsolete (Abernathy & Clark, 1985; Tushman & Anderson, 1986). Although these innovations appear smaller and less risky for the adopting organization, they may still be new to the world and true novelties. Due to their incremental nature these innovations may be more difficult to observe and, hence, to study. Nevertheless, a comprehensive understanding of management innovation should at least include a discussion of the role of incremental innovations in management practices.

In sum, I suggest that newness and radicalness are to distinct and complementary dimensions describing management innovation. The individual, organizational and contextual drivers of management innovation, their impact on the adopting organization and hence the

processes of their implementation as well as their performance outcomes is likely to differ vastly depending on the extent of radicalness and newness (Amis et al., 2004; Greenwood & Hinings, 1996). Therefore, I will argue that these are meaningful and valuable characteristics for future research on management innovation. That the qualitative nature of incremental and radical innovations differ may seem straightforward. From the perspective of the adopting firm, it may be harder to sense a substantial difference between new to the firm and new to the state of the art. Both in essence represent changes that are new to the adopting organization. However, the distinction between new to the firm and new to the state of the art is relevant because it represents a divide between imitators and innovators. What drives some companies to develop entirely new ideas and ways of organizing the work of management while others choose to implement off-the-shelve management solutions is a highly relevant question (Birkinshaw et al., 2008; Massini et al., 2005). Whether and how this affects the generative mechanisms and processes of implementation is an interesting empirical question.

The bulk of research on management innovation and even on innovation in general has focused on the new to the firm type of innovation. This type of innovation is often more easily observed, more common and hence more easily made subject to statistical scrutiny than the new to the world innovations. While management innovation scholars, per se, have not devoted much attention to the incremental innovations defined above, this category of innovation, it may be argued, is highly overlapping with other streams of research on change from the perspectives of e.g. cultural studies, management cognition, behavioral theory and institutional theory (e.g. Armenakis & Bedeian, 1999; Becker, Lazaric, Nelson & Winter, 2005; Colombo & Delmastro, 2002; Ford, Ford & McNamara, 2002; March, 1996; Mintzberg & Westley, 1992; Palmer & Dunford, 2008; Pettigrew, Woodman & Cameron, 2001; Poole & Van de Ven, 2004a; Santos & Garcia, 2006; Tidd, Bessant & Pavitt, 2001; Weick & Quinn, 1999). In practice, incremental innovations that do not fundamentally alter the work of the

organization may be hard to distinguish from other types of organizational changes. On the other hand, new to the state of the art management innovation is hugely understudied in spite of having potentially huge impact on firms, industries and maybe whole economies. For these reasons, new to the state of the art innovation should be high on the research agenda for management innovation scholars in the future.

Complexity

In studies of technological innovation, scholars have defined a vast number of innovation attributes (e.g. Afuah, 1998; Damanpour et al., 1989; Garcia & Calantone, 2002; Tornatzky & Klein, 1982; Wolfe, 1994). Having a clear understanding of innovation characteristics is necessary for comparing and generalizing results (Suddaby, 2010). Only characterizing management innovation along one dichotomous dimension, radicalness, may be a too limited categorization. On the other hand, some will argue that the proliferation of conflicting and overlapping attributes in the technological innovation literature has not always improved the generalizability of research findings (Wolfe, 1994). Nevertheless, I will suggest to further qualify the concept of management innovation by categorizing it along another dimension: complexity. Complexity has been included in innovation research both as an organizational variable driving innovation and as an innovation attribute. As a characteristic of a firm, complexity typically refers to how differentiated the structure of the organization is (Blau & McKinley, 1979; Damanpour, 1996; Hall, 1977). For example, Blau (1970) identified four dimensions of differentiation that form the core of the formal structure of organizations; namely spatial, occupational, hierarchical, and functional differentiation (p. 201). The degree of structural complexity, then, is implied by the extent of differentiation along these four dimensions (Aiken, Bacharach & French, 1980; Damanpour, 1996; Hall, 1977). A typical measure used in innovation research is the number of units under the top

executive or the variety of specialists that work in an organization (Blau & McKinley, 1979; Wolfe, 1994).

As an innovation attribute, complexity has been defined in a number of ways. Rogers and Shoemaker (1971, p. 154) defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". Pelz (1985) distinguishes between technical and organizational complexity of an innovation, where the first refers to the divisibility of the new technology and the latter to the number of units or groups involved in its adoption. Others have defined complexity as the triability, originality, difficulty of implementation or decomposability of an innovation (Damanpour & Schneider, 2009; Simon, 1962). For example, Damanpour (2009) argues that "[i]nnovations which are more difficult to implement, more original, and less trialable are less likely to be adopted by the organization because of higher uncertainty of their success and lower likelihood of their contribution to organizational performance" (p. 498). In this paper, I will use the notion of complexity in the sense proposed by Simon (1962). He describes a complex system as "one made up of a large number of parts that interact in a nonsimple way" (p. 468). Social systems often take form as a parts-within-parts structure (ibid.). As such, the perceived complexity of a system may be reduced because of its hierarchic nature. In other words, most interactions between organizational members is likely to take place within distinct subsystems and fewer interactions will take place among and across subsystems.

The more decomposable a system is, the fewer interdependencies and linkages cross subsystem boundaries. On the other hand, highly complex systems involve more interactions and interdependencies between organizational members across the organizational subsystems. A related feature of complex systems is the notion of loose coupling (Beekun & Glick, 2001; Weick, 1976) or modularity (Sanchez & Mahoney, 1996; Sanchez, 2000). The higher the interdependence and the more frequent the interactions between units the more tightly

coupled and the less modular is the system. Hence, the complexity of a system rises when the modularity or loose coupling of its subparts are lower.

A similar notion of complexity may be useful for understanding management innovation. Complex management innovations will involve new management practices, processes, techniques or structures that necessitate a high number of interdependencies between organizational units and members. One example of a highly complex management innovation, then, could be the spaghetti organization implemented at the Danish hearing aids company Oticon in the 1990s (Foss, 2003). In the 1980s, the company's market share dropped substantially and in 1988 a new CEO, Lars Kolind, was appointed with a clear objective to turn around the financial performance of the organization. Kolind implemented a radically new organizational structure that centered on self-organizing teams and abolished the formal hierarchy. As such, any employee could initiate projects, assemble teams and then compete for resources. Traditional offices and work stations were abolished and employees would travel around the facilities with mobile carts and laptops. The physical redesign also included the paperless office where all incoming mail was scanned into the computer system and then shredded. This management innovation represented a large departure from customary practices and was not seen before. Responsibilities for coordination and initiation of activities that had previously been held by managers was delegated to employees (Foss, 2003). Since ways of coordinating activities and required outputs from projects were, at least initially, not standardized, the new organizational structure vastly increased the number of interdependencies and the need for coordination between organizational subparts.

On the other hand, the M-form developed independently at General Motors and Du Pont in the 1920s may be understood as a less radical management innovation. As it has been thoroughly depicted by Chandler (1962), an overload in decision making of senior managers created a need for new ways of coordinating and delegating work. Thus, a general office was

created with the responsibility of coordinating and allocating resources for a number of quasi-autonomous divisions. Divisions' headquarters then administered a range of functional departments each comprising a number of field units (Chandler, 1962). This structure, which has by now diffused across a large population of firms (Fligstein, 1985; Teece, 1980), represented a great departure from the customary organizational forms of the time. Despite its newness and radicalness, the M-form maintained a high level of decomposability. Tasks and responsibilities are clearly divided between divisions and headquarters, subsystems are clearly defined and relatively few interdependencies exist across e.g. divisions (Chandler, 1962). As expressed by Sanchez and Mahoney (1996) "[t]he interactions between the divisions of a multidivisional organization are representative of a nearly decomposable system. The tasks within a multidivisional firm are intentionally designed to require low levels of coordination so that they can be carried out by an organizational structure of quasi-independent divisions functioning as loosely coupled subsystems" (p. 64). The multidivisional form, in other words, may be perceived as a *nearly decomposable system* in the terminology of Simon (1962).

The higher the complexity, i.e. the lower the decomposability and the higher the number of interdependencies between subparts of the new management practice or structure, the more difficult it is likely to be to implement a management innovation. Therefore, this dimension is relevant for categorizing management innovation. The determinants, implementation processes and performance consequences associated with a management innovation are likely to vary depending on the complexity of the management innovation. For example, more complex innovations may be more difficult or costly to implement and encounter more resistance and, thus, can be thought of as more risky for the adopting organization. However, more complex innovations are also likely to be associated with higher levels of causal ambiguity and may therefore be more difficult to imitate. Then, assuming that the innovation

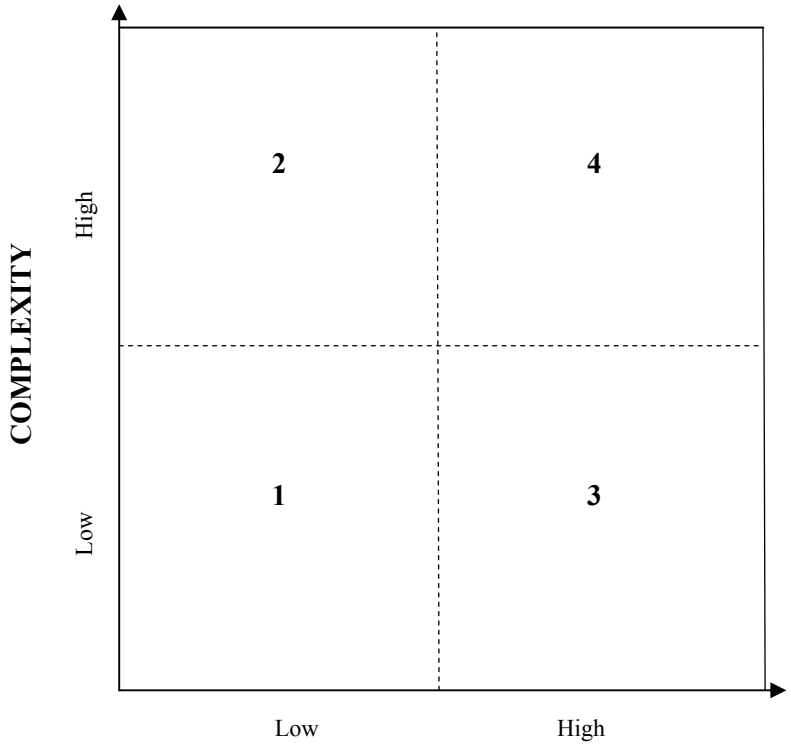
is valuable in the first place, a more complex innovation is more likely to give rise to sustainable competitive advantages (Barney , 1991; Wernerfelt, 1984).

A Typology for Management Innovation

In sum, I define management innovation in the broadest sense as the implementation of a new management practice, process, technique or structure that significantly alters the way the work of management is performed. In terms of the content of management innovation, this definition corresponds to what seems to be an emerging consensus in recent contributions (Birkinshaw et al., 2008; Damanpour et al., 2009; Mol & Birkinshaw, 2009). Positioning management innovation vis-à-vis the broader innovation literature, I understand management innovation as a type of administrative process innovation (Damanpour et al., 2009; Edquist et al., 2001). For more examples and cases of management innovations, please see e.g. Foss, Pedersen, Pyndt and Schultz (2011), Birkinshaw et al. (2008) or Mol and Birkinshaw (2007).

As already mentioned, the most important disagreement in the management innovation literature pertains to the degree of newness required for a change to be labeled an innovation. While I agree that this distinction is relevant, I propose to categorize management innovation along two other dimensions, that are more likely to directly influence the causal drivers, processes and performance consequences of innovation adoption: Radicalness and complexity (see figure 1). This enables a more nuanced and encompassing understanding of the core construct and lays a foundation for more comparable and generalizable studies in the future. For each of the four types defined here, a further distinction can be made between new to the firm and new to the state of the art innovations.

Figure 1. Management innovation typology



Even though the most incremental innovations pertaining to categories 1-2 may be hard to distinguish from other types of organizational changes and are to some extent studied by related literatures (e.g. cultural studies, management cognition, behavioral theory, and institutional theory: Armenakis & Bedeian, 1999; Becker et al., 2005; Colombo & Delmastro, 2002; Ford et al., 2002; March, 1996; Mintzberg & Westley, 1992; Palmer & Dunford, 2008; Pettigrew et al., 2001; Poole & Van de Ven, 2004a; Santos & Garcia, 2006; Tidd et al., 2001; Weick & Quinn, 1999), it is important for the purpose of conceptual clarity to include them here. In fact, it is somewhat a negligence in the extant management innovation literature to mostly disregard these, maybe less bombastic, alterations of management practices that nevertheless constitute an ongoing process of enhancing competences, resources and capabilities in many firms (Teece et al., 1997). One example of a (new to the firm) type 1 management innovation could be the adoption of a so-called "Fed-Ex Day" at a small

software company, Atlassian (see www.managementlab.org). The CEO of Atlassian was inspired by Google's 20 percent rule (Vise & Malseed, 2005), but he felt that his company was too small to devote 20 percent of developers' time to exploration. Instead he decided to set aside a single day to new product development. The first part of the day was spend brainstorming and the rest of the day developers worked on turning the best ideas into working prototypes. The event was named "Fed-Ex Day" after the day-to-day delivery made famous by Fed-Ex. The event was so successful that it was made a recurring part of new product development at Atlassian. While this innovation is new to Atlassian, it is clearly inspired by the practices of other companies such as Google. The practice does not drastically break with the theories in use of the organization. The new practice only affects the work of managers a few days a year, while the daily routines and practices of the firm are largely unaltered. Also, it is a relatively decomposable practices that does not create a high number of interdependencies and, hence, is fairly straightforward to implement.

An example of a (new to the firm) type 3 management innovation is the 360-degree feedback implemented at HCL (see www.managementlab.org). After Vineet Nayar became president of HCL in 2005, he implemented a number of changes in the management practices of the large IT services company. One change was to create an annual survey where employees rate the communication skills, responsiveness, strategic vision and so on of the company's 1500 managers. Instead of just linking the 360 degree feedback to compensation packages, the results are compiled and published online. Even though the adoption of 360 degree feedback marked a large change in the management practices and culture of HCL, it is a very widespread practice and, thus, only qualifies as a new-to-the-firm innovation. Also, it does not involve a high number of interdependencies between organizational subparts. Examples of type 4 management innovations include implementation of e.g. lean management, quality circles or total-quality-management. Also, the so-called backward

policing developed and implemented as a quality control initiative at the Japanese auto manufacturer Honda is an example of a (new to the state of the art) type 4 management innovation. Instead of inspecting the quality of a product at the end of the production process, each employee involved in production and shipping has the right to reject substandard inputs received from earlier production stages. If this means closing down the production line, the unit supplying the out-of-specification input would be held accountable for the downtime (Coleman, 1990, 1993). As such, the policing normally performed by a line foreman is instead performed by all operators on the line creating a high degree of interdependencies across units and members. This reallocation of rights and accountability was undoubtedly new to the state of the art.

As I have demonstrated here, the two-by-two typology of management innovation is useful for classifying known innovations and, as such, provides a framework for future studies. This conceptual clarification hopefully can assist in enabling more generalizable studies and may thus help overcome the inconsistent results that characterize the innovation literature in general (Suddaby, 2010; Wolfe, 1994).

FOUNDATIONS OF MANAGEMENT INNOVATION

The definitions of management innovation and most of the studies mentioned above are primarily phenomenon-driven. Most scholarly interest in management innovation has until now been driven by the empirical observation and categorization of a new or poorly understood phenomenon. Hence, management innovation has been approached from a range of different theoretical viewpoints. This paper seeks to apply a more theory-driven approach to management innovation. Rather than focusing on the observation of specific innovations in organizations, the aspiration of this paper is to lay the foundation for a model explaining why firms differ in their ability to continuously develop and reconfigure managerial resources to

meet and exploit external opportunities and demands. In the following, this ability, which will be termed "management innovation capabilities", is introduces, defined and discussed vis-à-vis constructs and frameworks from behavioral theory (Cyert & March, 1963; Pierce, Boerner & Teece, 2008), management cognition (Adner & Helfat, 2003; Helfat & Peteraf, 2010; Walsh, 1995) and dynamic capabilities research (Teece et al., 1997; Teece & Pisano, 1994).

Behavioral Theory of the Firm

The behavioral theory of the firm (BTF) pioneered the understanding of the internal organization of firms and has laid the foundation for most modern theories of strategy and firm behavior (Pierce et al., 2008). BTF incorporates sociological and social psychology perspectives into economics and thereby provides a more realistic theory of decision making in firms. The original contribution by Cyert and March (1963) provided a deep understanding of how firms make decisions in a context of bounded rationality, conflicting goals, problem driven search and imperfect environmental matching. Prior to the emergence of BTF, these internal dynamics had largely been "black-boxed" in the dominant neo-classical perspectives. The BTF has been hugely influential on the field of strategic management and on most modern theories of strategy and firm behavior (Pierce et al., 2008).

BTF provides a useful framework for understanding the search and decision behavior of firms. However, Cyert and March (1963) provided few guidelines for how managers may seek to improve or change firm behavior. The resource based view (Barney, 1991, 1996; Penrose, 1959; Wernerfelt, 1984) and dynamic capabilities (Helfat & Peteraf, 2009; Pierce et al., 2008; Teece et al., 1997; Teece, 2007; Winter, 2003) are examples of modern perspectives that build on and extend the learnings and assumptions of BTF. These theories place emphasis on the heterogeneous internal resources, routines and capabilities enabling firms to adapt to and exploit changes in their external environments.

Dynamic Capabilities

The dynamic capabilities approach suggests that firms sustain competitive advantage in rapidly changing environments by integrating, building, and reconfiguring internal and external competences in congruence with environmental demands (Teece et al., 1997). For example, Teece et al. observed that simply accumulating valuable assets is often not enough to give firms a competitive advantage, rather "winners in the global marketplace have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences" (1997, p. 515).

By nature, the dynamic capabilities approach is broad and encompasses multiple levels of analysis from that of the environment to that of the individuals (Helfat & Peteraf, 2009; Teece, 2007). Helfat et al. (2007) synthesized the most influential definitions provided by Teece et al. (1997), Eisenhardt and Martin (2000), and Zollo and Winter (2002) in defining dynamic capabilities as "the capacity of an organizational to purposefully create, extend, and modify its resource base" (p. 4). A firm's resource base according to Helfat et al. (2007, p. 4) includes "tangible, intangible, and human assets (or resources) as well as capabilities which the organization owns, controls, or has access to on a preferential basis".

Dynamic capabilities can be seen as an approach to understanding competitive advantage and strategic change more than as a theory in itself (Helfat & Peteraf, 2009; Teece et al., 1997) and, as such, its theoretical underpinnings have yet to be fully defined (Felin & Foss, 2005). However, the dynamic capabilities approach draws heavily upon earlier theoretical perspectives, particularly evolutionary economics, behavioral theory and the resource based view of the firm. Organizational routines are central to dynamic capabilities research. For example, Winter (Winter, 2000; Winter, 2003) and Zollo and Winter (2002)

view an organizational capability as a high level routine or collection of routines. However, an important distinction between organizational routines and dynamic capabilities lies in the notion of "purpose" in the definition proposed by Helfat et al. (2007): "The word "purposefully" also has a specific meaning in our definition. This word indicates that dynamic capabilities reflect some degree of intent, even if not fully explicit. We therefore distinguish dynamic (and other) capabilities from organizational routines, which consist of rote organizational activities that lack intent" (p. 5). The focus on routines and path dependencies as determining of organizational performance and strategic change is rooted in evolutionary economics (Nelson & Winter, 1982).

But dynamic capabilities, like evolutionary economics, also draw upon behavioral theory (Helfat & Peteraf, 2009; Winter, 2000). Behavioral theory, for example Simon (1947) and Cyert and March (1963), introduced the notion of firms as path dependent, learning organizations that make strategic decisions based on a principle of satisficing rather than optimization. The assumptions about boundedly rational and path dependent decision making procedures proposed in the behavioral theory of the firm are consistent with the dynamic capabilities approach. For example, Eisenhardt and Martin (2000) explicitly build on the behavioral notions of rules of thumb and efficient decision processes to analyze the processes underlying dynamic capabilities. Finally, like the resource based view of the firm (Argote & Ingram, 2000; Barney, 1991; 1996; Wernerfelt, 1984), the dynamic capabilities framework builds on the notion of firm-level heterogeneous assets and resources as the fundamental building block of competitive advantage (Helfat & Peteraf, 2009; Teece et al., 1997).

Dynamic capabilities come in many shapes and forms. Since there are many different types of dynamic capabilities, Helfat et al. (2007) suggest that scholars should define and specify the particular dynamic capabilities that they are investigating. This paper proposes and investigates a specific dynamic capability revolving around the ability of firms to develop,

renew and reconfigure their managerial resource base. This dynamic capability, which is termed management innovation capabilities, is defined as the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. Adapted from the definition of resource base proposed by Helfat et al. (2007), the managerial resource base refers to all the organizational and human assets related to the performance of management activities that a firm owns, controls or has access to.

Management Cognition

Adner and Helfat (2003) introduce the notion of dynamic managerial capabilities which is somewhat similar to the notion of management innovation capabilities introduced in this paper. Adner and Helfat (2003, p. 1012) define dynamic managerial capabilities as "the capabilities with which managers build, integrate, and reconfigure organizational resources and competences". The concept is aimed at explaining why some managers are more skillful than others at anticipating, interpreting, and responding to the demands of an evolving environment. However, management innovation capabilities in this paper differs from dynamic managerial capabilities by taking the organization as the unit of analysis and by having a more narrow focus in terms of content, since only changes to the managerial resource base are considered. Dynamic managerial capabilities on the other hand resides at an individual level but has a more encompassing content, since any skillful response to environmental demands is investigated. Nevertheless, dynamic managerial capabilities logically are part of the foundation of management innovativeness, since the skills and capabilities of top managers are important drivers of changes in the managerial resource base (Helfat & Peteraf, 2010; Teece, 2007).

According to Teece (2007), dynamic capabilities are composed of the capacity to sense opportunities and threats, to seize opportunities, and to reconfigure organizational assets.

Adner and Helfat (2003) divide dynamic managerial capabilities into three underlying attributes: managerial human capital, managerial social capital, and managerial cognition. Helfat and Peteraf (2010) expands the notion of managerial cognitive capabilities by discussing the role of cognition and mental activities for three underlying capabilities that follow from Teece's (2007) framework: namely, managerial sensing, seizing and reconfiguration capabilities.

Management Innovation Capabilities

In his discussion of the microfoundation of sustainable firm performance, Teece (2007) specifically emphasized the importance of managerial and organizational innovations. For example, Teece states that "not only must the innovating enterprise spend heavily on R&D and assiduously develop and protect its intellectual property; it must also generate and implement the complementary organizational and managerial innovations needed to achieve and sustain competitiveness" (2007, p. 1321). The notion of management innovation capabilities proposed in this paper is an attempt at specifying this ability to generate and implement managerial innovations necessary for sustainable competitive advantages.

As mentioned, management innovation capabilities refer to the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. This definition is similar to the definitions adopted in the dynamic capabilities literature (see the most common definitions in table 2) and stresses the ability of the organization to reliably reproduce the desired outcome (Helfat & Peteraf, 2010; Winter, 2003). Dynamic capabilities is still a relatively new field of inquiry and, hence, terms and constructs remain somewhat vague and "rough around the edges" (Helfat & Peteraf, 2009). Particularly, the microfoundations and interaction of antecedents at different levels of analysis is ill understood (Felin & Foss, 2005). However, in order to make sense of complex real life

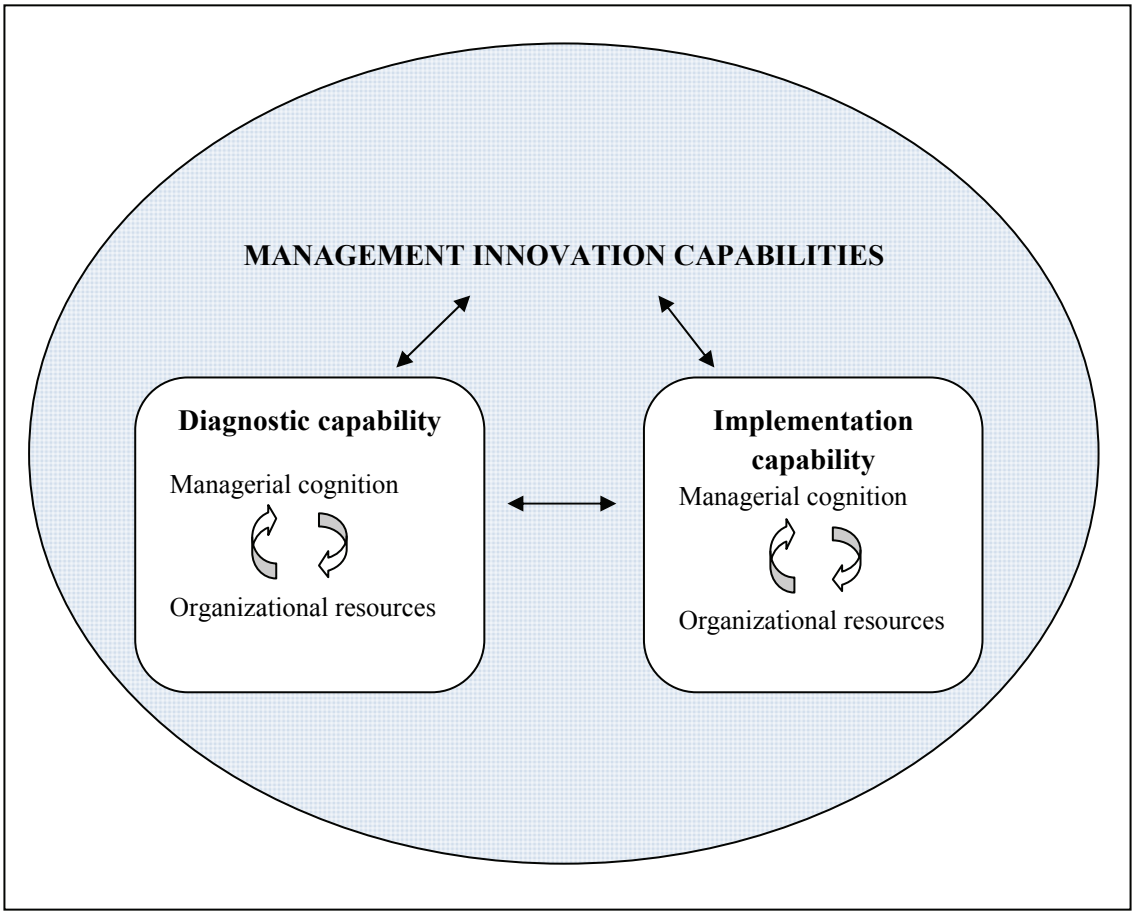
phenomenon such as management innovations, theories and ideas often need a long time to develop into neatly defined constructs. Therefore, the dynamic capabilities framework, in spite of its weaknesses, is still a relevant frame for developing ideas and theories for management innovation research.

Table 2. Main definitions of dynamic capabilities

Author	**Definition of dynamic capabilities**
Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece and Winter (2007)	"[A dynamic capability is] the capacity of an organization to purposefully create, extend, and modify its resource base" (p. 4)
Winter (2003)	"An organizational capability is a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type" (p. 991)
Zollo and Winter (2002)	"A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness" (p. 340)
Eisenhardt & Martin (2000)	"Dynamic capabilities (..) are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die" (p. 1107)
Teece, Pisano and Shuen (1997)	"We define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p. 516)

Similar to the subdivisions made by Teece (2007) and Helfat and Peteraf (2010), this paper divides management innovation capabilities into two subparts, (1) diagnostic capability, which is the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management solutions that either solve the problem or exploit the opportunity, and (2) implementation capability, which refers to the ability of an organization manage the transition process from one managerial setup to another. Each of these capabilities, then, is driven by managerial cognition and organizational resources (see model in figure 2).

Figure 2. Management innovation capabilities



Managerial cognition here refers to the capacity of individuals (in this case managers) to perform mental activities (Helfat & Peteraf, 2010). According to *A Dictionary of Psychology* published by Oxford University Press, cognition broadly refers to "the mental activities involved in acquiring and processing information" (Colman, 2006). Cognition plays an important part in understanding individuals' learning, decision making, perception, attention and search behavior (Gavetti, 2005; Helfat & Peteraf, 2010; Helfat & Peteraf, 2009; Ocasio, 1997). Research in cognitive psychology have found that mental activities may be divided into two types: (1) mostly automatic mental processing of information and (2) an "executive function" responsible for goal-directed, deliberate behavior (Helfat & Peteraf, 2010). Due to difference in innate cognitive capacities as well as differences in environmental conditioning,

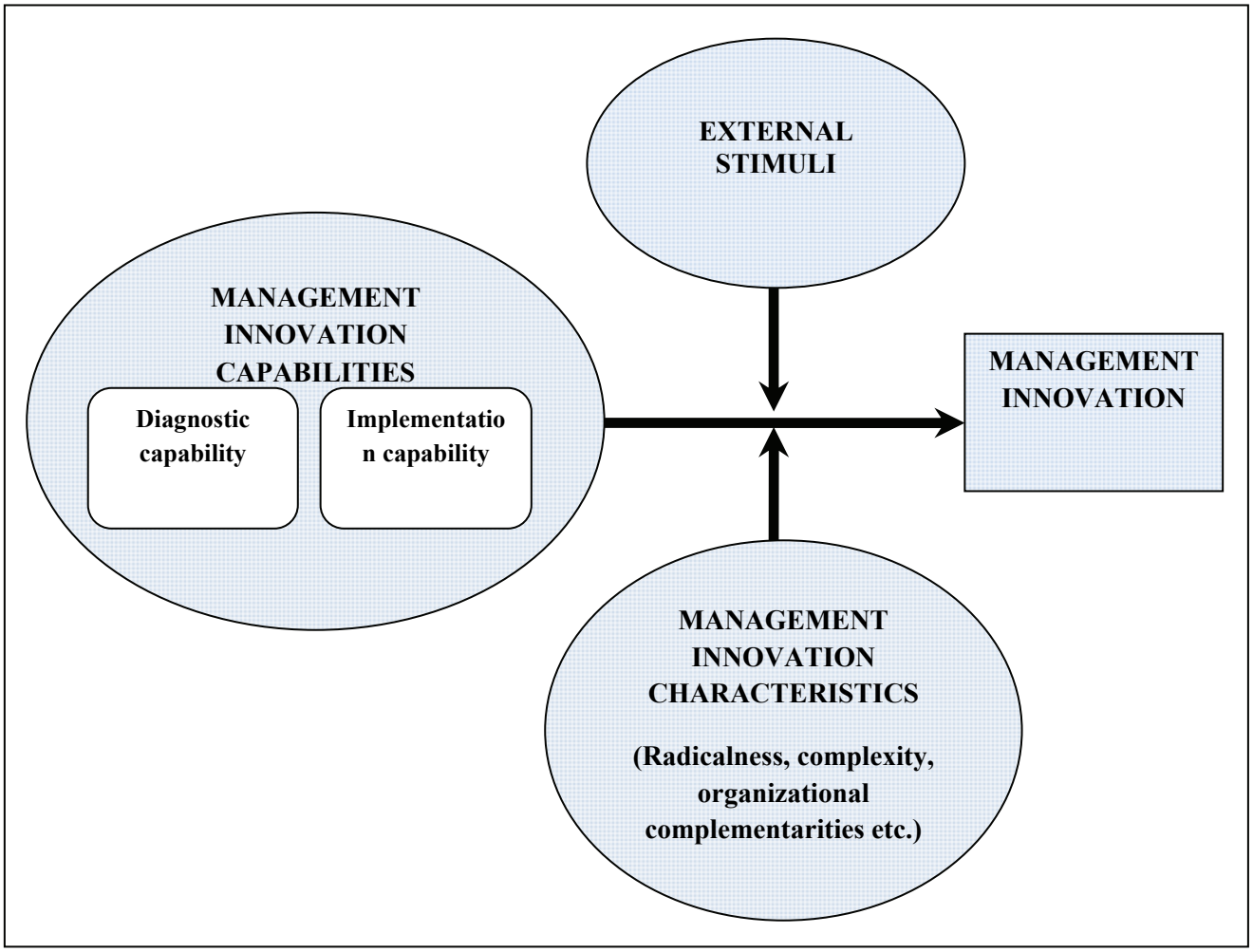
individuals exhibit heterogeneity in their abilities to perform mental activities. As such "heterogeneity of cognitive capabilities can contribute to persistent performance differences between organizations through managerial sensing, seizing, and recongifuration" (Helfat & Peteraf, 2010, p. 12). By including the notion of managerial cognition, this paper attempts to counter some of the typical criticism of dynamic capabilities research. Namely, the lack of clearly defined microfoundations (e.g. Felin & Foss, 2005; Gavetti, 2005). However, at the same time including individual level cognition is a departure from the traditional focus on capabilities and routines as a collective phenomenon (Becker, 2004; Weick & Roberts, 1993).

Organizational resources, on the other hand, refer to a number of firm-level factors such as how the firm has organized its activities and what sources of knowledge and assets it has access to. These factors reflect the institutionalized routines, operating procedures, power structures and learning paths of the organization (Becker et al., 2005; Nelson & Winter, 1982; Winter, 2003). This paper views organizational capabilities as emerging from the interaction between intentional but somewhat routinized organizational structures and procedures (i.e. organizational resources) and the deliberate, goal oriented actions of individuals (i.e. managerial cognition). Gavetti (2005) similarly argues that routine-based and cognitive logics are intertwined and both affect capability development. However, more theoretical and empirical work is needed to fully understand the microfoundations and the underlying processes of management innovation capabilities and its two subcategories of diagnostic capability and implementation capability.

A model of the foundations of management innovation is presented in figure 3. In addition to the expected influence of management innovation capabilities on the likelihood of implementing management innovations, the model also incorporates an expected moderating influence of external stimuli and innovation characteristics. In the following section

propositions are developed based on the behavioral theory and dynamic capabilities framework adopted.

Figure 3: Foundations of management innovation



PROPOSITIONS

Diagnostic Capability

Firms perceive their environments through an organizational filter and, hence, a range of internal factors influence the ability of firms to recognize opportunities and threats and to mobilize resources and capabilities in response (Cyert & March, 1963; Pitelis, 2007; Teece, 2007). Diagnostic capability refers to the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management

solutions that either solve the problem or exploit the opportunity. As already mentioned, diagnostic capability can be institutionalized and relate to structural variables in the organization, which I have labeled as organizational resources, or it may depend on the perceptiveness and sensitivity of managers. The idea that decision making in firms is a result of both the (limited) cognitive ability of managers and the influence of structural variables on the attention and search behavior of individuals is hardly new (see Simon, 1947), but it has not previously been incorporated directly into theories of management innovation. Nevertheless, elements of the invention phase discussed in Birkinshaw et al.'s (2008) conceptual model are compatible with the notion of diagnostic capability used here.

A number of organizational variables are likely to be part of the diagnostic capability of firms and this paper does not attempt to fully disentangle the empirically observable components. Nevertheless, dynamic capabilities and behavioral theory suggest a number of relevant variables to include. First, the managerial cognitive capabilities of managers as well as more observable underpinnings of these such as attitudes, beliefs and values of power holders, are likely to exert significant influence on the diagnostic capability of an organization and on the likelihood of adopting management innovation (Helfat & Peteraf, 2010). According to Ocasio (1997) attention structures are "social, economic, and cultural structures that govern the allocation of time, effort, and attentional focus of organizational decision-makers in their decision-making activities" (p. 195). An important component in firms' attention structures are the beliefs and values of critical organizational players and most notably of the CEO and the top management team (Eggers & Kaplan, 2009; Hambrick & Mason, 1984; Ocasio, 1997). Managers are also in a special position to exercise influence on aspiration levels, attention structures, search behavior and standard operating procedures adopted in the organization. Likewise, in resolving the inherent conflicts between organizational groups, managers will often be in a position to determine the sequence of goals

being attended to (Cyert & March, 1963; Pitelis, 2007). Examining the role of top managers and their beliefs and attitudes, thus, is crucial for understanding the likelihood of a firm implementing management innovations.

Proposition 1: The cognitive capabilities of managers, i.e. their abilities to perform mental activities related to sensing opportunities, positively influence the diagnostic capability and the management innovation capabilities of an organization and, hence, increases the likelihood of implementing management innovations.

Second, a number of variables relating to how the firm has organized its resources and what sources of knowledge it has access to are likely to influence its diagnostic capability. It is commonly acknowledged that firms' unique resources and assets are important determinants of their competitive advantage (Barney, 1996; Foss, 2007; Pitelis, 2007; Teece et al., 1997). Also, the present skill set and prior experiences of organizational members are likely to influence their search behavior (Cyert & March, 1963; Knudsen & Levinthal, 2007). Therefore, the educational background and level of education of employees, as well as the access to internal and external knowledge sources are likely to make firms more perceptive to problems and opportunities and, hence, more likely to implement management innovations. Likewise, organizational design variables may influence the cross-fertilization and spread of ideas and knowledge in the organization. For example, firms with more dispersed decision making processes (decentralization) should arguably be more sensitive to new ideas from within the organization. Other institutionalized structures such as reward schemes, decision rules, and knowledge sharing practices may likewise be more or less conducive to idea generation, experimentation and risk taking.

Proposition 2: Organizational resources (e.g. workforce characteristics, knowledge sources, knowledge sharing practices and organizational structures promoting

experimentation and knowledge sharing) positively influence the diagnostic capability and the management innovation capabilities of an organization and, hence, increases the likelihood of implementing management innovations.

Implementation Capability

While diagnostic capability refers to the ability to develop managerial solutions in response to perceived problems or opportunities, implementation capability refers to the ability of the organization to manage the transition process associated with implementing new management practices. Implementation capability does not in itself precipitate innovation, but it is an important part of an organization's management innovation capabilities and is a necessary prerequisite for management innovation success. This parallels what Birkinshaw et al. (2008) have identified as a distinct phase in the management innovation process, namely the implementation phase. As for diagnostic capability, I have identified two main components of firms' implementation capability: organizational resources and managerial cognition.

First, as stated by Teece (2007, p. 1327) "the existence of layer upon layer of standard procedures, established capabilities, complementary assets, and/or administrative routines can exacerbate decision-making biases against innovation". Implementing new management practices almost always requires substantial investments and necessitates developing new or altering existing managerial assets (ibid.). The institutionalized practices and the set up of current assets and knowledge sources, therefore, have an important influence on the implementation capability of a firm (Helfat & Peteraf, 2010). For example, established routines and path dependency may lead firms to adopt excessive risk averse behaviors.

A range of scholars in organizational sociology and psychology have acknowledged and studied the tendency of individuals to resist change (e.g. Agócs, 1997; Ford et al., 2002;

Giangreco & Peccei, 2005; Meyer & Stensaker, 2006; Meyer et al., 2007; Oreg, 2003; Reger, Gustafson, Demarie & Mullane, 1994; Reichers, Wanous & Austin, 1997; Strebel, 1996). Change is inherently associated with uncertainty and stress for organizational members. If employees are not well informed and involved in the change process, resistance to change may be an important barrier to management innovation (Armenakis, Harris & Mossholder, 1993; Bandura, 1982; Zbaracki, 1998).

Resistance to change is common due to the institutionalized nature of value commitments, norms and power structures (Greenwood & Hinings, 1996). As such, power distributions tend to become institutionalized as powerful coalitions and individuals establish procedures and structures that buffer themselves and the organization against change (Pfeffer, 1981, 1992; Salancik & Pfeffer, 1977). Implementing new management structures is likely to shift the power balance within an organization and, hence, is often resisted by the current power holders.

Furthermore, experience and learning paths of the organization are important drivers of organizations' implementation capability. For example, Greenwood and Hinings (1996) found that recent experience with change and knowledge of the new organizational setup are important enablers of radical change. In line with this argument, Amburgey, Kelly and Barnett (1993) found that companies with a recent history of change are more likely to attempt further change. Based on their experience, firms may develop skills and routines that support change implementation and may to a varying extent posses knowledge of the desired change outcome (Barney, 1991, 1996; Teece et al., 1997; Teece, 2007). In BTF, the experiences and backgrounds of organizational members are also thought to influence their search behavior (Cyert & March, 1963; Knudsen & Levinthal, 2007).

Finally, structural variables such as educational backgrounds and levels of organizational members and the distribution of decision authority may influence the implementation capability of organizations. A more well educated workforce is likely to increase the ability of organizational members to comprehend and manage new organizational configurations (Greenwood & Hinings, 1996). On the other hand, while decentralization is likely to increase the diagnostic capability of firms, the loss of central control in the transition process is likely to decrease implementation capability. In this respect, structural variables are likely to influence different aspects of management innovation capabilities differently. Teece (2007) likewise observed that "sensing activities need to be decentralized with the information rolling up to top management", while "tight planning will be part of seizing, but less so of sensing" (p. 1343).

Proposition 3: Organizational resources (e.g. employee and middle-manager support of change, workforce characteristics, prior experience and centralized decision making) positively influence the implementation capability and the management innovation capabilities of an organization and, hence, increase the likelihood of implementing management innovations.

Second, for arguments similar to the ones introduced in proposition 1, managerial cognition plays a role not only in the process of diagnosing opportunities and coming up with innovative solutions, but also in the implementation phase. Due to the risks often associated with implementing large changes and the path dependent nature of the organization, in fact, the purposeful actions of managers may be particularly important in the implementation phases of management innovation (Eggers & Kaplan, 2009; Helfat et al., 2007; Helfat & Peteraf, 2010). Hence, the beliefs, values, attentional focus, reasoning etc. of top managers exert important influence on the implementation capability of an organization.

Proposition 4: The cognitive capabilities of managers, i.e. their abilities to perform mental activities related to seizing opportunities and reconfiguring assets, positively influence the implementation capability and the management innovation capabilities of an organization and, hence, increases the likelihood of implementing management innovations.

External Stimuli

Early contingency theory and institutional approaches largely assumed organizational change to be a consequence of the need to adapt to contextual and institutional pressures. For example, Chandler (1962) formulated the idea that organizational structures are predominantly a consequence of the external strategies and demands confronting the firm. For example, technological improvements and cost reductions in rail transport was an important driver of strategic and organizational changes in large corporations in the 20th century. While contemporary organization scholars still acknowledge the importance of external contingencies, today more emphasis is placed on understanding how internal dynamics shape the way an organization responds to its institutional and competitive context (Greenwood & Hinings, 1996; Scott, 1995). However, since firms are characterized by bounded rationality, imperfect knowledge and conflicting goals, innovation is likely to often be an outcome of problemistic search induced by failure to meet the organizational aspiration levels (Cyert & March, 1963; Penrose, 1959).

As such, management innovation is more likely to occur in situations where firms experience external stimuli in the form of e.g. a performance shortfall. Such a shortfall can be either a perceived problem or a future unexploited opportunities (Birkinshaw et al., 2008; Ocasio, 1997). Since the search processes of firms are simple-minded, i.e. they begin the neighborhood of the problem or current solution and stop once an acceptable solution is

found, it is likely that the scale of the performance shortfall will predict the likeliness of firms engaging in more radical types of management innovation. Since more severe or complex problems decrease the likelihood of finding a solution in the proximity of the current organizational setup, more severe problems should be more likely to lead firms to broader search efforts and more novel solutions (Cyert & March, 1963; Levinthal, 1997; Nickerson & Zenger, 2004).

This type of logic is also used in the conceptual model proposed by Birkinshaw et al. (2008), which predicts the identification of a novel problem to spark the process of management innovation. Since the search process is problem driven, Birkinshaw and colleagues (2008) expect firms to first exhaust the market for management fashions, i.e. the new to the firm innovations, before experimenting with developing novel, new to the state of the art, management innovations.

Proposition 5: A performance shortfall, either in the form of a perceived problem or unexploited opportunity, positively moderates the relationship between management innovation capabilities and the implementation of actual management innovations.

Innovation Characteristics

The contention that innovation characteristics influence the antecedents and outcomes of innovation activities is hardly new (Abernathy & Utterback, 1978; Damanpour & Schneider, 2009; Damanpour et al., 1989; Damanpour, 1996; Edquist et al., 2001; Utterback & Abernathy, 1975; Wolfe, 1994). Among other things, innovations differ in their complexity, radicalness, perceived benefit for the adopting organization, cost, risk, modularity and their complementarity with the existing organizational system (James, Klein & Sykuta, 2010; Pelz & Munson, 1982; Sanchez, 2000; Stieglitz & Heine, 2007; Wolfe, 1994). These differences of characteristics are likely to moderate the relationship between management

innovation capabilities and the actual adoption rate of management innovations. For example, management innovation capabilities are likely to be particularly important for innovations that are associated with higher levels of risk, radicalness or complexity.

Proposition 6: Management innovation characteristics (e.g. radicalness, complexity, complementarity etc.) moderate the relationship between management innovation capabilities and the implementation of actual management innovations.

CONCLUDING DISCUSSION

In this paper, I have argued that management innovation is a phenomenon that should be of interest to both managers and scholars in its own right. That is, there is good reason to believe that management innovation is important for firm competitiveness, yet the phenomenon is not fully understood and adequately addressed in the extant innovation and management literatures. Being an emergent field of research, a range of relevant questions revolving around management innovation remain unanswered. This paper has attempted to further our understanding of management innovation by offering a more nuanced typology and by suggesting a conceptual model of key determinants. In so doing, the paper introduced the concept of management innovation capabilities as an important antecedent of management innovation.

The contribution made in this paper should be viewed as a first step in developing a comprehensive model of the causal drivers of management innovation. In so saying, I acknowledge that more theoretical and empirical work is needed in order to fully appreciate the generative mechanisms underlying management innovation and management innovation capabilities. Especially, a better understanding of the drivers of management innovation capabilities is needed. Based on BTF and the dynamic capabilities framework, as well as on the extant knowledge about management innovations in firms, I have suggested avenues to

pursuit in future work on disentangling the driving and moderating factors leading some firms to adopt management innovations. Future research should go further by exploring and testing empirically if the factors outlined in this paper are in fact the key drivers of firms' adoption of new management practices. In so doing, future research may also expand our understanding of the actual process and sequence of events leading firms to innovate and explore how management innovation influences firm performance.

Management innovation is inherently a multi-level phenomenon. This poses challenges for scholars wishing to empirically study management innovation. In particular, it is difficult to reliably measure and study the causal relationships between variables at different levels of analysis. For example, the relationship between the cognitive capabilities of individual managers and the management innovation capability of the organization as a whole. In general, the capabilities literature suffer from a lack of clear conceptualization as well as operationalization (Felin & Foss, 2009, 2005; Foss, 2007). The capabilities literature has not yet provided good explanations for the emergence and origins of capabilities and routines. Often macro phenomena (e.g. dynamic capabilities) have been explained by other macro phenomena (e.g. routines) without specifying or observing the underlying patterns of individual actions and interactions. This results in argumentation that may sometimes appear tautological. For example, Helfet et al. (2007) defines dynamic capabilities as "the capacity of an organization to purposefully create, extend, or modify its resource base" (p. 4). However, the authors acknowledge that dynamic capabilities are themselves part of the resource base of an organization. Hence, dynamic capabilities are defined party as the ability to create, extend and modify dynamic capabilities.

By including managers' cognitive capabilities, this paper has attempted to outline a direction for further investigations into the microfoundations of management innovation capabilities. Yet, much more theoretical and empirical work has to be done before

management innovation capabilities are fully understood, clearly defined and not the least measurable. In particular, future research on management innovation should focus on specifying and observing the microfoundations of management innovation capabilities.

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INTERNAL ANTECEDENTS OF MANAGEMENT INNOVATION: THE EFFECT OF DIAGNOSTIC CAPABILITY AND IMPLEMENTATION CAPABILITY[5]

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ABSTRACT

Management innovation is the introduction of new management practices that significantly alter the way the work of management is performed. Building on behavioral theory of the firm, this paper explores the effect of firms' diagnostic capability and implementation capability on the likelihood of implementing new-to-the-firm and new-to-the-industry management innovations. The paper finds that formalized activities directed at developing and implementing management innovations as well as CEO novelty increases the likelihood of innovating in both categories. Also, top management team (TMT) diversity increases the likelihood of adopting new-to-the-industry innovations. The paper does not find a direct effect of performance decline on the likelihood of implementing management innovation, but two variables, TMT diversity and previous experience, positively moderate the relationship between performance decline and new-to-the-industry management innovation.

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INTRODUCTION AND BACKGROUND

For good reason, innovation has attracted massive attention from both scholars and practitioners and has been studied in various scientific disciplines and management fields over the past decades. As Schumpeter (1934) may have been the first to acknowledge, innovation drives economic development. Schumpeter (1934) even explicitly included organizational changes in his discussion of innovation. "Economic development embodies technological, organizational, and resource changes which, by raising productivity and reducing costs, lay the foundations for economic growth despite, indeed because of, the interruptions of the business cycle and its associated economic contractions," John E. Elliott writes in the introduction to the *Transaction-edition* (Schumpeter, 1983, p. xxvii). Nevertheless, most scholarly endeavors in the field of innovation have investigated new products and technologies (e.g. Abernathy & Clark, 1985; Imai, Ikujiro & Takeuchi, 1985; Rogers, 2003; Urabe, Child & Kagono, 1988) and quite little attention has been dedicated to other types of service, administrative or management innovation (Birkinshaw, Hamel & Mol, 2008; Damanpour, Walker & Avellaneda, 2009; Mol & Birkinshaw, 2007). However, recently interest has been growing in what may be labeled management innovation.

Management innovation refers to the introduction of new management practices, processes, techniques or structures[6] and, arguably, is an important source of value creation in firms (Hamel, 2006; Mol & Birkinshaw, 2009). Examples of management innovations include Motorola's six sigma methodology, the multidivisional form at General Motors and Oticon's spaghetti organization (Chandler, 1962; Foss, 2003; Mol & Birkinshaw, 2007). Since management innovation pertain to the internal functioning of a firm, e.g. its task design, reward structures, management styles and delegation of authority, management innovations are often more tacit, intangible and difficult to imitate than other types of innovation and may

[6] For the benefit of readability, the term management practices is used to refer to both practices, processes, techniques and structures throughout the paper

for that reason be important sources of sustainable competitive advantage (Barney, 1991; Foss, 2007; Grant, 1996; Teece, Pisano & Shuen, 1997). For more examples and cases of management innovation see Foss, Pedersen, Pyndt and Schultz (2011) or Mol and Birkinshaw (2007).

Although administrative innovation has been addressed in earlier studies (e.g. Teece, 1980), the more narrowly defined field of management innovation was essentially introduced in work by Gary Hamel, Michael Mol and Julian Birkinshaw only a few years ago (see e.g. Birkinshaw & Mol, 2006; Hamel, 2006; Mol & Birkinshaw, 2006). Beginning with a few practitioner oriented articles based on anecdotal evidence, the emerging research field has already moved a long way. Over the last few years, conference tracks (e.g. at *the Academy of Management Conference*) and mini-conferences at London Business School and Copenhagen Business School have explicitly addressed management innovation. *Industrial and Corporate Change* has even published a special issue focusing on management innovation indicating the growing acknowledgement of management innovation as an emerging but distinct research field (Lazonick & Teece, 2010). Also, a number of robust empirical and theoretical contributions have emerged (e.g. Ansari, Fiss & Zajac, 2010; Birkinshaw et al., 2008; Damanpour et al., 2009; Lazonick & Teece, 2010; Lazonick, 2010; Mol & Birkinshaw, 2009; Vaccaro, Jansen, Van Den Bosch & Volberda, 2010; Vaccaro, 2010).

For example, Ansari, Fiss and Zajac (2010) provide a theoretical framework for studying how management practices vary as they diffuse. Damanpour, Walker and Avalleneda (2009) studied the performance consequences of adoption of three types of innovation (service, technological process and administrative process innovation) in service organizations. Birkinshaw et al. (2008) propose a framework for the management innovation process. They identify four phases in the innovation process (motivation, invention, implementation, and theorization & labeling) and suggests that the identification of a novel

problem, or a new threat or opportunity, and an organizational context supportive of new thinking drives the motivation for developing management innovations. Also, Mol and Birkinshaw (2009) found that firm size, access to internal and external knowledge sources and the level of education of the workforce significantly impacted the adoption of new management practices.

Yet, serious gaps in our understanding of management innovation remain. A number of detailed accounts of the emergence and spread of specific management innovations as well as studies of diffusion patterns exist (e.g. Abrahamson, 1991; Chandler, 1962; Ehigie & McAndrew, 2005; Fligstein, 1985; Guler, Guillén & Macpherson., 2002; Kogut & Parkinson, 1993; O'Mahoney, 2007; Rogers, 2003; Teece, 1980), but little systematic research has examined the antecedents or the performance consequences of management innovations and no agreed-upon model or conceptualization of management innovation has emerged. Some contributions have defined management innovation as changes in management practices that are new to the state of the art (e.g. Birkinshaw et al., 2008; Hamel, 2006, 2007), while others have defined the concept more broadly as any changes new to the adopting organization (e.g. Damanpour et al., 2009; Kimberly & Evanisko, 1981; Mol & Birkinshaw, 2009). Almost all empirical studies, however, fall in the latter category. Hence, apart from historical accounts of specific innovations, the antecedents of new-to-the-industry management innovations have not been subject to systematic empirical investigation.

This paper builds on a broad definition of management innovation as the implementation of a new management practice, process, technique or structure that significantly alters the way the work of management is performed. This definition includes both new-to-the-firm innovations and innovations that are new-to-the-industry. Using industries as the base for comparison is preferred over notions of new-to-the-world or new-to-the-state-of-the-art since the latter are difficult to delineate in practice. New-to-the-firm and

new-to-the-industry management innovation may be thought of as two distinct bodies of literature and scholars should be specific about which stream of literature they are addressing when discussing management innovation. The present study includes both types of management innovation and, thus, contributes to increasing our understanding of similarities and differences between determinants of new-to-the-firm and new-to-the-industry innovation. The differences may in some respects not be great from the perspective of the adopting firm, since both in essence represent changes that are new to the adopting organization. However, the distinction between new to the firm and new to the state of the art is relevant because it represents a divide between imitators and innovators. What drives some companies to develop entirely new ideas and ways of organizing the work of management while others choose to implement off-the-shelve management solutions, and whether this affects the generative mechanisms, processes of implementation and consequences of innovating, is a highly relevant question (Birkinshaw et al., 2008; Massini, Lewin & Greve, 2005).

In recent work, Harder (2011) introduces the notion of management innovation capabilities which refers to the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. A model of the foundations of management innovation capabilities is derived from behavioral theory of the firm (see e.g. Argote & Greve, 2007; Cyert & March, 1963; Pitelis, 2007) and dynamic capabilities theory (Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece & Winter, 2007; Teece, 2007; Winter, 2003). Management innovation capabilities can be divided into two subparts, (1) diagnostic capability, which is the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management solutions that either solve the problem or exploit the opportunity, and (2) implementation capability, which refers to the ability of an organization manage the transition process from one managerial setup to another. Each of these capabilities, then, is driven by

managerial cognition and organizational resources. These concepts share some commonalities with Teece's (2007) notion of sensing and seizing opportunities and March's (1991; 1996; 2006) concepts of exploration and exploitation. Nevertheless, diagnostic capability and implementation capability are understood as specifically related to management innovation.

Based on a behavioral logic of problemistic search, this paper posits that firms are more likely to innovate in the presence of a performance shortfall (Cyert & March, 1963). However, since firms perceive and respond to their external environments through an organizational filter, the management innovation capabilities of the organization will also influence the likelihood of adopting management innovations. Measuring management innovation capabilities per se lies beyond the ambitions of this paper. In this study the notions of diagnostic capability and implementation capability are used as a theoretical and an organizing frame for the empirical analysis. As such, relevant determinants are identified and grouped based on this framework.

Based on a survey of the largest Danish firms combined with archival performance data from the Danish CD-direct database, this paper may be the first to empirically address the antecedents of both new-to-the-firm and new-to-the-industry management innovation. Two questions are addressed. First, how do factors pertaining to the diagnostic capability of a firm influence the likelihood of implementing management innovations? Under the umbrella concept of diagnostic capability, the paper focuses on four variables; education level, TMT diversity, CEO novelty and formal activities aimed at the development or implementation of management innovations. Second, how do factors pertaining to the implementation capability of a firm influence the likelihood of implementing management innovation? Implementation capability, in this study, is focused on two variables: previous experience with large organizational changes and middle-management support of change.

The rest of the article is structured as follows. First, a set of hypotheses are developed based on prior empirical and theoretical work. The hypotheses are then tested using survey and archival data collected from 314 large Danish firms. The paper lastly discusses the findings, limitations and implications for future research.

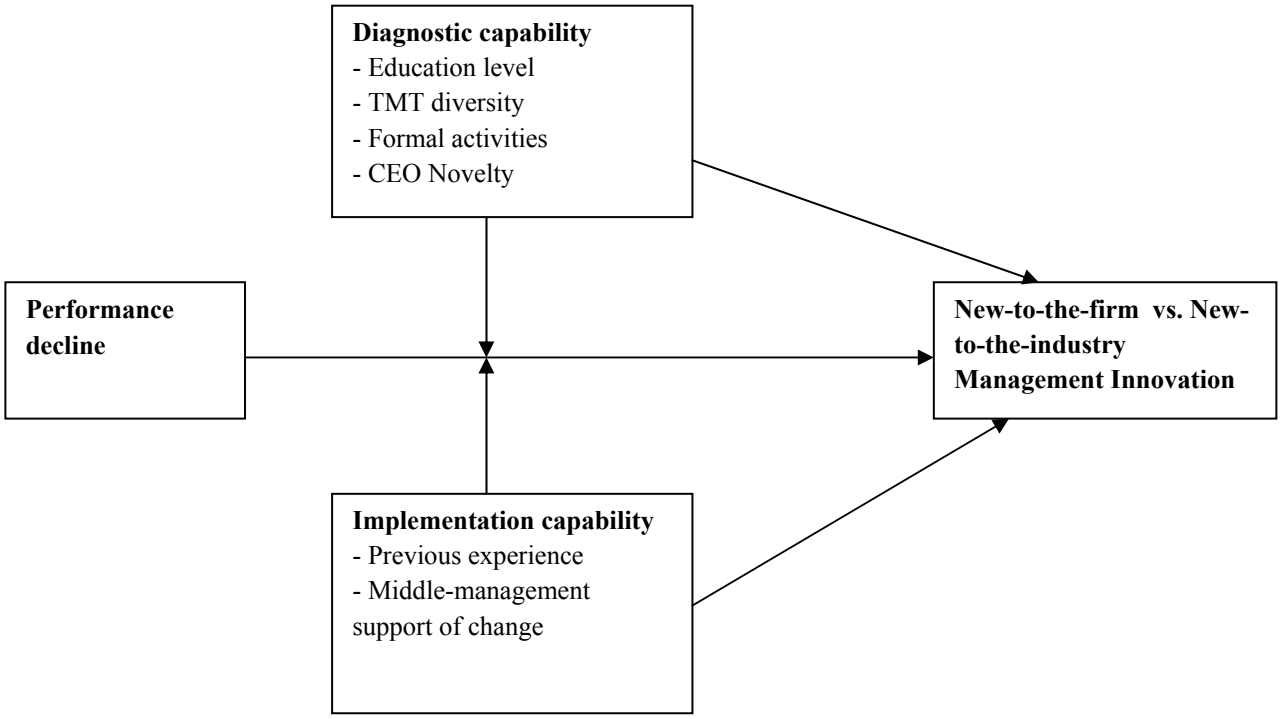
THEORETICAL DEVELOPMENT

The overall theoretical framework for this study is the behavioral theory of the firm (Cyert & March, 1963; March & Simon, 1958; Simon, 1947). The behavioral theory of the firm (BTF) views the firm as a boundedly rational, adaptive and learning organization. BTF bridges across economics, sociology, social psychology and political sciences, thereby, providing a deeper understanding of firms' internal organization and decision making. Prior to the emergence of BTF, these internal dynamics had largely been "black-boxed" in the dominant neo-classical perspectives. The BTF has been hugely influential on the field of strategic management and on most modern theories of strategy and firm behavior (Pierce, Boerner & Teece, 2008).

While the original BTF provided a deep understanding of how firms actually behave and make decisions, Cyert and March provided few guidelines for how managers may seek to improve or change firm behavior (this point is discussed in detail in e.g. Pierce et al., 2008). The resource based (Barney, 1991, 1996; Penrose, 1959; Wernerfelt, 1984) and dynamic capabilities (Pierce et al., 2008; Teece et al., 1997; Teece, 2007; Winter, 2003) views are examples of theoretical perspectives that are complementary to and extend the learnings and assumptions of BTF. These theories place emphasis on the heterogeneous internal resources, routines and capabilities enabling firms to adapt to and exploit changes in their external environments. In the present article, the above mentioned theories are combined to argue for

the seven hypotheses presented in the following section. The hypotheses are summarized in the conceptual model presented in figure 1.

Figure 1. Conceptual model.



HYPOTHESES

Performance shortfall

It has for long been acknowledged that firms respond to external stimuli and that changes in the environment can drive innovation (Abernathy & Utterback, 1978; Chandler, 1962; Damanpour & Evan, 1984; Kimberly & Evanisko, 1981; Schumpeter, 1934; Van de Ven, Polley, Garud & Venkataraman, 1999). While neo-classical economists assumed firms to continuously scan all decision alternatives and perfectly match the environment, BTF as well as institutional theory have shed light on a number of factors that may limit the firm's ability to perfectly adapt to its environment. For example, aspiration levels are determined from comparison with relevant reference groups and previous performance (Greve, 1998;

Massini et al., 2005), search is simple-minded and decisions aim to satisfice rather than optimize organizational outcomes (Cyert & March, 1963). Operating procedures, routines and power dependencies lock firms into their strategic trajectories and create organizational inertia (Cyert & March, 1963; Drazin, Glynn & Kazanjian, 2004; Romanelli & Tushman, 1994; Scott, 1995). Hence, large organizational changes such as management innovations are more likely to occur when firms are facing major performance crises or other drastic external pressures.

Since organizational search processes are characterized by being problem driven and by focusing on solutions in the proximity of the current organizational setup, the complexity or severity of the perceived problem is likely to influence the novelty of the chosen solution. In other words, more complex or severe problems are likely to lead firms to broader search efforts and more novel solutions (Birkinshaw et al., 2008; Cyert & March, 1992; Levinthal, 1997; Nickerson & Zenger, 2004). Building on the same logic, Birkinshaw et al. (2008) suggested that the identification of a novel problem is a necessary starting point for the development of management innovations that are new to the state of the art. Birkinshaw and colleagues argue that firms will exhaust the market for management fashions, i.e. the new-to-the-firm management innovations, before experimenting with developing truly novel management innovations. "[T]he demand for new management practices is driven by the identification of a *novel problem* – a perceived shortfall between the organization's current and potential performance", argues Birkinshaw et al. (2008, p. 833). Thus, although the internal dynamics are the main interest of the article, it seems reasonable to assume that a perceived performance shortfall in a lot of cases will be the triggering factor in the management innovation process and that this will be important especially for new-to-the-industry innovations (Birkinshaw et al., 2008). This motivates the following hypothesis:

Hypothesis 1: The greater the performance decline experienced in the recent past, the higher the likelihood of a firm implementing management innovations.

In all hypotheses, management innovation refers to both new-to-the-firm and new-to-the-industry innovations. Since new-to-the-industry management innovation has not been subject to empirical studies before, little is known about the differences between new to the firm and new to the industry innovations. Therefore, this paper does not propose separate hypotheses for the two types of management innovation.

Diagnostic Capability

Diagnostic capability refers to the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management solutions that either solve the problem or exploit the opportunity. In this paper, the concept of diagnostic capability is not in itself an empirically observed. Rather, it is used as an umbrella term grouping together the internal factors related to a firm's ability to recognize and develop efficient management solutions in response to a changing environment. As such, the concept builds on the fundamental behavioral premise that firms perceive and respond to their environments not through a process of continuous scanning and perfect matching but rather through an organizational filter consisting of biased search processes, conflicting goals and satisficing (Cyert & March, 1963; Helfat & Peteraf, 2010; Peteraf & Reed, 2007; Pitelis, 2007).

Furthermore, the notion that firms have varying degrees of diagnostic capability follows from the dynamic capabilities perspective which "emphasizes the key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources, and functional competences toward a changing environment" (Teece & Pisano, 1994, p.57).

Diagnostic capability may reside both at macro or micro levels of the organization. At a macro level, diagnostic capability may pertain to institutionalized and routinized resources and processes at the organizational level. As such, firms may possess practices, routines and resources that enhance or direct the attention of organizational members. For example formal procedures for idea generation or testing, search and selection processes, strategic planning units with responsibility for the development of new management practices and a well educated workforce may underlie the diagnostic capability of a firm. At a micro level, diagnostic capability may pertain specifically to the perceptiveness and cognitive abilities of top managers (Helfat et al., 2007; Helfat & Peteraf, 2010). Helfat et al. (2007, p. 6) write that "[d]ynamic capabilities therefore pertain to both an organizational unit (e.g., a firm, a division, other sub-unit, or team) and to an individual decision maker within the organization". Ideas similar to this line of argument are also discussed as part of the invention phase in Birkinshaw et al.'s (2008) conceptual model of management innovation. Three variables pertaining to the diagnostic capability of firms treated here are: education levels of the workforce, use of formalized strategic activities directed at the development of management innovations and top management team (TMT) diversity.

The level of education of the workforce is an important organizational resource with the potential to influence the ability of firms to recognize and respond strategically to problems and opportunities. More well educated employees are likely to have a deeper understanding of strategic and managerial issues. Therefore, they are more likely to detect and respond to changes in the organization and the environment. Also, they possess knowledge and skills making them more likely to develop qualified ideas and solutions to the critical problems and opportunities facing the organization. Lastly, more well educated employees are likely to have a more resourceful personal and professional network, e.g. via university alumni, professional organizations and former colleagues, potentially exposing them to valuable sources of ideas

and knowledge (Barney, 1996; Birkinshaw et al., 2008; Hansen, 2002; Mol & Birkinshaw, 2009).

Mol and Birkinshaw (2009) found that the level of education is positively related to the likelihood of implementing new-to-the-firm management innovations. This article posits that education is equally important in predicting new-to-the-industry management innovation. Since new-to-the-industry innovations require the development of managerial solutions that are not already present on the market for management fashions, the knowledge resources firms posses in the form of well educated employees may arguably be even more important in the case of new-to-the-industry innovations.

In accordance with the behavioral lens adopted in this article, a perceived performance shortfall is expected to be the triggering factor in the management innovation process. Nevertheless, the education of the workforce is expected to influence the likelihood that a firm develops and implements management innovations as a response to the perceived performance shortfall. Intuitively, the expected relationship then is an interaction between the performance shortfall and the education level. However, since very little is known about the causal drivers of management innovation, two hypotheses about the relationship between education level and management innovation are presented and tested. The first posits a direct relationship and the second tests the hypothesis that there is an interaction effect.

Hypothesis 2: The higher the level of education of the workforce the higher likelihood of implementing management innovations.

Hypothesis 2b: The level of education of the workforce positively moderates the relationship between performance decline and the implementation of management innovations.

The creation of formalized strategic activities or procedures directed at developing and implementing new management practices may also be an important driver of management innovations. Examples of such initiatives could include formal training of employees in relation to the development or implementation of new management practices, formalized procedures for gathering and evaluating new management ideas, and formal planning units with responsibility for developing and/or implementing new management practices. All of these initiatives represent the allocation of resources as well as organizational and managerial attention to the area of management innovation (Ocasio, 1997). Hence, firms that have adopted formalized procedures or activities related to management innovation should be more likely to adopt management innovation in response to problems or opportunities.

Hypothesis 3: The more firms make use of formalized strategic activities directed at the development or implementation of management innovations, the more likely they are to implement management innovations.

Hypothesis 3b: The presence of formalized strategic activities directed at the development or implementation of management innovations positively moderates the relationship between performance decline and the implementation of management innovations.

The importance of the attitudes, cognitive capabilities and beliefs of top managers have attracted quite a bit of research attention (e.g. Bantel & Jackson, 1989; Boeker, 1997; Damanpour & Schneider, 2006; Hambrick & Mason, 1984; Helfat & Peteraf, 2010; Santos & Garcia, 2006; Stjernberg & Philips, 1993; Vaccaro et al., 2010). Arguably, the perception, experiences and attitudes of top managers are an important part of the attention structures of an organization (Ocasio, 1997). Attention structures, according to Ocasio (1997, p. 195) are "social, economic, and cultural structures that govern the allocation of time, effort, and

attentional focus of organizational decision-makers in their decision making activities". Top managers, thus, are in a special position to exert influence on the aspiration levels, search behaviors and routines of an organization. For example, the innovation agenda set by top managers is likely to also influence the aspirations and search behavior of other organizational members. Lastly, top managers have by nature of their position in the organization the final say on whether or not large scale management innovations are adopted. Therefore, it seems natural to scrutinize the attitudes, experiences and backgrounds of top managers when studying management innovation.

In this article, top management team diversity is used as an indication of the diversity of knowledge sources and perspectives present among the leaders who are expected to make the final decision on whether or not management innovations are implemented. The more diverse the top management team is regarding experiences, areas of expertise and general backgrounds, the more diverse ideas and perspectives are likely to be included in managerial considerations (Buyl, Boone, Hendriks & Matthyssens, 2010; Michel & Hambrick, 1992). The variety of ideas and the exposure to different perspectives should give rise to a process of idea cross-fertilization increasing the likelihood that innovative managerial solutions are developed in response to problems or opportunities facing the organization.

Hypothesis 4: The higher the TMT diversity of an organization, the higher likelihood of implementing management innovations.

Hypothesis 4b: TMT diversity positively moderates the relationship between performance decline and the implementation of management innovations.

As discussed above, the chief executive officer (CEO) is in a special position to exercise influence on the strategies, search behaviors, aspiration levels, attention structures and standard operating procedures of a firm. Therefore, CEO succession may be an important

driver of organizational changes. When a CEO has been in office for a period of time, the routines and operating procedures of the organization tend to stabilize and large structural or strategic changes become less likely. Therefore, CEO tenure is associated with a higher degree of strategic myopia, internal resistance, vested interests and, hence, organizational inertia (Hannan & Freeman, 1984; Romanelli & Tushman, 1994; Tushman & Rosenkopf, 1996). Similarly, Miller (1991) found that CEO tenure is inversely related to the degree of match between an organization and its environment. Therefore, CEO succession may constitute an opportunity to overcome organizational inertia and a number of studies have documented that CEO succession indeed increases the likelihood of strategic and structural changes (Carlson, 1961; Denis & Denis, 1995; Helmich & Brown, 1972; Meyer, 1975).

Over time, groups and individuals gain power based on their ability to deal with the strategic contingencies facing an organization. However, with time the prevailing power distribution also tends to become institutionalized, since power holders resist changes that undermine their influence (Pfeffer & Salancik, 1978; Pfeffer, 1981; 1992; Salancik & Pfeffer, 1977). CEO succession offers an opportunity for existing power distributions to be altered and new strategic perspectives to be introduced (Shen & Cannella, 2002).

Finally, CEO succession may be a mechanism for organizational learning, since it often brings with it a shift in the core assumptions and theories-in-use in an organization (Tushman & Rosenkopf, 1996; Virany, Tushman & Romanelli, 1992). The shift of top executive, hence, may facilitate so called second order or double-loop learning (Argyris, 1977; Weick, 1979; Weick & Roberts, 1993), which under normal circumstances may be hampered by inertia and path dependency.

In summary, recent CEO succession is likely to be associated with large organizational changes because it assists an organization in overcoming inertia, political resistance and

institutionalized power dependencies. Furthermore, it brings new managerial perspectives and facilitates double-loop learning, which increases the likelihood of developing and implementing new, complex and pervasive management innovations. Since new-to-the-industry innovations require higher degrees of novelty and involve more risk than new-to-the-firm innovations, CEO novelty may be especially important for new-to-the-industry management innovations.

Hypothesis 5: The more recent the CEO has taken office, the higher likelihood of implementing management innovations.

Hypothesis 5b: CEO novelty positively moderates the relationship between performance decline and the implementation of management innovations.

Implementation Capability

While the ability to recognize problems and opportunities and to imagine and design new managerial practices is undoubtedly important, firms also need to be able to implement the derived solutions in order to reap the benefits of their innovation efforts. Implementation capability, hence, refers to the ability to manage the transition process associated with management innovation. Implementation capability does not in itself lead to innovation, but it is a prerequisite for the successful exploitation of innovation opportunities.

That the organizational processes of idea generation and implementation represent two distinct and quite different organizational capabilities has long been recognized in organization and management theory (Birkinshaw et al., 2008; Gibson & Birkinshaw, 2004; Greenwood & Hinings, 1996; March, 1996). As such, it is perfectly imaginable that a firm can have a high degree of diagnostic capability but lack the implementation capability necessary for realizing the potential of new management practices. In this study, two elements

of firms' implementation capability are studied; previous experience and middle management support of change.

Since firms are learning organizations, previous experience with implementing large organizational changes is likely to improve the skills and abilities of organizational members to handle future change processes. According to Cyert and March (1963), standard operating procedures, choice procedures and task performance rules function as an organization's memory and have been adapted based on past experience. In that way, future behavior is conditioned by experience. Nelson and Winter (1982) similarly argue that the routines of an organization allow it to replicate previous behaviors. Firms learn by doing and the knowledge gathered via past experience is stored in organizational routines (Nelson & Winter, 1982). This line of argument has also found support in empirical studies. For example, Amburgey, Kelly & Barnett (1993) found that companies with a recent history of change are more likely to attempt further change. Therefore, it is hypothesized that firms with a recent history of large organizational changes are more likely to have developed skills and routines supportive of the transition process and are hence more likely to adopt management innovation.

Hypothesis 6: Previous experience with implementing large organizational changes increases the likelihood of implementing management innovations.

Hypothesis 6b: Previous experience with implementing large organizational changes positively moderates the relationship between performance decline and the implementation of management innovations.

Large organizational changes are inevitably associated with uncertainty and stress for organizational members. Although people differ in their extent of risk aversion, most people have a natural inclination toward skepticism or resistance when faced with changes (Agócs, 1997; Bandura, 1982; Ford et al., 2002; Giangreco & Peccei, 2005; Knights & McCabe, 2000;

Oreg, 2003; Piderit, 2000; Strebel, 1996). Resistance to change may also be institutionalized as powerful coalitions or individuals establish procedures and structures that protect their sources of power and influence (Pfeffer, 1992; Salancik & Pfeffer, 1977). Implementing new management practices and structures is likely to shift the power balance within an organization. Therefore, the support of middle managers is particularly important for this type of innovation. Middle managers are likely to be in a position to significantly influence the implementation process and if they resist the intended changes, it may have important consequences for innovativeness of a firm.

Hypothesis 7: The higher middle management support of change, the higher likelihood of adopting new-to-the-firm and new-to-the-industry management innovations.

Hypothesis 7b: Middle managers' support of change positively moderates the relationship between performance decline and the introduction of new-to-the-firm and new-to-the-industry management innovations.

DATA AND METHODS

The Management Innovation Survey conducted as part of this study has been developed at the Center for Strategic Management and Globalization at Copenhagen Business School. The overall structure of the survey has been adapted from the Community Innovation Survey (CIS), which is a European wide survey measuring product and process innovation. The CIS was developed on initiative of the European Union and has been executed by national statistical offices throughout the EU six times since 1992. The survey has been incrementally improved and refined during the years and a large number of papers have been published using CIS data (see e.g. Battisti & Stoneman, 2010; Evangelista, Perani, Rapiti & Archibugi, 1997; Frenz & Ietto-Gillies, 2009; Laursen & Salter, 2006). The CIS includes measures on changes in business practices and structures, which have been used by e.g. Mol and

Birkinshaw (2009) in their studies of new-to-the-firm management innovation. However, the CIS does not measure new-to-the-industry changes and also lacks a number of the firm level variables of interest to this study. Therefore, the Management Innovation Survey employed in this study has refined the innovation measures used in the CIS to allow for more adequate measures of management innovation. As such, this paper represents the first attempt at empirically measuring management innovations that are new to the industry.

The sample of firms was taken from the Danish CD-direct database, which contains detailed public information on all Danish enterprises. The survey was sent to CEOs of the 1,051 largest Danish firms and the data was collected during the fall of 2009. The selection was done based on number of full-time employees and include all firms with more than 150 employees in 2008. 314 firms responded corresponding to a response rate of 29.9%. However, due to missing values on some items (e.g. 90 of 314 respondents did not report when the current CEO took office), the regressions include fewer observations (n=204). The survey was conducted online and respondents received a postal invitation with a unique login and password for the website. All non-respondents received a postal reminder and were subsequently contacted via telephone. When it was not possible to reach the respondent, interviewers asked for a direct e-mail address and follow up e-mails with a link to the survey were sent. The survey was sent to CEOs but other members of the top management team were also allowed to answer.

In order to reduce the risk of common method bias, data regarding the performance decline variable was collected using archival data from the CD-direct database. This ensured that all measures in the survey were not collected from the same source. Furthermore, most of the questions used in this study are based on factual data that is at least in principle verifiable from other sources. For example, education levels, existence of formalized activities, previous experience with large organizational changes and composition of the top management team.

This type of items reduces the risk of bias in the sample compared to e.g. self-reported items based on the respondent's perception or attitudes (Podsakoff & Organ, 1986; Siemsen, Roth & Oliveira, 2009). Finally, a factor analysis, the Harman's one-factor test, did not indicate common method variance (Podsakoff & Organ, 1986). Two-group mean comparison tests were used to test for non-response bias and indicated no significant differences between respondents and non-respondents when comparing relevant variables such as industry affiliations and company size. A multinomial logit model (MNLM) was employed to estimate the likelihood of firms adopting new-to-the-firm and new-to-the-industry management innovation. The MNLM simultaneously estimates binary logits for all comparisons among the alternatives.

Measures

Management innovation. Respondents were asked "During the years 2006-2009, did your firm introduce any significant changes to the organizational structure of your firm?" with three response alternatives: (a) "Yes, changes to the organizational structure were new to the industry", (b) "Yes, changes to the organizational structure were only new to the firm", or (c) "No". Respondents were then asked "During the years 2006-2009, did your firm implement any new or significantly altered management practices, processes or techniques?" and given the same response alternatives. The structure of these questions and alternatives are similar to the items used to measure product and process innovation in the Community Innovation Survey. See table 1 for an overview of the distribution of the answers provided by respondents.

Table 1. Management innovation outcome distributions.

Management innovation outcome categories		Structures		
		No innovation	New-to-the-firm	New-to-the-industry
Practices	No innovation	33	22	2
	New-to-the-firm	10	140	15
	New-to-the-industry	4	21	27

The two questions have been combined into one scale with the value of 1 for "no innovation" when respondents answered "c" in both questions, 2 for "new-to-the-firm management innovation" when respondents answered "b" in one or both questions but "a" in none of them, and 3 for "new-to-the-industry management innovation" when respondents answered "a" in one or both questions. See table 2 for an illustration of the outcome categories.

Table 2. Management innovation outcome categories

Management innovation outcome categories		Structures		
		No innovation	New-to-the-firm	New-to-the-industry
Practices	No innovation	1	2	3
	New-to-the-firm	2	2	3
	New-to-the-industry	3	3	3

The scale is regarded as a categorical variable measuring whether or not a firm has innovated in the given category of innovations. As such, the scale does not indicate a hierarchical relationship between the two types of innovation, since there is no theoretical or empirical reason to believe that firms adopt management innovation in stages beginning with new-to-the-firm and then moving on to new-to-the-industry innovations. Poor results when using ordered logit regressions confirmed this.

Performance decline. Performance decline is measured as the percentage change in a firm's return on capital (the relationship of profit to capital employed) from the financial year 2004 compared to 2006 based on data from the Danish CD-Direct database. The measure is reverse-coded so that a larger measure indicates a larger performance decline. The years 2004 and 2006 are chosen to reflect the time period prior to the main period of interest in the study, namely the years 2006-2009, and thus reflects an aspiration level formed by the performance history of the firm itself (Greve, 1998). This reflects an expected time lag between the perceived performance shortfall and a change in the outcome variable; i.e. management innovation. A firm's financial performance obviously does not fully reflect the strategic aspirations of an organization. Nevertheless, since a range of factors influence the extent to which performance is perceived to meet aspirations, a financial measure is chosen as a crude proxy for performance shortfall. Another option could have been to ask for CEOs' perception of previous firm performance. However, the ability of respondents to accurately report their perception and performance 3-5 years ago is questionable. Also, this approach would raise serious issues of both social desirability and common method bias, since that would make CEOs the source of information for the dependent as well as independent variables (Furnham , 1986; Moorman & Podsakoff, 1992; Podsakoff & Organ, 1986; Spector, 2006).

Workforce education. This measure reflects the education level of employees. Respondents were asked to indicate approximately what percentage of employees have a degree level education.

Formal activities. This measure indicates the use of formal activities and procedures directed at the development and/or implementation of management innovation and is a formative construct based on an average of three items. Respondents were asked "During the period 2006-2009, to what extent did your firm engage in the following activities?". (1) Training, specifically related to the development or implementation of management

innovations, (2) Formal procedures for developing new management innovations, and (3) Strategic planning units with formal responsibility for developing or implementing new management innovations. Responses were given on a 7 point Likert scale ranging from 1 (not used at all) to 7 (highly used).

Top management team diversity. This measure is based on a multi-item scale with three items adapted from Campion, Medsker and Higgs (1993). Respondents were asked "To what extent do the following statements accurately describe the composition of your firm's top management team?". (1) The members of the top management team vary widely in their areas of expertise, (2) The members of the top management team have a variety of different backgrounds, and (3) The members of the top management team have a variety of different experiences. Responses were reported on a 7 point Likert scale ranging from 1 (not accurately at all) to 7 (very accurately). The scale has an alpha coefficient of 0.81.

CEO novelty. CEO novelty indicates the number of years the current CEO has been in office. The measure is reverse-coded so that a higher number indicates a more recent CEO succession, i.e. a higher degree of novelty.

Previous experience. This measure indicates the extent to which firms have recent experience with implementing large organizational changes. Respondents were asked to indicate their experience with organizational changes in the three year period prior to the time period measuring management innovation in the present study: "During the three years *2003-2005*, did your company implement large organizational changes (e.g. mergers or acquisitions, large restructurings etc.)?". Responses were recorded on a scale from 1 (not at all) to 7 (many large changes).

Middle-management support. This measure is a multi-item scale reflecting the level of middle manager support of change as perceived by top managers. Inspired by measures used

by Burton et al. (2002) and Agócs (1997), respondents were asked "In your experience with previous organizational changes, how do middle managers in your firm respond to change?". Respondents were asked to indicate the accuracy of four items on a 7 point Likert scale ranging from 1 (not accurate at all) to 7 (very accurate). The items were: (1) They generally acknowledge the need for change, (2) They are often reluctant to implement changes that have been agreed to (reverse-coded), (3) They accept responsibility for dealing with change issues, and (4) They sometimes act to dismantle changes that have been initiated (reverse-coded). The multi-item scale has an alpha coefficient of 0.7.

Control variables. Three control variables were included in order to test for possible alternative explanations. First, firm size measured as the logarithm of the number of employees in 2009 was included, since larger organizations may possess more resources for R&D, organizational development and other innovation related activities. Second, an industry dummy distinguishing between service industries (coded as 1) and manufacturing industries (zeros) was included to account for potential industry effects. Third, a dummy measuring whether a firm is part of an enterprise group or not was included, since firms that are part of enterprise groups may have access to more innovation related knowledge sources and assets.

Table 3. Means, standard deviations and correlations among main variables

	Mean	Std. Dev.	1	2	3	4	5	6	7	8
Introduction of management innovations	2.17	0.58	1.00							
Performance decline	0.58	9.88	0.15	1.00						
Education level	15.91	21.39	0.09	-0.02	1.00					
Formal management innovation activities	4.28	1.52	0.21	0.10	0.05	1.00				
TMT diversity	5.52	1.14	0.20	-0.01	-0.06	0.17	1.00			
CEO Novelty	42.41	8.52	0.20	0.07	0.03	0.09	0.14	1.00		
Previous experience	4.14	2.18	0.12	-0.02	-0.11	-0.04	0.11	0.11	1.00	
Middle manager support	4.55	0.95	0.01	0.01	0.23	-0.04	-0.09	0.01	-0.14	1.00

RESULTS

The means, standard deviations and correlations between main variables is displayed in table 3. The relatively small correlations between independent variables indicate that there are not multicollinearity problems in the data set. The survey examines the management innovation activities of Danish firms in the period 2006-2009. 25% of respondents report new-to-the-industry innovation, 62% report new-to-the-firm innovations, and only 13% have not implemented any form of management innovation since 2006.

The antecedents of management innovation are analyzed using multinomial logistic regression and table 4 contains the results for hypotheses 1-7. The table shows the base model (model 1) and one additional model for each of the hypothesized interaction effects. All the models themselves are highly significant ($p < 0.01$), but not all hypotheses are supported.

Hypothesis 1 stipulating a positive relationship between performance decline and the likelihood of adopting management innovation is not supported by the data. This may reflect that a performance shortfall is not an important trigger of management innovations. However, it may also reflect that performance decline is not an adequate measure of performance shortfall.

Hypothesis 2 and 2b are also not supported by the data. Education levels of the workforce, which in previous studies have been related to new-to-the-firm management innovation (Mol & Birkinshaw, 2009), was not significantly related to the implementation of management innovation of either type in this sample.

Hypothesis 3, on the other hand, is confirmed in the study. There is a highly significant direct relationship between the use of formal activities directed at developing and implementing management innovation and the likelihood of actually adopting both types of management innovation. In this sample, the relationship between formal activities and

innovation outcomes does not depend on a performance decline. In other words, there is no support for the interaction effect proposed in hypothesis 3b.

Regarding top management team diversity, both hypothesis 4 and 4b are supported for new-to-the-industry management innovations. The direct effect between TMT diversity and new-to-the-industry management innovation is the most significant ($p<0.01$), while the interaction term is only significant at the $p<0.1$ level. However, this study does not find a relationship between TMT diversity and the likelihood of adopting new-to-the-firm management innovations. This suggests that the diversity of knowledge sources and perspectives represented by top managers is less important for the adoption of management practices from the market for management fashions, i.e. new to the firm innovations, than for the development of truly novel management practices. An explanation may be that knowledge about the management practices that are already present in the industry is more readily available from other sources (e.g. consultants). Whereas, the development of own solutions to perceived problems may rely more on internal knowledge sources.

Hypothesis 5 regarding CEO novelty is supported for both innovation outcomes. This indicates that the inertia associated with CEO tenure may be an important barrier to management innovation and that CEO succession may bring in new perspectives conducive for changing management practices. Hypothesis 5b stipulating an interaction between CEO novelty and performance decline is significant for new-to-the-industry management innovations, although the regression coefficient is very small. This could indicate that a CEO who has recently taken office is more perceptive to changing demands of the environment and, hence, more likely to develop innovative managerial solutions to perceived performance shortfalls. However, this interaction should be interpreted with some caution. Overall, this study confirms the relevance and usefulness of at least three out of the four diagnostic capability variables included.

Regarding the two variables relating to a firm's implementation capability, the data only indicates an effect of previous experience (Hypothesis 6b) on new-to-the-industry innovations. This study indicates that previous experience with large organizational changes positively moderates the relationship between a performance decline and the likelihood of adopting new-to-the-industry management innovation. However, there is no indication of a direct relationship between previous experience and innovation. Likewise, the data does not support Hypotheses 7 and 7b regarding middle management support of change.

CONCLUDING DISCUSSION

The support for hypotheses regarding TMT diversity, CEO novelty, formal management innovation activities and previous experience suggest that behavioral theory as a theoretical framework as well as the concepts of diagnostic capability and implementation capability are useful in explaining new-to-the-firm and new-to-the-industry management innovation. However, the lack of support for a number of hypotheses in this study also attest to the early stage of development of this research field. Clearly, more empirical and theoretical clarification is needed in order to advance our understanding of management innovation. As such, the paper constitutes a first step in building an empirical understanding of management innovation. Nevertheless, this study contributes to the management innovation literature in at least three ways.

First, the paper indicates that internal antecedents play an important role in management innovation. This attests to the importance of internal dynamics in understanding the behavior of firms and naturally builds on the learnings from behavioral theory (Cyert & March, 1963; Pierce et al., 2008). In other words, management innovation cannot be explained purely by factors external to the firm such as management fashion (Abrahamson, 1996; Abrahamson & Fairchild, 1999), mimetics (Dimaggio & Powell, 1983) or competitive pressures. In fact, these

findings suggest that management innovation may not be triggered particularly by performance decline, which goes counter to common assumptions about failure induced innovation.

Second, the paper indicates that management innovation may at least to some extent be a learned capability. In accordance with the behavioral lenses adopted in the study, firms are perceived as learning and adaptive organizations. Specifically, the findings suggest that previous experience with large organizational changes may make companies faced with performance decline more able to implement necessary strategic solutions such as new management practices and structures. The skills and knowledge accumulated from previous change projects are stored in organizational routines and procedures, thus, making a firm able to respond faster and more skillfully when faced with opportunities or problems in the future.

Third, the results strongly indicate that managerial choices have an important influence on the innovation outcomes of the organization (Child, 1972). The importance of TMT diversity, for example, suggest that CEOs interested in improving innovation outcomes may attempt to increase the diversity of the top management team. Also, formal activities aiming at developing and implementing new management practices strongly improve the likelihood that a firm adopts new-to-the-industry management innovation. The use of formalized activities such as training, formal procedures or strategic planning units specifically addressing management innovation indicates a strategic intent of managers and a willingness to devote organizational resources to building innovation capabilities. This study shows that these formal activities may in fact improve the diagnostic capacity of firms. That is, formalizing procedures for developing and implementing new management practices may improve the ability of a firm to detect opportunities or problems and translate them into managerial solutions.

Table 4. Results of multinomial logistic regression (baseoutcome is no-innovation)

VARIABLES	MODEL 1		2		3		4		5		6		7	
	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry	New-to-the-firm	New-to-the-industry
Size	0.57**	0.36	0.57**	0.35	0.56**	0.36	0.56**	0.35	0.58***	0.37	0.57**	0.37	0.57**	0.36
	(2.56)	(1.36)	(2.56)	(1.33)	(2.53)	(1.34)	(2.45)	(1.30)	(2.61)	(1.41)	(2.56)	(1.37)	(2.53)	(1.33)
Industry (dummy)	-0.75	-0.38	-0.75	-0.33	-0.69	-0.34	-0.78	-0.40	-0.71	-0.31	-0.77	-0.39	-0.74	-0.33
	(-1.38)	(-0.63)	(-1.35)	(-0.54)	(-1.21)	(-0.53)	(-1.41)	(-0.65)	(-1.28)	(-0.50)	(-1.41)	(-0.64)	(-1.33)	(-0.53)
Enterprise group (dummy)	-1.04	-0.83	-1.03	-0.81	-0.96	-0.76	-1.05	-0.84	-1.04	-0.82	-1.05	-0.84	-1.03	-0.83
	(-1.46)	(-1.08)	(-1.45)	(-1.06)	(-1.37)	(-1.00)	(-1.49)	(-1.10)	(-1.47)	(-1.08)	(-1.47)	(-1.10)	(-1.45)	(-1.08)
Performance decline	-0.02	0.03	-0.02	-0.16	0.01	0.08	-0.09	-0.00	-0.06	-0.04	0.01	0.06	-0.03	-0.15*
	(-0.93)	(1.33)	(-0.40)	(-1.42)	(0.33)	(1.59)	(-0.95)	(-0.02)	(-1.34)	(-0.97)	(0.24)	(1.29)	(-0.34)	(-1.94)
Education level	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
	(0.39)	(0.83)	(0.39)	(0.85)	(0.44)	(0.92)	(0.34)	(0.78)	(0.36)	(0.81)	(0.39)	(0.83)	(0.38)	(0.81)
Formal management innovation activities	0.49**	0.59***	0.49**	0.59***	0.50**	0.60***	0.50**	0.59***	0.50**	0.59***	0.49**	0.58***	0.49**	0.59***
	(2.48)	(2.68)	(2.47)	(2.71)	(2.48)	(2.68)	(2.55)	(2.74)	(2.49)	(2.68)	(2.45)	(2.66)	(2.47)	(2.70)
TMT diversity	0.20	0.49**	0.19	0.47**	0.17	0.45*	0.21	0.51**	0.22	0.52**	0.21	0.51**	0.19	0.48**
	(0.96)	(2.08)	(0.92)	(1.96)	(0.85)	(1.89)	(0.99)	(2.08)	(1.04)	(2.15)	(1.00)	(2.06)	(0.94)	(2.00)
CEO novelty	0.05**	0.09***	0.05**	0.09***	0.05**	0.09***	0.05**	0.09***	0.05**	0.09***	0.05**	0.09***	0.05**	0.09***
	(2.23)	(2.77)	(2.21)	(2.72)	(2.19)	(2.75)	(2.29)	(2.81)	(2.28)	(2.82)	(2.25)	(2.77)	(2.21)	(2.85)
Previous experience	0.06	0.16	0.06	0.17	0.06	0.16	0.06	0.16	0.06	0.16	0.05	0.16	0.06	0.17
	(0.49)	(1.23)	(0.51)	(1.29)	(0.50)	(1.18)	(0.51)	(1.25)	(0.50)	(1.19)	(0.45)	(1.18)	(0.51)	(1.29)
Middle-manager support	0.37	0.27	0.38	0.30	0.40	0.29	0.37	0.26	0.37	0.26	0.35	0.24	0.38	0.27
	(1.38)	(0.89)	(1.40)	(0.97)	(1.40)	(0.94)	(1.35)	(0.86)	(1.38)	(0.89)	(1.26)	(0.79)	(1.39)	(0.90)
TMT div (INTERACTION)			0.00	0.04*										
			(0.16)	(1.68)										
Education (INTERACTION)					-0.00	-0.00								
					(-0.69)	(-1.13)								
Formal activities (INTERACTION)							0.02	0.01						
							(0.73)	(0.30)						
Previous experience (INTERACTION)									0.01	0.02*				
									(1.21)	(1.78)				
Midde-manager sup (INTERACTION)											0.01	0.01		
											(0.61)	(0.90)		
CEO novelty (INTERACTION)													0.00	0.00**
													(0.15)	(2.02)
Constant	-3.27	-3.66	-3.19	-3.53	-3.16	-3.45	-3.37	-3.69	-3.55	-3.89	-3.43	-3.80	-3.24	-8.27***
	(-1.23)	(-1.32)	(-1.19)	(-1.26)	(-1.18)	(-1.24)	(-1.26)	(-1.32)	(-1.35)	(-1.43)	(-1.27)	(-1.35)	(-1.21)	(-2.73)
Observations		204		204		204		204		204		204		204
Wald (chi2)		51.11		54.24		50.09		56.71		51.16		51.02		59.37
Pseudo R2		0.14***		0.15***		0.14***		0.14***		0.14***		0.14***		0.14***

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this study, formal activities have been understood as part of a firm's diagnostic capacity. However, these activities may in practice be directed as much the implementation phase as at the detection of problems and opportunities. Therefore, future studies may develop more detailed measures distinguishing between formal activities involving diagnostic capacity and those that involve implementation capacity. Often, formalized activities are perceived to be more important for organizational tasks related to implementation than for the less controllable tasks related to search and opportunity discovery. For example, Teece (2007, p. 1343) observes that "sensing activities need to be decentralized with the information rolling up to top management", while "tight planning will be part of seizing, but less so of sensing". The extent to which formal activities are important for diagnosis and implementation of management innovation, respectively, could be an interesting future research direction.

Implications for Theory and Practice

As suggested above, the findings in this study indicate that the behavioral theory of the firm and the concepts of diagnostic capability and implementation capability are useful for studying management innovation. The results also clearly show that managerial choices have important consequences for a firm's innovation performance. Future studies should aim at furthering our understanding of how different internal antecedents are related to each other and to the potential external triggers of management innovation. This study did not indicate that performance decline is an important trigger of management innovation. However, future research may attempt different measures of performance shortfall to shed more light on how failure to meet aspiration levels may influence and interact with other internal drivers of innovation.

While this study clearly confirms that new-to-the-industry management innovation is an observable and relevant phenomenon, large gaps in our understanding of these truly novel

innovations remain. Future research, thus, may attempt to disentangle in higher detail the internal processes leading to the development and subsequent implementation of new-to-the-industry management innovations. In-depth case study research designs, for example, could explore with more nuance the organizational, social, cultural and individual level drivers and barriers to management innovation. Birkinshaw et al. (2008) highlights the importance of internal and external change agents in their process model of management innovation. Case studies may shed more light on the roles that these change agents play in developing new to the state of the art management innovations.

In this study, the benefit of management innovation to firms is assumed. Due to the time period of data collection, it was not possible to collect data on the performance consequences with a sufficient time lag. Therefore, whether new-to-the-industry management innovations are beneficial for firm performance remains an empirical question and outlines a potentially fruitful direction for future research.

This study reveals two important implications for practitioners. First, the study confirms that managerial actions and choices matter and may have important influence on the likelihood of management innovations. Specifically, managers seeking to increase the likelihood of adopting management innovations may establish training, formal procedures and/or strategic planning units directly targeted at the development or implementation of new management practices. As this article has indicated, engaging strategically and systematically in a pursuit of management innovation pays off. Second, managers should consider how the top management team is composed. Increasing the diversity of top managers in terms of their educational background, experiences and areas of expertise increases the likelihood of developing and implementing truly novel management practices.

Limitations

A number of limitations apply to this research. In making observations on the level of the firm, the study may overlook potentially interesting multi-level determinants and perspectives on management innovation. Arguably, management innovation is inherently a multi-level phenomenon, since variables at both the individual, organizational and contextual level are likely to influence innovation adoption. Collecting rich data at both individual and organizational level, however, is very time and resource demanding. Nevertheless, understanding the influence of values, attitudes and behaviors of employees and key change agents would be very valuable. Future research may therefore attempt to incorporate multi-level perspectives and methods in studies of management innovation.

This study is based on cross-sectional data and most variables represents a specific point in time. Therefore, the actual process of idea generation, testing and implementation are not considered. Similarly, it is a limitation of this paper that performance consequences of adopting management innovation are not considered. The specific context of the study performed may also constitute a limitation to the generalizability of the findings. The data is collected from large Danish firms. Whether results apply in other cultural contexts or for smaller enterprises is uncertain.

The measure used for performance decline is clearly only a crude proxy for the concept of performance shortfall as it was formulated by e.g. Cyert and March (1963). Future research should use additional performance variables and broader measures of performance shortfall. Finally, this study only includes a limited set of variables within the diagnostic capacity and implementation capacity categories. A range of other variables could be included in future studies to increase the explanatory value of the model. For example, future studies may include variables relating to a firm's use of internal and external knowledge sources, the

attitudes and values of managers, the organizational climate, culture, reward structures and distribution of authority etc. The lack of variables measuring corporate culture could be a source of endogeneity in the model. However, since educational levels and middle manager support also reflect aspects of corporate culture, the risk of endogeneity due to omitted variables should be low.

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EXPLAINING MANAGEMENT INNOVATION PERVASIVENESS: THE ROLE OF INTERNAL ANTECEDENTS[7]

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ABSTRACT

Management innovation is the introduction of new management practices, processes, techniques or organizational structures that significantly alter the way the work of management is performed. This paper examines a particular characteristic of management innovation: i.e. pervasiveness. Based on the behavioral theory of the firm, the determinants of firms' adoption of pervasive management innovations are explored. I find that performance shortfalls have a direct positive effect on the pervasiveness of adopted innovations. Likewise, I find a direct effect of education level, richness of internal communication and CEO novelty on pervasiveness.

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INTRODUCTION AND BACKGROUND

Recently, the phenomenon of management innovation has attracted increasing interest among scholars and practitioners (e.g. Birkinshaw, Hamel & Mol, 2008; Damanpour, Walker & Avellaneda, 2009; Lazonick & Teece, 2010; Mol & Birkinshaw, 2009). While innovation in general and technological innovation in particular have been subject to intense research scrutiny over at least the last half century, management innovation is still an emerging field struggling with unclear definitions, weak empirical measurements and limited knowledge of the basic generative mechanisms and performance consequences.

Systematic discussions about innovation characteristics or properties have been surprisingly absent in the management innovation literature. In studies of other types of innovation, it is widely recognized that an understanding of innovation characteristics is a prerequisite for building cumulative and generalizable knowledge (Wolfe, 1994). Numerous studies of technological innovation have shown that innovation characteristics influence innovation adoption (Damanpour & Schneider, 2009; Wolfe, 1994; Zaltman, Duncan & Holbek, 1973). For example, a review of 75 studies identified three innovation characteristics (compatibility, relative advantage and complexity) that have a consistent and significant effect on innovation adoption (Tornatzky & Klein, 1982). Pelz and Munson (1982) also found that innovation attributes such as the originality and the complexity of an innovation influenced the sequence of innovation stages. The more complex or uncertain an innovation, the more disorderly the observed innovation process in firms. Hitherto, no publications have applied or measured any of these innovation attributes in empirical studies of management innovations.

Overall, management innovation refers to the introduction of new management practices, processes, techniques or structures[8] (Birkinshaw et al., 2008). Examples of well

[8] For the benefit of readability, the term management practices is used to refer both to practices, processes techniques and structures throughout the paper.

known management innovation include Motorola's six sigma methodology, the multidivisional form at General Motors and Oticon's spaghetti organization (Chandler, 1962; Foss, 2003; Mol & Birkinshaw, 2007), but management innovations may also be changes of a smaller scale and hence less observable. Since management innovations involve changes in the internal functioning of a firm, e.g. its task design, reward structures, management philosophies and distribution of decision making authority, they are often more tacit, systemic and difficult to imitate than technological innovations. For that reason, it can be argued that management innovations are an important potential source of sustainable competitive advantage in firms (Barney, 1991, 1996; Penrose, 1959; Teece & Pisano, 1994).

Nevertheless, little systematic knowledge about management innovation has been gathered. Detailed accounts of the emergence and spread of specific innovations exist (e.g. Chandler, 1962; Fligstein, 1985; Guler, Guillén & Macpherson, 2002; Kossek, 1987; Teece, 1980). Also, a stream of diffusion literature has focused on the general patterns of diffusion of organizational practices (e.g. Ansari, Fiss & Zajac, 2010; Massini, Lewin & Greve, 2005). But few studies have addressed the antecedents or the performance consequences of management innovation from a firm-level perspective. Noteworthy exceptions include the recent contributions from particularly Michael Mol, Julian Birkinshaw and Gary Hamel (e.g. Birkinshaw et al., 2008; Hamel, 2006; Mol & Birkinshaw, 2009, 2007). Nevertheless, research on management innovation is still characterized by lack of consensus on definitions and theoretical frameworks and there is no shortage of methodologies and theoretical lenses proposed in the various recent publications.

This paper defines management innovation as the implementation of management practices, processes, techniques or structures that are new to the firm. The main purpose of the paper is to contribute to the growing literature on management innovation by addressing the gap in our understanding of innovation characteristics. Particularly, this article addresses

pervasiveness as a characteristic of management innovation and attempts to explain what leads firms to adopt management innovations with higher levels of pervasiveness. Arguably, innovations with different levels of pervasiveness are likely to be affected differently by different organizational and contextual factors (Wolfe, 1994). As mentioned, the literature on technological innovation has paid a great deal of attention to innovation characteristics. For example, innovations have been subdivided into product vs. process innovation (e.g. Abernathy & Utterback, 1978; Damanpour & Aravind, 2006; Edquist, Hommen & McKelvey, 2001), radical vs. incremental innovations (e.g. Afuah, 1998; Dewar & Dutton, 1986; Ettlie, Bridges & OKeefe, 1984; Greenwood & Hinings, 1996) and complex vs. simple innovations (e.g. Damanpour & Schneider, 2009; Pelz, 1985; Wolfe, 1994).

Pervasiveness in this paper refers to the number of units or employees affected by an innovation and is similar to what has been labeled "scope" (Wilson, 1966; Wolfe, 1994) or "breadth" (Pelz & Munson, 1982) in studies of technological innovation. It is widely acknowledged in innovation studies that complex innovations involve higher levels of uncertainty and higher implementation costs for adopting organizations (Damanpour & Schneider, 2009). However, complexity has been defined in a number of ways. For example, complexity can refer to the intellectual difficulty associated with understanding an innovation (Drucker, 1985) or to the trialability of an innovation, i.e. the extent to which an innovation may be experimented with on a limited basis (Damanpour & Schneider, 2009; Rogers, 2003). Complexity is defined by Rogers and Shoemaker (1971, p. 154) as "the degree to which an innovation is perceived as relatively difficult to understand and use". Yet, others have thought of complexity as relating to the extent of decomposability, modularity and loose coupling of a system or structure (Beekun & Glick, 2001; Sanchez & Mahoney, 1996; Simon, 1962; Weick, 1976).

Pervasiveness in this paper is used in a meaning similar to the notion of organizational complexity proposed by Pelz (1985). Pelz (1985) distinguishes between technical and organizational complexity of an innovation, where the first refers to the divisibility of the new technology and the latter to the number of units or groups involved in its adoption. Since innovations that involve multiple units require more coordination and entail higher implementation costs than innovations that are only adopted by a few units, pervasiveness is central for understanding innovation adoption (Damanpour & Schneider, 2009; Pelz, 1985). The definition of pervasiveness employed in this study, furthermore, reflects the way complexity as a term is used to describe the structure of a firm. As a characteristic of a firm, complexity typically refers to how differentiated the structure of the organization is (Blau & McKinley, 1979; Damanpour, 1996; Hall, 1977). The degree of complexity, then, is implied by the extent of differentiation along a number of dimensions, e.g. number of occupational types, hierarchical levels functions (Aiken, Bacharach & French, 1980; Blau, 1970).

The main purpose of the paper is to explain what leads some firms to adopt more pervasive management innovations than others. Based on survey and archival data, two main questions are addressed. First, how does external stimuli in the form of a performance shortfall influence the pervasiveness of adopted management innovations? Second, how do internal antecedents influence the pervasiveness of adopted innovations? Specifically, the paper explores three internal antecedents: workforce education levels, richness of internal communication and CEO novelty.

In the following section, a set of hypotheses are developed based on behavioral theory and findings from previous management innovation studies. Then data and methodologies employed in the study are described. Finally, the paper discusses the findings, limitations and implications for future research.

THEORETICAL DEVELOPMENT

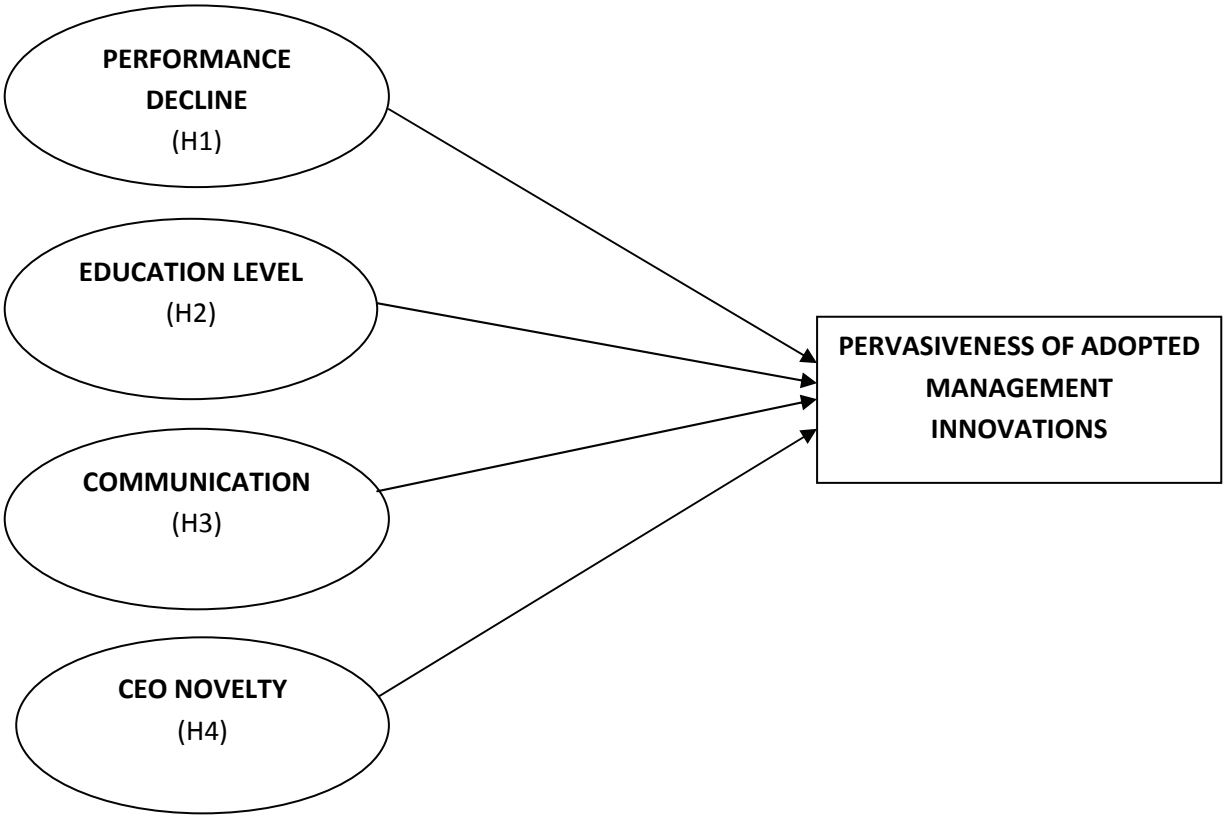
The theoretical lenses applied in this paper are derived from the behavioral theory of the firm (Cyert & March, 1963; March & Simon, 1958; Simon, 1947, 1955). The behavioral theory of the firm (BTF) pioneered the understanding of the internal organization of firms and has contributed importantly to the foundation for most modern theories of strategy and firm behavior (Pierce et al., 2008). BTF incorporates sociological and social psychology perspectives into economics and thereby provides a more realistic theory of decision making in firms. The original contribution by Cyert and March (1963) provided a deep understanding of how firms make decisions in a context of bounded rationality, conflicting goals, problem driven search and imperfect environmental matching. However, they provide few guidelines for managers actually seeking to change firm behavior.

Subsequent contributions in the field of strategic management have remedied this weakness in Cyert and March' framework. Most notably the resource based view (Barney, 1991, 1996; Penrose, 1959; Wernerfelt, 1984) and the dynamic capabilities perspective (Pierce, Boerner & Teece, 2008; Teece, Pisano & Shuen, 1997; Teece, 2007; Winter, 2003) have formulated theories of firm behavior with stronger prescriptive implications. These perspectives are compatible with the assumptions and perspectives of BTF and I will regard them as part of a broader BTF tradition (for a discussion of the relation between BTF, resource based theory and dynamic capabilities see e.g. Pierce et al., 2008). The resource based view and the dynamic capabilities perspective emphasize how heterogeneous internal resources, routines and capabilities underlie the sustainable competitive advantage of firms.

The broad BTF perspectives discussed above provide a nuanced and realistic starting point for understanding the decision to adopt management innovations in firms. In the following section, these theories are used to argue for four hypotheses related to the

pervasiveness of adopted management innovations. The hypotheses are summarized in the model presented in figure 1.

Figure 1. Overall conceptual model



HYPOTHESES

Performance Shortfall

It is a fairly straightforward assumption that an important driver of changes in firms are changes in their external environments. For example, Damanpour and Evan (1984) consider innovations to be responses to environmental change or means to bring about changes in the organization: "Organizations can cope with environmental changes and uncertainties not only by applying new technology, but also by successfully integrating technical or administrative changes into their organizational structure that improve the level of achievement of their goals" (p. 393). Chandler (1962) in a serious of historical case studies

also illustrated how organizational structures are greatly influenced by the external strategies and contingencies facing a firm. For example, the technological advances in rail transport contributed to enabling the diversification strategies of large American corporations. Diversification, then, led to the need for structural and administrative reorganization to meet the needs of the increasingly different markets. This pressure eventually spurred the development of the multidivisional form of organization. Likewise, as different geographical markets became more similar with the spread of urbanization, regionally defined divisions in large firms tended to merge into single units for each line of products (Chandler, 1962).

Likewise, institutional theory has formulated the idea that firms due to inertia and path dependencies are most likely to implement radical changes and innovations only when confronted with severe pressures or exogenous changes such as performance crises or CEO succession (Drazin, Glynn & Kazanjian, 2004; Romanelli, 1991; Romanelli & Tushman, 1994; Scott, 1995).

The BTF acknowledges the influence of external stimuli but contests the typical neo-classic assumption of perfect environmental matching. I.e. the idea that firms are able to continuously scan all possible decision alternatives and chose the value maximizing response to any problem or opportunity. Due to bounded rationality of decision makers and the presence of internal goal conflicts, BTF suggests that firms make satisficing rather than optimizing decisions (Cyert & March, 1963). According to the BTF, firms set satisficing aspiration levels based on previous performance and the performance of relevant reference groups. Search is problem-driven and biased in the sense that alternatives are scanned in order of proximity to the present organizational setup or to the problem area. The search process ends once an alternative that meets the aspiration level is found.

Failure to meet aspiration levels and identification of an action alternative that brings the organization back to satisfactory performance, respectively, triggers and ends the search process. Therefore, it is reasonable to assume that the complexity or severity of the initial problem influences the nature of the chosen solution. Birkinshaw et al. (2008) argue that a novel problem is a prerequisite for a novel solution to be implemented. In the context of management innovation, Birkinshaw and colleagues claim that firms will exhaust the consultancy market for off-the-shelve management solutions before experimenting with their own development of something truly novel. Nickerson and Zenger (Nickerson & Zenger, 2004), similarly, argue that more complex problems are likely to lead firms to broader search processes, since the most simple and routine based solutions will not suffice.

Pervasive management innovations are likely to entail higher implementation costs and require more coordination between subunits, since more employees are affected. Hence, the risk of failure and the uncertainty involved with the innovation process is larger for the adopting organization (Damanpour & Schneider, 2009; Pelz & Munson, 1982; Pelz, 1985). It is well established in the literature on technological innovation that innovation complexity (across varying definitions and measurements) is negatively related to innovation adoption (Damanpour, 1996; Pelz, 1985; Zaltman, Duncan & Holbek, 1973). This could indicate that a higher sense of urgency is needed for firms to adopt risky innovations. I.e. a stronger sense of necessity is needed in order to compensate for the perceived risk involved. Due to the risk and costs associated with more pervasive management innovations, I will argue that the same will be the case for this type of innovation. In other words, the larger a performance shortfall experienced, the more likely a firm is to adopt more pervasive management innovations.

In accordance with the principle of simple minded search and satisficing as the decision criteria, firms are likely to implement simple and less pervasive innovations if such innovations could resolve the perceived problem (Cyert & March, 1963; Pitelis, 2007).

According to this principle, organizational members will initially search for solutions to perceived problems in the neighborhood of the problem area. If a firm for example experiences problems with the reward structures in the sales department, it is likely to look for a solution that requires only minor changes to the reward system for this department before initiating a wider search. Conversely, firms are more likely to experiment with more risky and pervasive innovations, when the problems facing the organization are so severe that simpler solutions are inadequate (Birkinshaw et al., 2008; Cyert & March, 1963; Wiseman & Bromiley, 1996).

Hypothesis 1: Perceived performance declines positively influence the pervasiveness of adopted management innovations.

Education

For a number of reasons, the education of the workforce is thought to influence the innovativeness of a firm. Highly educated employees will generally posses more knowledge of strategic and managerial issues. This knowledge may in itself be valuable in developing qualified ideas and solutions to the critical problems or opportunities facing an organization. Employees who from their educational background have skills and understanding of strategic management, are more likely to contribute to the development and implementation of management innovations (Barney, 1991; Barney & Wright, 1998; Mol & Birkinshaw, 2009). It is reasonable to assume that these skills and competences of the workforce will have a particular strong effect on the likelihood of adopting more pervasive management innovations.

Furthermore, the knowledge that employees possess may be important for the ability of firms to recognize, assimilate and apply new valuable external information. This ability has been labeled absorptive capacity and essentially depends on the level of prior related

knowledge already available in an organization (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Szulanski, 1996). New management practices will typically involve new information of a rather academic nature. This information may, for example, relate to task coordination, knowledge sharing, distribution of decision making authority and organizational efficiency. Employees with a degree level education are more likely to be able to absorb this type of information, assess its usefulness for the organization and actually apply it in developing and implementing managerial solutions to the problems or opportunities facing the organization. This ability to comprehend and use knowledge of an academic, strategic and managerial nature is likely to be exceptionally important when the desired management innovations are more pervasive.

Finally, highly educated employees are more likely to have a resourceful personal and professional network, which potentially exposes them to valuable new information and ideas (Hansen, 2002; Mol & Birkinshaw, 2009). The cross-fertilization of ideas that occurs in these types of networks may be a potential source of management solutions available to firms and increases the likelihood of a firm adopting pervasive management innovations.

In accordance with the behavioral theory perspective adopted in this article, educational backgrounds of employees may also be important because it influences the search behavior of an organization (Cyert & March, 1963; Pierce et al., 2008). Firms are not able to scan all available information in their environments, but rather they filter the information based on prior experience and extant knowledge. Employees with a degree level education are more likely to search for solutions that relate to management practices since they have a richer understanding of these issues than other employees. Likewise, they are more likely to grasp the implications, consequences and coordination challenges involved in more pervasive management innovations and, hence, are more likely to search for solutions of this nature.

Hypothesis 2: A highly educated workforce positively influences the pervasiveness of adopted management innovations.

Communication

The richness and frequency of communication between employees and units in an organization is generally found to be important for the innovativeness of firms. New knowledge is created when information and ideas are diffused and combined across an organization (Gupta & Govindarajan, 2000; Jassawalla & Sashittal, 2000; Nonaka & Takeuchi, 1995), and the ability to continuously create information and knowledge is an important driver of organizational self-renewal and innovation (Allen, Lee & Tushman, 1980; Argyris, 1977; Nonaka & Yamanouchi, 1989; Rothwell & Robertson, 1973). When interunit relations are strong and plentiful, the effectiveness of organizational members' search behavior is increased, since individuals are more likely to be exposed to information about new opportunities and relevant knowledge residing in other business units or departments (Hansen, 2002). Similarly, studies have found that the absence of effective internal communication is a major barrier to the development of new technology based products (e.g. Gupta & Wilemon, 1990). As such, rich communication flows are likely to increase the diagnostic capacity of a firm by exposing employees to new ideas, giving them access to valuable knowledge in other parts of the organization and fostering cross-fertilization of ideas (Jassawalla & Sashittal, 2000). This paper, thus, posits that firms with rich and plentiful communication are more likely to develop novel and pervasive management solutions to the problems or opportunities facing the organization.

Internal communication serves a number of purposes in the innovation process. For example, a study of innovation in the financial services industries (Lievens, Moenaert & Sjegers, 1999) finds that internal communication is the prime vehicle for realizing a positive

team climate and foster adequate cross-functional cooperation. Lievens et al. (1999) argue that internal communication, therefore, is a critical success factor in innovation projects. Also, a number of studies have found that the frequency of communication between organizational members and units positively affects the level of trust in an organization (e.g. Becerra & Gupta, 2003; Johnson & Lederer, 2005), and in a recent study, Bartels, Pruyn, De Jong and Joustra (2007) find that internal communication is a strong predictor of organizational identification. Both trust and identification may be important for the successful implementation of large organizational changes (Giangreco & Peccei, 2005; Meyer, Srinivas, Lal & Topolnytsky, 2007; Reger, Gustafson, Demarie & Mullane, 1994). In this respect, rich and plentiful communication flow are also likely to support the implementation processes related to management innovation. This is particularly the case for pervasive management innovations, since these innovations are likely to require a higher degree of coordination and collaboration across organizational units and departments than less pervasive innovations.

Hypothesis 3: Rich and plentiful communication flows in a firm positively influences the pervasiveness of adopted management innovations.

CEO Novelty

The chief executive officer (CEO) is in a special position to exercise influence on the strategies, search behaviors, aspiration levels, attention structures and standard operating procedures of a firm (Buyl, Boone, Hendriks & Matthyssens, 2010; Damanpour & Schneider, 2006; Eggers & Kaplan, 2009; Hambrick & Mason, 1984; Miller, 1991; Ocasio, 1997; Pitelis, 2007; Shen & Cannella, 2002; Vaccaro, Jansen, Van Den Bosch & Volberda, 2010). Therefore, CEO succession may be an important driver of organizational changes.

Firms are by nature adaptive and path dependent (Cyert & March, 1963). Hence, when a CEO has been in office for a long time, the routines and operating procedures of the

organization tend to stabilize and large structural or strategic changes become less likely. CEO tenure is associated with a higher degree of strategic myopia, internal resistance, vested interests and, hence, organizational inertia (Hannan & Freeman, 1984; Romanelli & Tushman, 1994; Tushman & Rosenkopf, 1996). Similarly, Miller (1991) found that CEO tenure is inversely related to the degree of match between an organization and its environment. Therefore, CEO succession may constitute an opportunity to overcome organizational inertia and a number of studies have documented that CEO succession indeed increases the likelihood of strategic and structural changes (Carlson, 1961; Denis & Denis, 1995; Helmich & Brown, 1972; Meyer, 1975; Romanelli & Tushman, 1994).

CEO succession may also lead to a shift in the distribution of power in an organization, which may facilitate necessary strategic and structural changes. Over time, groups and individuals gain power based on their ability to deal with the strategic contingencies facing an organization. However, with time the prevailing power distribution also tends to become institutionalized, since power holders resist changes that undermine their influence (Pfeffer & Salancik, 1978; Pfeffer, 1981; 1992; Salancik & Pfeffer, 1977). CEO succession offers an opportunity for existing power distributions to be altered and new strategic perspectives to be introduced (Pfeffer & Salancik, 1978; Shen & Cannella, 2002).

Finally, CEO succession may be a mechanism for organizational learning, since it often brings with it a shift in the core assumptions and theories-in-use in an organization (Tushman & Rosenkopf, 1996; Virany et al., 1992). The shift of top executive, hence, may facilitate so called second order or double-loop learning (Argyris, 1977; Weick, 1979), which under normal circumstances may be hampered by inertia and path dependency. According to Virany, Tushman and Romanelli (1992, p. 72), "[..]executive succession can fundamentally alter the knowledge, skills and interaction processes of the senior management team. These revised skills and communication processes improve the team's ability to recognize and act on

changing environmental conditions". Tushman and Rosenkopf (1996) also used this type of learning perspective to explain an observed correlation between CEO succession and the introduction of discontinuous organizational changes.

In summary, recent CEO succession is likely to be associated with large organizational changes because it assists an organization in overcoming inertia, political resistance and institutionalized power dependencies. Furthermore, it brings new managerial perspectives and facilitates double-loop learning, which increases the likelihood of developing and implementing new, pervasive management innovations. Conversely, as CEO tenure increases, inertial forces and path dependency grow and make management innovations less likely. Since more pervasive management innovations affect more employees, they are likely to be associated with higher degrees of resistance and, therefore, the inertia associated with CEO tenure is likely to be especially important for this type of innovation.

Hypothesis 4: CEO novelty positively influences the pervasiveness of adopted management innovations.

DATA AND METHODS

This study is based on the Management Innovation Survey developed at the Center for Strategic Management and Globalization at Copenhagen Business School. The overall structure of the survey has been adapted from the Community Innovation Survey (CIS), which is a European wide survey measuring product and process innovation. The CIS was developed on initiative of the European Union and has been executed by national statistical offices throughout the EU six times since 1992. The survey has been incrementally improved and refined during the years and a large number of papers have been published using CIS data (e.g. Battisti & Stoneman, 2010; Evangelista, Perani, Rapiti & Archibugi, 1997; Frenz & Ietto-Gillies, 2009; Laursen & Salter, 2006). The CIS includes measures on changes in

business practices and structures, which have been used as a measure of management innovation by e.g. Mol and Birkinshaw (2009). However, the CIS does not measure the pervasiveness of changes and also lacks a number of the firm level variables of interest to this study. Compared to the CIS, the Management Innovation Survey employed in this study has refined the innovation measures allowing for a more nuanced understanding of the phenomenon.

The sample of firms was taken from the Danish CD-direct database, which contains detailed public information on all Danish enterprises. The survey was sent to CEOs of the 1,051 largest Danish firms and the data was collected during the fall of 2009. The selection was done based on number of full-time employees and include all firms with more than 150 employees in 2008. 314 firms responded corresponding to a response rate of 29.9%. The survey was conducted online and respondents received a postal invitation with a unique login and password for the website. All non-respondents received a postal reminder and were subsequently contacted via telephone. When it was not possible to reach the respondent, interviewers asked for a direct e-mail address and follow up e-mails with a link to the survey were sent. The survey was sent to CEOs but other members of the top management team were also allowed to answer.

In order to minimize the risk of common method bias, data regarding the performance decline variable was collected using archival data from the CD-direct database. This ensured that all measures in the survey were not collected from the same source. Two of the other variables, education levels and CEO tenure, are also of a fairly factual nature and could in principle be confirmed from other sources. This reduces the risk of bias in the sample compared to e.g. self-reported items based on the respondent's perception or attitudes (Podsakoff & Organ, 1986). Finally, a factor analysis, the Harman's one-factor test, did not indicate common method variance (Podsakoff & Organ, 1986). Two-group mean comparison

tests were used to test for non-response bias and indicated no significant differences between respondents and non-respondents when comparing relevant variables such as industry affiliations and company size.

Ordinary Least Square regression (OLS) is employed to assess how much variance in the pervasiveness of adopted management innovations can be explained by the set of independent variables (IVs) and to analyze the relative contribution of each of the IVs.

Measures

Pervasiveness. The pervasiveness of adopted management innovations is measured as the percentage of employees directly affected by the management innovations implemented by the firm. First, respondents were asked whether they during the years 2006-2009 implemented any new or significantly altered organizational structures or management practices, processes or techniques. Management innovation in this study is defined as practices that are new to the adopting organization. Respondents who reported having implemented management innovations where asked to indicate the approximate percentage of employees who had been directly affected. Non-innovators are coded as '0'. Since they have not implemented new management practices or structures, no employees are affected.

Performance decline. Performance decline is measured as the percentage change in a firm's return on equity (net profit divided by equity) from the financial year 2004 compared to 2006 based on data from the Danish CD-Direct database. The measure is calculated so that a larger measure indicates a larger performance decline, i.e. (ROE 2006-ROE 2004)/ROE 2004*(-1). The years 2004 and 2006 are chosen to reflect the time period prior to the main period of interest in the study, namely the years 2006-2009. This reflects an expected time lag between the perceived performance shortfall and a change in the outcome variable; i.e. pervasiveness of adopted management innovations. A firm's financial performance obviously

does not fully reflect the strategic aspirations of an organization. Nevertheless, since a range of factors influence the extent to which performance is perceived to meet aspirations, a financial measure is chosen as a crude proxy for performance shortfall. Another option could have been to ask for CEOs' perception of previous firm performance. However, the ability of respondents to accurately report their perception and performance 3-5 years ago is questionable. Also, this approach would raise serious issues of both social desirability and common method bias, since that would make CEOs the source of information for the dependent as well as independent variables (Furnham , 1986; Moorman & Podsakoff, 1992; Podsakoff & Organ, 1986; Spector, 2006).

Workforce education. This measure reflects the education level of employees. Respondents were asked to indicate approximately what percentage of employees have a degree level education (M.Sc., MBA, PhD or equivalent).

Communication. The measure of communication flows indicates the top manager's perception of the richness of communication and collaboration in the firm. The measure is a multi-item scale and respondents were asked to indicate based on their personal experience to what extent the following statements accurately describe the communication climate in the organization: (1) The communication across departments is rich and plentiful, (2) Departments are often skeptical about information received from other departments (reverse-coded), (3) The communication across levels of the organization is rich and plentiful, (4) Inter-disciplinary and cross-departmental collaboration on tasks and activities is widespread, and (5) Formal channels of communication, e.g. company blogs, newsletters, intranet and databases, are plentiful and widely used. Responses were recorded on a scale from 1 (not accurate at all) to 7 (very accurate). The scale has an alpha coefficient of 0.73.

CEO novelty. CEO novelty indicates the number of years the current CEO has been in office. The measure is reverse-coded so that a higher number indicates a more recent CEO succession, i.e. a higher degree of novelty.

Controls. Four control variables are included in order to test for possible alternative explanations: (1) Larger firms may have more resources enabling them to invest more in innovation activities. On the other hand, larger firms may be more characterized by inertia. Also, the mere size of a firm in itself, may influence the costs and risk involved in implementing more pervasive innovations. Therefore, firm size measured as the logarithm of the number of employees in 2009 was included. (2) An industry dummy distinguishing between service and manufacturing industries was included to control for industry effects. (3) Firms that are member of enterprise groups may have access to knowledge and resources from corporate headquarters or other members of the group. Hence, a group dummy measuring whether a firm is part of an enterprise group or not is included. Finally, (4) the extent of organizational differentiation, e.g. number of functions or departments reporting directly to top management, may influence the likelihood of adopting pervasive innovations. Therefore, span of authority measuring the number of units or departments reporting directly to the CEO is included as a control.

RESULTS

Table 1 shows the means, standard deviations and correlation coefficients of the dependent and independent variables. Firms in the sample adopted management innovations in the period 2006-2009 that on average affected 59% of their employees. On average firms experienced a decline in return on equity from 2004 to 2006, which is used as the measure for performance decline below. However, substantial variance existed between firms.

Table 1. Means, standard deviations and correlations among variables

	Mean	S.D.	Skewness	1	2	3	4	5	6	7	8	9
1. Pervasiveness of management innovations	59.38	33.63	-0.23	1								
2. Performance decline	.77	21.40	-0.94	.13	1							
3. Education level	15.52	20.56	2.04	.19	.11	1						
4. Communication climate	4.48	.95	-0.18	.24	.07	.12	1					
5. CEO Novelty	43.52	8.42	-2.32	.20	-.18	.04	-.03	1				
6. Size	5.89	1.31	0.72	.02	.07	.19	.03	-.00	1			
7. Span of authority	8.43	7.43	4.08	-.01	-.01	.12	-.02	-.02	.39	1		
8. Industry dummy	.34	.46	0.52	-.06	-.03	.22	.05	-.11	-.04	.16	1	
9. Enterprise group dummy	.71	.45	-0.87	.00	-.05	-.05	-.03	.26	.01	-.06	-.12	1
N = 201												

The antecedents of management innovation pervasiveness are analyzed using standard OLS regression and table 2 contains the regression results. The model in itself is highly significant and explains roughly 15% of the variance in the dependent variable, which is a reasonable level of R-squared for this type of study.

The first column in table 2 shows the standardized regression coefficients (betas) of each of the variables. As expected, all four variables of interest have a positive relationship with pervasiveness of adopted management innovations. Furthermore, all of the betas are significant, which indicates that each of the variables make a unique contribution to the prediction of pervasiveness when the variance explained by all the other variables is accounted for. Standardizing the beta coefficients allows for a comparison of the unique contribution made by each independent variable. From table 2 it can be seen that CEO novelty (beta=0.23, $p<0.01$) and communication (beta=0.22, $p<0.001$) make the strongest unique contribution to explaining pervasiveness. None of the control variables significantly explain the dependent variable.

Table 2. OLS regression results predicting the pervasiveness of adopted management innovations

	Standardized beta	**t-value**
Performance decline	.14***	4.63
Education level	.16*	2.29
Communication	.22***	3.25
CEO novelty	.23**	2.94
Size	-.03	-.24
Span of authority	.00	.02
Industry dummy	-.08	-1.11
Enterprise group dummy	-.05	-.76
Constant	-.05	-.38
Observations	201	
F-value	7.79***	
R-squared	.154	
Adjusted R-squared	.148	

*** p<0.001, ** p<0.01, * p<0.05

In summary, there is strong support in the data for all four hypotheses. This indicates that the proposed behavioral model explaining pervasiveness of adopted management innovation is useful and relevant. It is confirmed that the introduction of management innovations with higher levels of pervasiveness is related to a performance shortfall in the years prior to innovating (hypothesis 1). Normally, OLS regression does not lend itself to any conclusions on the direction of causality. However, since the performance decline variable specifically measures a time period prior to the occurrence of the dependent variable, the data indicates that the direction of causation runs from performance shortfall to the innovation outcome. Also, the data confirms that the three internal antecedents studied, namely higher workforce education levels (hypothesis 2), richness of communication (hypothesis 3) and recent CEO succession (hypothesis 4), increase the pervasiveness of adopted management innovations.

CONCLUDING DISCUSSION

The strong support for all hypotheses in this paper suggest that the behavioral framework is a useful lens for studying and understanding management innovation pervasiveness. Overall, this study supports the idea of firms as path dependent and adaptive organizations that are most likely to implement fundamental changes when confronted with a performance shortfall or a CEO succession (Cyert & March, 1963; Drazin et al., 2004; Hannan & Freeman, 1984; Romanelli & Tushman, 1994). Also, the study indicates the importance of internal dynamics in understanding firm behaviors. Specifically, the paper makes at least two important contribution to the management innovation literature.

First, the paper contributes to our understanding of the concept of management innovation by initiating a discussion of innovation attributes. Management innovations are not all alike. They are likely to differ along a number of dimensions such as their origins, contents, complexity, pace and sequence of implementation and their pervasiveness. This paper constitutes a first step toward a richer understanding of management innovation by specifically addressing the pervasiveness of adopted innovations. The paper shows that pervasiveness of management innovations vary across firms and, hence, that pervasiveness as an innovation attribute is relevant for empirical analysis. Furthermore, the paper has found that a significant part of the observed variance in pervasiveness of adopted innovations can be explained by a number of behavioral variables.

Second, the paper applies the behavioral notion that firms perceive their environments through organizational filters to management innovation. Three variables involving these internal organizational filters are investigated, namely CEO novelty, communication and education levels. These three variables all have to do with what resources and competencies are present in a firm and how these assets are leveraged and put to use across the organization.

A new CEO brings new perspectives and knowledge into the organization which is potentially valuable for the development and implementation of new and more complex management practices in response to problems or opportunities facing the organization (Denis & Denis, 1995; Helmich & Brown, 1972; Meyer, 1975; Shen & Cannella, 2002). Also, this study indicates that CEO succession may spur valuable learning processes and assist in overcoming inertia and other organizational barriers to implementing structurally complex management innovations (Tushman & Rosenkopf, 1996; Virany et al., 1992). The knowledge and competences employees have as a result of higher education levels are likely to improve their ability to absorb new knowledge and information of a strategic nature (Cohen & Levinthal, 1990), to recognize problems and opportunities and to develop managerial solutions in response. Finally, the richness of communication flows within an organization is likely to make firms better able to identify, cross-fertilize, distribute and utilize extant knowledge and resources for management innovation purposes (Bartels et al., 2007; Jassawalla & Sashittal, 2000).

Previously, Harder (2011a; 2011b) has introduced the notion of diagnostic capability to explain how internal antecedents influence the likelihood of adopting management innovations. Diagnostic capability refers to the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management solutions that solve the problem or exploit the opportunity. The concept of diagnostic capability, therefore, is based on the behavioral assumptions of bounded rationality, imperfect environmental matching and internal goal conflicts. Since firms do not have access to perfect information, continuous environmental scanning and infinite cognitive abilities, organizational filters become hugely important in understanding why some firms are more likely to innovate than others (Cyert & March, 1963; Pierce et al., 2008; Pitelis, 2007).

Diagnostic capability share commonalities with e.g. the notions of sensing and seizing of opportunities introduced by Teece (2007) and with March' (1991; 1996; 2006) concept of exploitation and exploration. However, diagnostic capability is thought of as a more limited concept directly related to firms' management innovation behavior. Due to the broad nature of the diagnostic capability concept, a number of factors may be involved and made subject to studies in relation to management innovation. Overall, Harder (2011b) suggest that diagnostic capability may relate to either institutionalized elements of organizational design, resources or routines or to the perceptiveness and cognitive abilities of to managers. The importance of top managers as internal change agents and the effect of organizational design variables are also discussed in the conceptual model introduced by Birkinshaw et al. (2008).

While this paper does not directly test or measure the notion of diagnostic capability, the three internal antecedents studied may be perceived as relating to a firm's diagnostic capability. The empirical findings in this study, hence, indicate that varying degrees of diagnostic capability of firms may be an important explanation of the observed differences in management innovation behavior. Specifically, this paper gives some indication that diagnostic capability may be a determining factor in explaining the pervasiveness of adopted management innovations. As such, developing more pervasive innovations is likely to place higher demands on the perceptiveness and cognitive abilities available in a firm. Therefore, firms with higher levels of diagnostic capability are more likely to implement management innovations with higher levels of pervasiveness.

Implications for theory and practice

The paper indicates that the behavioral lenses and, indirectly, the concept of diagnostic capability may be useful for understanding and studying management innovation. Also, the paper has opened a discussion of the innovation attributes that may be subject to analysis in

relation to management innovation. However, in so doing, it is also stressed that our understanding of the core concept of management innovation is still in many ways imperfect. If we disregard the management fashion literature and studies of diffusion patterns of specific innovations, there exist very few empirical studies of firm-level management innovation. Even fewer studies actually distinguish between types or attributes of management innovation and investigate how causal drivers and performance outcomes may differ depending on innovation characteristics. Obviously, a richer understanding of the types and attributes of management innovation is necessary in order to build generalizable and cumulative knowledge of management innovation. This study has made a small contribution to this understanding of management innovation attributes, but much research still needs to be done. A potentially valuable direction for future research, therefore, lies in developing a deeper understanding of management innovation attributes. For example, scholars should attempt to answer the following questions: What are the most meaningful attributes of management innovation? What causes some firms to adopt certain types of innovations? And how do innovation attributes influence adoption rates, implementation sequence, implementation pace and performance outcomes?

This study reveals a number of important implications for managers. The study confirms that managerial actions and decisions matter. Innovation outcomes are not purely a result of performance shortfall or external pressures. Specifically, three recommendations can be made for managers wishing to increase the likelihood of adopting pervasive management innovations. First, managers can attempt to design hiring and promotion policies that favor highly educated employees. Second, managers can ensure that internal communication channels are plentiful and easily accessible for employees. Furthermore, they should focus on encouraging communication and collaboration across units, departments and levels in the organization in order to boost idea cross-fertilization and learning. Finally, top executives and

firm owners should be aware of the inertial pressures associated with high CEO tenure. CEO succession is associated with costs and should, of course, not be interpreted as a general recommendation. Nevertheless, executives could think of other ways to compensate for the inertia associated with high CEO tenure. For example, ensuring diversity in the top management team could be one way to bring in different perspectives and to combat inertia (Bantel & Jackson, 1989; Boeker, 1997; Hambrick & Mason, 1984; Santos & Garcia, 2006; Stjernberg & Philips, 1993).

Limitations

A number of limitations apply to this research. A range of innovation characteristics could be investigated, but this research only observes pervasiveness. A more complete understanding of management innovation, of course, entails including more nuanced measures of the core concept. Also, this paper has taken the firm as unit of analysis. In reality, management innovation is more likely to be a multilevel phenomenon with drivers at both individual, organizational and contextual levels. Future research, therefore, may attempt to include multilevel methodologies in the study of management innovation.

Since this study employs cross-sectional data, it should also be noted, that the results represent a specific point in time. The time-order dynamics of management innovation are not studied. Future research may attempt to grasp the actual process of idea generation, testing and implementation in order to further our understanding of how management innovation actually occur in firms. Likewise, it is a weakness of this study, that it is predominantly based on a single-respondent survey. Especially the measure of communication climate may be subject to social desirability biases. Also, it is a limitation of this study that the positive performance effect of management innovation is assumed and not measured. The relationship

between the pervasiveness of adopted management innovations and future firm performance is not addressed. Future research should attempt to measure the actual performance effects.

Finally, this paper does not attempt to actually measure diagnostic capability, nor does it include all imaginable variables related to the diagnostic capability concept. The notion of diagnostic capability is still conceptually vague and future research should attempt to clarify the boundaries and definitions associated with diagnostic capability. Future research may attempt to develop and measure diagnostic capability as an empirically observable construct and discover what underlying factors drive a firm's diagnostic capability. While this is undoubtedly an interesting research prospect, it lies outside the ambitions of the current study.

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INTERNAL DETERMINANTS OF PRODUCT INNOVATION AND MANAGEMENT INNOVATION: THE EFFECT OF DIAGNOSTIC CAPABILITY AND IMPLEMENTATION CAPABILITY[9]

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ABSTRACT

This paper adopts a behavioral theory of the firm perspective in order to compare the antecedents of two types of innovation: Management innovation refers to the adoption of new management practices or organizational structures, whereas product innovation refers to the introduction of new products or services on the market. The study further distinguishes between two categories of innovation within each type: new to the firm and new to the industry innovations. The findings indicate that there are more differences than similarities between the antecedents of the two types of innovation. However, adopting either type of innovation increases the likelihood of simultaneously adopting the other.

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INTRODUCTION

The importance of innovation for economic growth and for the development of societies and firms is well established (e.g. Schumpeter, 1934). The field of innovation is very broad and a plethora of subfields and typologies have emerged. The invention and commercialization of new products is probably the type of innovation most widely studied by management and strategy scholars (e.g. Abernathy & Clark, 1985; Imai, Ikujiro & Takeuchi, 1985; Rogers, 2003; Urabe, Child & Kagono, 1988; Wolfe, 1994). But recently a new type of innovation, so-called management innovation, has attracted considerable attention (Birkinshaw, Hamel & Mol, 2008; Hamel, 2006; Mol & Birkinshaw, 2009). Management innovation is defined as the introduction of new management practices, processes, techniques or structures[10] that significantly alter the way the work of management is performed (Birkinshaw et al., 2008; Hamel, 2006). Examples of management innovations include the M-form at General Motors and Oticon's spaghetti organization (Chandler, 1962; Foss, 2003).

However, despite recent efforts our knowledge of management innovation remains limited and the differences and similarities between management innovation and other types of innovation are not yet well understood. Previous research has compared the determinants, processes and outcomes of product innovation to other types of innovation. For example, the comparison between product and process innovation is well known (Abernathy & Utterback, 1978; Damanpour & Aravind, 2006; Damanpour, 1991; Edquist, Hommen & McKelvey, 2001; Utterback & Abernathy, 1975). Also, Kimberly and Evanisko (1981) have compared technical innovation (encompassing both product and process types of innovation) to administrative innovation in the Hospital sector and found that the determinants of the two types of innovation differed(). However, the notion of administrative innovation in the study by Kimberly and Evanisko (1981) refers to innovations that are only indirectly related to the

[10] The term management practices is used to refer to both practices, processes, techniques and structures throughout the paper.

organization's basic work activity: "Administrative innovations, which in this study all involve the adoption of electronic data processing for a variety of internal information storage, retrieval, and analytical purposes, are only indirectly related to the basic work activity of the hospital and are more immediately related to its management" (p. 692). As such, administrative innovation is a broader concept not directly comparable to management innovation. For example, the adoption of electronic data processing technologies for internal purposes is considered an administrative innovation, but would not be regarded as a management innovation.

Damanpour and Evan (1984) defined administrative innovation in broader terms: "Administrative innovations are defined as those that occur in the social system of an organization. The social system here refers to the relationships among people who interact to accomplish a particular goal or task" (p. 394). While this notion may be closer to the concept of management innovation, it still has a broader emphasis than management. In more recent work, Edquist and colleagues (Edquist et al., 2001; Meeus & Edquist, 2006) have suggested integrating the earlier work on innovation typologies into an overall innovation taxonomy with two types of product innovation (goods and services) and two types of process innovation (technological and administrative). In this framework, I will suggest that management innovation can be regarded as a type of administrative process innovation.

It is important to study the differences between product innovation and management innovation. Not only because it has not been done before. But because product innovation and management innovation essentially differ in nature. Product innovation refers to new products or services offered on the market and, hence, are typically well defined, articulated and observable. Management innovation, on the other hand, refers to new ways of performing management activities within the organization. For example, new ways of coordinating, delegating, motivating and rewarding tasks. As such, management innovations are often more

systemic and may be associated with higher degrees of causal ambiguity and uncertainty for the adopting organization (Birkinshaw et al., 2008; Mol & Birkinshaw, 2007). Also, compared to product innovation, management innovations often involve reallocating decision rights and income rights and, hence, are more political (Foss, Pedersen, Pyndt & Schultz, 2011). These differences in nature are likely to also reflect differences in the causal mechanisms underlying the development and implementation of innovations as well as differences in the performance outcomes of the two types of innovation. A better understanding of the differences and similarities between different types of innovation serves at least two purposes. First, it will increase our understanding of the different innovation types, their drivers and, eventually, their consequences for the growth and development of both firms and societies. Second, it will increase our ability to make predictions about innovation performance and, hence, will assist decision makers in developing innovation strategies suited for the desired innovation outcomes.

The aim of this paper, thus, is to explore the antecedents of firms' decisions to adopt product innovation and management innovation, respectively. Specifically, the paper aims to investigate whether the determinants of management innovation also predictors of firms' adoption of product innovation. The paper builds on a framework based on the behavioral theory of the firm (Cyert & March, 1963; Pierce, Boerner & Teece, 2008) and explores how different internal determinants may be more or less important in explaining the different innovation outcomes outlined above. The paper is based on survey data collected among the 1,000 largest Danish firms (314 respondents) mapping their innovation activities during the years 2006-2009. The paper is structured as follows: First, previous research and findings in the field of management innovation and product innovation are briefly outlined. Then the theoretical approach adopted in this paper is introduced and a set of hypotheses is developed. Finally, the results are presented and implications for research and practice are discussed.

BACKGROUND

Based on a thorough review of the various definitions of innovation offered in multiple disciplines, Baregheh, Rowley & Sambrook (2009, p. 1334) suggest the following integrative definition of organizational innovation: "Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace". Wolfe (1994) has identified three major research streams in the innovation literature. First, the diffusion literature focuses on how specific innovations diffuse over time or across populations of firms, industries or countries. Second, process theories of innovation focus on the stages and increments that organizations go through during the implementation of innovations. Lastly, a stream of literature focuses on the determinants of innovation behavior at the firm level. This paper addresses the stream of literature investigating innovation determinants.

Damanpour (1991) defines product innovation as "new products or services introduced to meet an external user or market need" (p. 561). A thorough account of the many studies of product innovation lies beyond the purpose of this paper. However, the most widely studied determinants of product innovation include specialization, functional differentiation, professionalism, centralization, managerial attitudes toward change, knowledge resources, slack and communication (e.g. Damanpour & Aravind, 2006; Damanpour, 1991; Wolfe, 1994).

Past research has suggested that comparing different types of innovation is necessary for identifying and understanding the determinants of firms' adoption behavior (Damanpour & Aravind, 2006; Damanpour, 1987; Damanpour, Szabat & Evan, 1989; Downs & Mohr, 1976; Edquist et al., 2001; Knight, 1967). Different types of innovations influence the

adopting organization differently and imply potentially different causal mechanisms and decision making processes (Aiken, Bacharach & French, 1980; Daft, 1978; Damanpour, 1991). For example, Daft (1978) introduced a dual-core model of innovation suggesting that technical innovations are facilitated by bottom-up factors such as low formalization and low centralization, whereas innovations pertaining to the administrative core of an organization are more likely to develop through a top-down process enhanced by the inverse organizational characteristics, i.e. high formalization and high centralization. Also, Damanpour (1987) finds that e.g. specialization and slack have stronger effects on technical than on administrative innovations.

Although administrative innovations have been investigated in earlier studies, the more narrowly defined field of management innovation has been introduced only a few years ago. Hence, no empirical studies have yet compared management innovation to other innovation types. For that reason, we know little about how determinants of management innovation and product innovation differ or whether the two types of innovation vary in their beneficial consequences for firm performance or for the economic growth of societies.

A number of detailed accounts of the origins and diffusion of specific management innovations exist. For example, Chandler's (1962) well known accounts of the emergence of the multidivisional form at Du Pont and General Motors. Also, a stream of literature has studied how new practices and management fashions diffuse over time and across populations of firms and industries (Abrahamson, 1991; Abrahamson & Fairchild, 1999; Ansari, Fiss & Zajac, 2010; Ehigie & McAndrew, 2005; Fligstein, 1985; Guler, Guillén & Macpherson, 2002; Kogut & Parkinson, 1993; O'Mahoney, 2007; Rogers, 2003; Teece, 1980). Nevertheless, the interest in the determinants of management innovation from a firm-level perspective has been pioneered in recent work, most notably in work by Gary Hamel, Michael

Mol and Julian Birkinshaw (e.g. Birkinshaw et al., 2008; Birkinshaw & Mol, 2006; Hamel, 2006, 2007a, 2007b; Mol & Birkinshaw, 2009, 2007).

As mentioned, management innovation is defined as the introduction of new management practices, processes, techniques or structures that significantly alter the way the work of management is performed (Birkinshaw et al., 2008; Hamel, 2006). Within this broad definition of management innovation, two streams of literature can be distinguished. The first focuses on management practices that are new to the state of the art (e.g. Birkinshaw et al., 2008), while the second investigates innovations that are new to the adopting organization (e.g. Mol & Birkinshaw, 2009).

For example, Mol and Birkinshaw (2009) studied new to the firm management innovations and tested a number of hypotheses derived from reference group literature. They found that firm size, education levels, market scope and use of knowledge sources predicted the number of new management practices adopted by firms. They also found that management innovation was associated with subsequent productivity growth. However, few studies have compared new to the firm and new to the industry or the state of the art. In general, few studies have empirically measured new to the industry innovations. The present paper attempts to bridge this gap in the literature by measuring management and product innovation at both new to the firm and new to the industry level.

In recent work, Harder (2011a; 2011b) introduced a conceptual model outlining the causes of firm-level management innovation. The model builds on modern interpretations of the behavioral theory of the firm (see e.g. Argote & Greve, 2007; Pierce et al., 2008; Pitelis, 2007) and posits that an organization's propensity to introduce management innovations depends on its diagnostic and implementation capabilities. These two concepts refer to the

ability to diagnose opportunities and problems and to develop and implement managerial solutions in response.

Specifically, diagnostic capability refers to the ability of an organization to recognize the locus of a perceived problem or an opportunity for improved performance and to develop management solutions that either solve the problem or exploit the opportunity. Implementation capability, on the other hand, refers to the ability of the organization to manage the transition process associated with implementing new management practices. As such, diagnostic and implementation capability share some commonalities with Teece's (2007) notion of sensing and seizing opportunities and March's (1991; 1996; 2006) concepts of exploration and exploitation. Nevertheless, diagnostic capability and implementation capability are understood as dynamics specifically related to management innovation.

This framework obviously was developed with the intention of explaining the antecedents of management innovation. However, in this paper the notion of diagnostic capability and implementation capability will be used as an organizing framework to investigate whether a number of variables that are thought to influence management innovation are also determinants of product innovation. As such, hypotheses are derived based on behavioral theory of the firm and categorized as pertaining to one of the two capabilities (see figure 1 below).

THEORETICAL DEVELOPMENT

The theoretical framework for this study is based on the behavioral theory of the firm (Cyert & March, 1963; March & Simon, 1958; Pierce et al., 2008; Simon, 1997, 1955). The behavioral theory of the firm (BTF) integrates perspectives from economics, sociology, social psychology and political science in order to provide a nuanced understanding of the behavior of firms. Specifically, BTF differs from the previously dominant neo-classical perspectives by

looking inside the "black box". As such, BTF provides a framework for analyzing the internal dynamics that lead firms to act in ways that may sometimes seem irrational from the outside.

BTF views the firm as a boundedly rational, adaptive and learning organization characterized by internal goal conflicts, asymmetric information and path dependency (Cyert & March, 1963). The work of Cyert and March (1963) has been hugely influential in strategic management research and many modern theories of strategy and firm behavior have incorporated the assumptions presented in BTF (Argote & Greve, 2007; Pierce et al., 2008). The original work by Cyert and March (1963) focused primarily on understanding and describing how firms actually behave and make decisions. Implications for how managers may seek to improve or change firm behavior have been elaborated on in work by others. For example, contributions based on the resource based (Barney, 1991, 1996; Penrose, 1959; Wernerfelt, 1984) and dynamic capabilities (Pierce et al., 2008; Teece, Pisano & Shuen, 1997; Teece, 2007; Winter, 2003) views have emphasized how heterogeneous internal resources, routines and capabilities can be exploited to build and sustain competitive advantages. Resource based theories and dynamic capabilities share the basic assumptions about firm behavior with BTF and can, thus, be regarded as part of a wider behavioral theory tradition in strategic management research (Argote & Greve, 2007; Pierce et al., 2008).

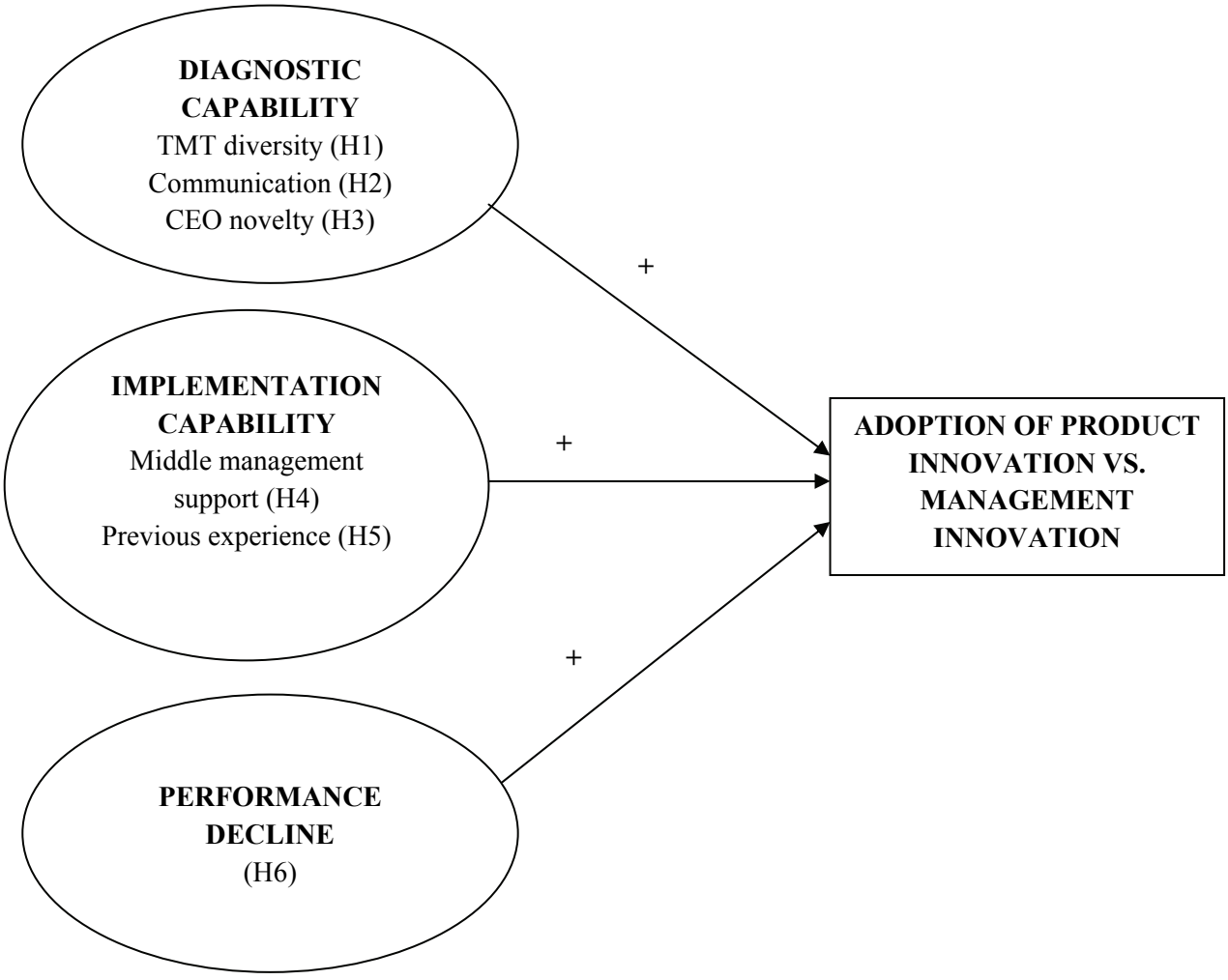
In the present paper, hypotheses are proposed based on a combination of the above mentioned theories. Since the main purpose of the paper is to understand the determinants of a firm's decision to innovate, behavioral theory offers a useful and relevant frame for the analysis. A summary of the overall conceptual model is presented in figure 1.

HYPOTHESES

As already mentioned, the variables measuring internal antecedents of innovation in the present paper fall into two categories and the analysis is structured accordingly. The variables

that are mainly concerned with the ability of the firm to recognize opportunities or problems and to develop solutions in response are addressed under the label of diagnostic capability. On the other hand, the variables that mainly involve the ability of the firm to manage the transition process from one organizational setup to another are addressed under the label of implementation capability. The concepts of diagnostic capability and implementation capability relate to the management innovation behavior of firms, but is used as an organizing framework in this study in order to compare determinants of management and product innovation.

Figure 1. Overall conceptual model



Diagnostic Capability

The concept of diagnostic capability is based on the notion that firms perceive their environment through an organizational filter (Helfat & Peteraf, 2010; Pitelis, 2007; Teece, 2007; Walsh, 1995). In contrast to the neo-classical assumptions of continuous scanning of information and perfect environmental matching, behavioral theory acknowledges that the information processing capabilities of individuals and firms are limited (Cyert & March, 1963; March & Simon, 1958; Ocasio, 1997). In other words, individuals and firms are not able to monitor and absorb all the available information inside and outside the organization and, hence, firms will rarely be in perfect alignment with their environments. A number of internal factors influence the attention and search behavior of firms, the decision alternatives that are taken into consideration and, eventually, the actual and observable behavior (Ocasio, 1997; Peteraf & Reed, 2007; Simon, 1947). These factors constitute an organizational filter which moderates the strategic behavior of firms. The part of the organizational filter that pertains to the ability of firms to recognize opportunities or problems and develop managerial solutions in response is regarded as a firm's diagnostic capability.

Factors that go into the diagnostic capability of firms include the backgrounds, beliefs, attitudes and cognitive ability of managers as well as organizational resources such as workforce characteristics, access to knowledge sources, reward structures and communication flows in the organization (Cyert & March, 1963; Hambrick & Mason, 1984; Helfat & Peteraf, 2010; Håkonsson, Obel & Burton, 2008; Knudsen & Levinthal, 2007; Ocasio, 1997). As such, a number of factors are likely to be part of an organizations diagnostic capability. Disentangling these factors and measuring diagnostic capability as a latent variable lies beyond the purpose of this paper. Instead, the influence of a number of factors that are likely to be part of a firm's diagnostic capability are studied individually.

Top management team (TMT) diversity is one factor that is likely to influence the adoption of innovations in firms. The importance of top managers' cognitive abilities, attitudes and beliefs for a number of organizational outcomes is well established in strategic management research (e.g. Bantel & Jackson, 1989; Boeker, 1997; Damanpour & Schneider, 2006; Hambrick & Mason, 1984; Santos & Garcia, 2006; Stjernberg & Philips, 1993). The perception, beliefs and experiences of top managers are important parts of the attention structure of an organization and, therefore, influence the allocation of time, effort and attentional focus in decision making processes (Ocasio, 1997). Top managers also are in a special position to influence the aspiration levels, search behaviors and routines adopted throughout an organization (Cyert & March, 1963). Finally, top managers will often be in a position to initiate, terminate or eventually approve the adoption of innovations. In the words of Chandler (1962): "Although the enterprise undoubtedly had a life of its own above and beyond that of its individual executives, although technological and market requirements certainly set boundaries and limits to growth, nevertheless, its health and effectiveness in carrying out its basic economic functions depended almost entirely on the talents of its administrators" (p. 384).

The more diverse the backgrounds, experiences and education of the top management team, the more diverse are the knowledge sources and perspectives available to decision makers. The diversity of ideas and perspectives may then influence the direction of search, the alternatives that are considered and eventually the innovation behavior of the organization. The exposure to different knowledge sources and perspectives is also likely to foster idea cross-fertilization of and, thus, increases the likelihood of innovating. Since the top management team represents the administrative core of an organization, this determinant could be expected to have a stronger influence on management innovation than product innovation (Daft, 1978; Damanpour, 1987).

Hypothesis 1: TMT diversity of an organization increases the likelihood of implementing management innovations and product innovations.

In all hypotheses, management innovation and product innovation refer to both new-to-the-firm and new-to-the-industry innovations. Since new-to-the-industry management innovation has not been subject to empirical studies before, little is known about the differences between new to the firm and new to the industry innovations. Also, no studies have previously compared management innovation and product innovation. Hence, an open-ended formulation of hypothesis has been adopted in this paper.

Richness and frequency of internal communication is generally found to promote organizational innovativeness. For example, a meta-analysis of the determinants of organizational innovation found a statistically significant correlation for internal communication (Damanpour, 1991). In the studies included in the meta-analysis internal communication was measured in different ways, e.g. referring to the number of committees, the frequency of committee meetings, the number of face-to-face contacts between people at different levels of the organization or to the degree to which units share decisions.

The notion that communication promotes innovation stems from research linking the diffusion of ideas and information to new knowledge creation (Gupta & Govindarajan, 2000; Jassawalla & Sashittal, 2000; Nonaka & Takeuchi, 1995). For example, Nonaka and Takeuchi (1995) introduced the now well known spiral model in which knowledge creation is viewed as a continuous process of articulating, combining, internalizing and sharing ideas. Hence, as individuals communicate, diffuse and combine their knowledge and ideas, new valuable knowledge is likely to be created. Internal communication, therefore, is an important driver of learning (Argyris, 1977; Zollo & Winter, 2002) as well as organizational self-renewal and

innovation (Allen, Lee & Tushman, 1980; Nonaka & Yamanouchi, 1989; Rothwell & Robertson, 1973).

Communication may also increase the likelihood of innovating in a more direct manner. The more rich and frequent internal communication, the faster information about new opportunities or problems will spread throughout the organization. According to the behavioral assumption of problemistic search, organizational members search for potential solutions inside the organization before exploring information from other sources (Cyert & March, 1963). As such, communication will increase the effectiveness of organizational members' search behavior, since individuals are more likely to be exposed to information about new opportunities and relevant knowledge residing in other business units or departments (Hansen, 2002). Likewise, studies have found that the absence of effective internal communication is a major barrier to the development of new technology based products (Gupta & Wilemon, 1990).

Therefore, rich communication flows are likely to increase the diagnostic capability of a firm by exposing employees to new ideas, giving them access to valuable knowledge in other parts of the organization and fostering cross-fertilization of ideas (Jassawalla & Sashittal, 2000). According to a dual core logic (Daft, 1978), communication richness may be expected to have a more important influence on product innovation than on management innovation, since technical innovations are expected to arise out of a bottom-up process. Communication richness at least to some extent represents a decentralized or bottom up approach to innovation.

Hypothesis 2: Rich internal communication flows in an organization increase the likelihood of implementing management innovations and product innovations.

As already discussed, the chief executive officer (CEO) is in a special position to exercise influence on the strategies and behaviors of a firm. Therefore, CEO succession may have significant influence on an organization and can be a trigger for organizational change. The longer a CEO has been in office, the more routines and operating procedures of an organization tend to stabilize and large structural or strategic changes become less likely. Therefore, CEO tenure can lead to strategic myopia, internal resistance, vested interests and organizational inertia (Hannan & Freeman, 1984; Romanelli & Tushman, 1994; Tushman & O'Reilly III, 1996). In fact, Miller (1991) found that CEO tenure correlates with lower levels of "match" between an organization and its environment. Therefore, CEO succession may constitute an opportunity to overcome organizational inertia and a number of studies have documented that CEO succession indeed increases the likelihood of strategic and structural changes (e.g. Carlson, 1961; Denis & Denis, 1995; Helmich & Brown, 1972; Meyer, 1975).

Also, CEO succession may be important for organizational change from a power dependency perspective. Over time, the prevailing power distribution tends to become institutionalized, since power holders resist changes that undermine their influence (Pfeffer & Salancik, 1978; Salancik & Pfeffer, 1977). CEO succession offers an opportunity for existing power distributions to be altered and new strategic perspectives to be introduced (Shen & Cannella, 2002).

Finally, CEO succession may be a mechanism for organizational learning (Tushman & O'Reilly III, 1996; Virany et al., 1992). As such, the shift of top executive can facilitate so called second order or double-loop learning (Argyris, 1977; Weick, 1979; Weick & Roberts, 1993), which would otherwise be held back by inertia and path dependency.

In summary, recent CEO succession may bring in new managerial perspectives and is likely to assist an organization in overcoming inertia, political resistance and institutionalized

power dependencies. Since new-to-the-industry innovations require higher degrees of novelty and involve more risk than new-to-the-firm innovations, CEO novelty may be especially important for new-to-the-industry product and management innovations. Based on the findings of e.g. Daft (1978), CEO novelty could be expected to exert the most important influence on management rather than product innovation, since the top executive succession first and foremost constitutes a change in the administrative core of the organization. Nevertheless, CEO novelty is expected to positively influence the likelihood of adopting both management and product innovation.

Hypothesis 3: CEO novelty increases the likelihood of implementing management innovations and product innovations.

Implementation Capability

While diagnostic capability refers to the ability to recognize opportunities or problems and to come up with innovative solutions in response, implementation capability refers to the ability of firms to actually implement the new discovery. Implementation capability does not in itself lead to innovation, but it is a prerequisite for the successful exploitation of innovation opportunities. Nevertheless, firms possessing high levels of diagnostic capability are not necessarily very capable of managing the transition process from idea to practice. In fact, the organizational processes associated with idea generation on the one hand and implementation or commercialization on the other may even work against each other. Idea generation, experimentation and exploration are typically associated with decentralized, informal bottom-up processes, whereas effective implementation is associated with more controlled, formalized top-down processes (Birkinshaw et al., 2008; Gibson & Birkinshaw, 2004; Greenwood & Hinings, 1996; March, 1996; Teece, 2007). Implementation may also require a different skill-set and entail higher human costs in the form of changes in work procedures

and shifts in the distribution of decision and income rights (Greenwood & Hinings, 1993, 1996). In this regard, invention and implementation are two distinct organizational processes.

Management innovations are often associated with large changes to the organizational setup, e.g. delegation of tasks, reward structures, and coordination. However, product innovations may also be associated with substantial changes primarily to the technical core of the organization but also to its administrative procedures, since the technical and social structures of an organization are interdependent. For example, changes in production technologies tend to influence how work is organized and tasks are coordinated (Cummings & Srivaste, 1977; Daft, 1978; Trist & Murrey, 1993). Therefore, implementation capability is relevant for both product and management innovation. However, the influence of implementation capability is likely to be greater for management innovations, since they involve more direct changes to the management systems and organizational setup than do product innovations. In this study, two elements of firms' implementation capability are studied; middle management support of change and previous experience with large organizational changes.

The organizational changes associated with innovating are inevitably perceived as stressful and are likely to cause uncertainty for organizational members. Although people exhibit different levels of risk aversion, studies in sociology and social psychology find that most people have a natural tendency to resist changes (Agócs, 1997; Ford, Ford & McNamara, 2002; Giangreco & Peccei, 2005; Meyer & Stensaker, 2006; Meyer et al., 2007; Oreg, 2003; Reger et al., 1994; Reichers et al., 1997; Strebel, 1996). Resistance to change may also stem from institutionalized values, norms or power structures (Greenwood & Hinings, 1996). Powerful coalitions or individuals tend to protect their authority by implementing procedures and formalized structures that buffer themselves and the organization against change (Pfeffer, 1981, 1992; Salancik & Pfeffer, 1977). This sort of

barrier to change may be particularly important for management innovation, since new management practices or structures will almost inevitably shift the balance of power within the organization and hence may be perceived as a threat to current power holders. Nevertheless, product innovations may also influence the distribution of power, since new products may render previously critical resources or competences obsolete and, as such, diminish the power of the people in control of those resources. Therefore, the support of middle managers may be crucial for the successful implementation of both product and management innovations.

Hypothesis 4: Middle management support of change increases the likelihood of implementing management innovations and product innovations.

As individuals we learn from our experiences. So do firms. Therefore, having prior experience with implementing organizational changes is likely to make firms more able to manage the process of organizational transition associated with future innovation projects. According to Cyert and March (1963), firms use standard operating procedures, decision rules and aspiration levels as a sort of organizational memory reflecting prior experiences. As firms gain experience with organizational changes, procedures are slowly adapted thereby improving the ability of the firm to manage future implementation processes. Similarly, Nelson and Winter (1982) argue that the knowledge gathered in previous experience is stored in organizational routines. These routines, then, allow firms to replicate successful behaviors.

From a resource based perspective, past experience with change is likely to improve the skills and routines that support the implementation of changes. The more a firm has experience with implementing large changes, the more likely it is to possess the necessary knowledge and competences to manage other change projects in the future (Barney, 1996; Teece, 2007). Empirical studies have also confirmed that firms that are experienced in

implementing changes are indeed more likely to adopt additional changes. For example, Amburgey, Kelly and Barnett (1993) found that companies with a recent history of change are more likely to attempt further change. Therefore, this paper argues that firms with a recent history of large organizational changes are more likely to have developed skills and routines supportive of the transition process associated with either product or management innovation. Due to the more political nature of management innovation, experience with change may be more important for management than for product innovation.

Hypothesis 5: Previous experience with implementing large organizational changes increases the likelihood of implementing management innovations and product innovations.

Performance Decline

It is a common assumption that an important driver of changes in firms are changes in their external environments (e.g. Damanpour & Evan, 1984; Drazin et al., 2004; Scott, 1995; Tushman & Anderson, 1986; Tushman & Rosenkopf, 1996). Chandler (1962), for example, illustrated how the diversification strategies of large American corporations led to the need for structural and administrative reorganization to meet the needs of the quite different markets, which in turn drove the development of the multidivisional form at DuPont and General Motors. In the 1989 edition of his famous book, Chandler writes: "As a relatively young historian, I had developed an interest in the beginnings and evolution of modern large-scale organizations, in how and why they altered their operating structures. For I had learned that historically administrators rarely changed their daily routine or altered positions of power except under the strongest pressures" (p. 1).

Likewise, institutional theory has formulated the idea that firms due to inertia and path dependencies are most likely to implement radical changes and innovations only when

confronted with severe pressures or exogenous changes such as performance crises or CEO succession (Drazin et al., 2004; Romanelli, 1991; Romanelli & Tushman, 1994; Scott, 1995).

The behavioral theory of the firm contests the typical neo-classic assumption of perfect environmental matching. In other words, the idea that firms are able to continuously scan all possible decision alternatives and chose the value maximizing response to any problem or opportunity. Due to bounded rationality of decision makers and the presence of internal goal conflicts, BTF suggests that firms make satisficing rather than optimizing decisions (Cyert & March, 1963; Simon, 1947). Nevertheless, change is problem driven. Failure to meet aspiration levels triggers the search process. Therefore, the severity of the initial problem is likely to influence the nature of the chosen solution. For example, Birkinshaw et al. (2008) argue that novel problems are necessary preconditions for novel solutions.

In accordance with the principle of simple minded search and satisficing as the decision criteria, firms are likely to adopt simple, off-the-shelf, innovations if such innovations could resolve the perceived problem (Birkinshaw et al., 2008; Cyert & March, 1963; Pitelis, 2007). According to this principle, organizational members will initially search for solutions to perceived problems in the neighborhood of the problem area. Conversely, firms are more likely to experiment with the development of own, new to the industry, innovations, when the problems facing the organization are so severe that simpler solutions are inadequate (Birkinshaw et al., 2008; Wiseman & Bromiley, 1996).

Hypothesis 6: Performance decline increases the likelihood of implementing management innovations and product innovations.

DATA AND METHODS

The Management Innovation Survey conducted as part of this study has been developed at the Center for Strategic Management and Globalization at Copenhagen Business School.

The overall structure of the survey is similar to the Community Innovation Survey (CIS), which is a European wide survey measuring product and process innovation. The CIS was developed on initiative of the European Union and has been executed by national statistical offices throughout the EU six times since 1992. The survey has been incrementally improved and refined during the years and a large number of papers have been published using CIS data (e.g. Battisti & Stoneman, 2010; Evangelista et al., 1997; Frenz & Ietto-Gillies, 2009; Laursen & Salter, 2006). The CIS includes measures on changes in business practices and structures, which have been used by e.g. Mol and Birkinshaw (2009) in their studies of new-to-the-firm management innovation. However, the CIS measures are very crude proxies for management innovation. These surveys only report changes to structures, policies and practices, but do not require alterations to be new to the adopting organization. New to the industry management innovations are not included at all. Hence, the CIS measures have weak content validity if used in management innovation studies. Also, CIS data lacks a number of the firm level variables of interest to this study. Therefore, the Management Innovation Survey was conducted in order to refine and improve the innovation measures used in the CIS thereby allowing for more adequate measures of management innovation.

The sample of firms was derived from the Danish CD-direct database, which contains detailed public information on all Danish enterprises. The survey was sent to CEOs of the 1,051 largest Danish firms and the data was collected during the fall of 2009. The selection was done based on number of full-time employees and include all firms with more than 150 employees in 2008. 314 firms responded corresponding to a response rate of 29.9%. The survey was conducted online and respondents received a postal invitation with a unique login and password for the website. All non-respondents received a postal reminder and were subsequently contacted via telephone. When it was not possible to reach the respondent, interviewers asked for a direct e-mail address and follow up e-mails with a link to the survey

were sent. The survey was sent to CEOs but other members of the top management team were also allowed to answer.

In order to reduce the risk of common method bias, data regarding the performance decline variable was collected using archival data from the CD-direct database. This ensured that all measures in the survey were not collected from the same source. Furthermore, most of the questions used in this study are based on factual data that is at least in principle verifiable from other sources. For example, previous experience with large organizational changes, CEO novelty and composition of the top management team. This type of items reduces the risk of bias in the sample compared to e.g. self-reported items based on the respondent's perception or attitudes (Podsakoff & Organ, 1986). Finally, a factor analysis, the Harman's one-factor test, did not indicate common method variance (Podsakoff & Organ, 1986). Two-group mean comparison tests were used to test for non-response bias and indicated no significant differences between respondents and non-respondents when comparing relevant variables such as industry affiliations and company size.

Since the majority of firms in the sample have adopted both management innovations and product innovation during 2006-2009, entering both types of innovation in one regression would give little variance in the two separate outcomes of interest (see table 1 for an overview of the distribution of management innovation vis-à-vis product innovation in the sample). In order to avoid having most observations in the "both types of innovation" group, I conducted two separate multinomial regressions for each of the innovation types. This also allowed for distinguishing between new to the firm and new to the industry innovation without splitting the sample in overly small categories. The multinomial logit model (MNLM) simultaneously estimates binary logits for all comparisons among the alternatives and, hence, allows for comparing different outcomes of categorical dependent variables.

Table 1. Frequencies of innovation types in the sample

	Frequency	Percent	Cum.
No innovation	13	5.73	5.73
Product innovation	9	3.96	9.69
Management innovation	30	13.22	22.91
Both	175	77.09	100.00
Total	227	100.00	

Measures

Management innovation. Respondents were asked "During the years 2006-2009, did your firm introduce any significant changes to the organizational structure of your firm?" and "During the years 2006-2009, did your firm implement any new or significantly altered management practices, processes or techniques?". For each question, the respondents were given three response alternatives: a) "Yes, changes to the organizational structure were new to the industry", b) "Yes, changes to the organizational structure were only new to the firm", or c) "No". The scale is coded as a categorical variable with three outcome variables: 1) no innovation, 2) new to the firm innovation and 3) new to the industry innovation. See table 2 for an illustration of the outcome categories.

Table 2. Management innovation outcome categories

Management innovation outcome categories		**Structures**		
		No innovation	New-to-the-firm	New-to-the-industry
Practices	No innovation	1	2	3
	New-to-the-firm	2	2	3
	New-to-the-industry	3	3	3

Product innovation. Respondents were asked the following question: "During the years 2006-2009, did your firm introduce any new or significantly improved goods or services?". Respondents were given three response alternatives: a) "Yes, new to the market (your firm introduced new products or services onto your market before your competitors)", b) "Yes, only new to the firm (your firm introduced new products or services that were already available from your competitors)", or 3) "No". This item is identical to the measure used for product innovation in the Community Innovation Survey. The product innovation variable, then, is coded as a categorical variable with three values: 1) no innovation, 2) new to the firm innovation, and 3) new to the market innovation.

Top management team diversity. This measure is based on a multi-item scale with three items adapted from Campion, Medsker & Higgs (1993). Respondents were asked "To what extent do the following statements accurately describe the composition of your firm's top management team?". (1) The members of the top management team vary widely in their areas of expertise, (2) The members of the top management team have a variety of different backgrounds, and (3) The members of the top management team have a variety of different experiences. Responses were reported on a 7 point Likert scale ranging from 1 (not accurately at all) to 7 (very accurately). The scale has an alpha coefficient of 0.81.

Communication. The measure of communication flows indicates the top manager's perception of the richness of communication and collaboration in the firm. The measure is a multi-item scale and respondents were asked to indicate based on their personal experience to what extent the following statements accurately describe the communication climate in the organization: (1) The communication across departments is rich and plentiful, (2) Departments are often skeptical about information received from other departments (reverse-coded), (3) The communication across levels of the organization is rich and plentiful, (4) Inter-disciplinary and cross-departmental collaboration on tasks and activities is widespread,

and (5) Formal channels of communication, e.g. company blogs, newsletters, intranet and databases, are plentiful and widely used. Responses were recorded on a scale from 1 (not accurate at all) to 7 (very accurate). The scale has an alpha coefficient of 0.73.

CEO novelty. CEO novelty indicates the number of years the current CEO has been in office. The measure is reverse-coded so that a higher number indicates a more recent CEO succession, i.e. a higher degree of novelty.

Previous experience. This measure indicates the extent to which firms have recent experience with implementing large organizational changes. Respondents were asked to indicate their experience with organizational changes in the three year period prior to the time period measuring management innovation in the present study: "During the three years *2003-2005*, did your company implement large organizational changes (e.g. mergers or acquisitions, large restructurings etc.)?". Responses were recorded on a scale from 1 (not at all) to 7 (many large changes).

Middle-management support. This measure is a multi-item scale reflecting the attitudes and behaviors of middle managers when faced with organizational changes. The measure is based on the perception of the CEO. Inspired by measures used by Burton et al. (2002) and Agócs (1997), respondents were asked "In your experience with previous organizational changes, how do middle managers in your firm respond to change?". Respondents were asked to indicate the accuracy of four items on a 7 point Likert scale ranging from 1 (not accurate at all) to 7 (very accurate). The items were: (1) They generally acknowledge the need for change, (2) They are often reluctant to implement changes that have been agreed to (reverse-coded), (3) They accept responsibility for dealing with change issues, and (4) They sometimes act to dismantle changes that have been initiated (reverse-coded). The multi-item scale has an alpha coefficient of 0.7.

Performance decline. Performance decline is measured as the percentage change in a firm's return on equity (net profit divided by equity) from the financial year 2004 compared to 2006 based on data from the Danish CD-Direct database. The measure is calculated so that a larger measure indicates a larger performance decline, i.e. (ROE 2006-ROE 2004)/ROE 2004*(-1). The years 2004 and 2006 are chosen to reflect the time period prior to the main period of interest in the study, namely the years 2006-2009. This reflects an expected time lag between the perceived performance shortfall and a change in the outcome variable; i.e. pervasiveness of adopted management innovations. A firm's financial performance obviously does not fully reflect the strategic aspirations of an organization. Nevertheless, since a range of factors influence the extent to which performance is perceived to meet aspirations, a financial measure is chosen as a crude proxy for performance shortfall. Another option could have been to ask for CEOs' perception of previous firm performance. However, the ability of respondents to accurately report their perception and performance 3-5 years ago is questionable. Also, this approach would raise serious issues of both social desirability and common method bias, since that would make CEOs the source of information for the dependent as well as independent variables (Furnham, 1986; Moorman & Podsakoff, 1992; Podsakoff & Organ, 1986; Spector, 2006).

Control variables. Four control variables were included in order to test for possible alternative explanations. First, firm size measured as the logarithm of the number of employees in 2009 was included, since larger organizations may possess more resources for R&D, organizational development and other innovation related activities. Second, an industry dummy distinguishing between service industries (coded as 1) and manufacturing industries (zeros) was included to account for potential industry effects. Third, a dummy measuring whether a firm is part of an enterprise group or not was included, since firms that are part of enterprise groups may have access to more innovation related knowledge sources and assets.

Finally, since the majority of firms in the sample had implemented both management and product innovation, a dummy measuring adoption of the other type of innovation was included in each regression in order to control for the effects of the other innovation type. For example, in the regression for management innovation, a product innovation dummy is included. The dummies are coded as: 0) no innovation and 1) new to the firm or new to the industry/market innovation.

RESULTS

The means, standard deviations and correlations between the variables in the study are reported in table 3. The survey examines the introduction of two types of innovation. As illustrated in table 1, roughly 6% of firms had adopted no innovations in the period 2006-2009. 4% had implemented only product innovations, 13% had implemented only management innovations and 77% had implemented both types of innovation. The regression results for the industry dummy variable (table 4) indicate that manufacturing industries have a higher rate of innovation across all categories than service industries. Also, the size of a firm is positively associated with the likelihood of adopting new to the firm management innovation and new to the industry product innovation. Finally, the dummies entered to represent the opposite innovation type indicate that adoption of either category of innovation increases the likelihood of simultaneously adopting the other.

Table 3. Means, standard deviations and correlations between variables

	Mean	Std.	1	2	3	4	5	6	7	8	9	10	11
1. Management innovation	2.18	0.58	1.00										
2. Product innovation	2.35	0.78	0.37	1.00									
3. Performance decline	0.77	21.30	0.07	-0.09	1.00								
4. Communication	4.49	0.96	0.05	0.26	0.07	1.00							
5. TMT diversity	5.52	1.14	0.20	0.18	-0.17	0.06	1.00						
6. Middle management support	4.56	0.95	0.01	0.12	0.03	0.28	-0.09	1.00					
7. Previous experience	4.19	2.17	0.11	0.23	-0.13	-0.03	0.12	-0.14	1.00				
8. CEO novelty	43.38	8.54	0.21	0.16	-0.17	-0.05	0.15	0.02	0.11	1.00			
9. Size	5.89	1.31	0.07	0.19	0.07	0.04	-0.03	-0.01	0.17	-0.01	1.00		
10. Industry dummy	0.33	0.47	-0.02	-0.03	-0.03	0.04	-0.11	0.05	-0.05	-0.10	-0.04	1.00	
11. Group dummy	1.71	0.46	0.03	0.10	-0.05	-0.03	0.06	0.05	0.04	0.25	0.01	-0.12	1.00

The determinants of firms' innovation behavior are examined using multinomial logistic regression and the results for hypotheses 1-6 are displayed in table 4. The overall model is highly significant ($p<0.001$) and the pseudo R-squared is 0.14 and 0.15 respectively. The table shows the regression coefficients indicating the effect of the independent variables on the likelihood of obtaining each of the two innovation outcomes as compared to the base outcome (no innovation).

Hypothesis 1 stating that TMT diversity has a positive effect on the likelihood of innovating is supported in the data. However, the effect differs for management and product innovations, respectively. Top management team diversity increases the likelihood of implementing new to the industry management innovations, while it has no significant effect on new to the firm management innovation. For product innovation the opposite applies. TMT diversity seems to increase the likelihood of implementing new to the firm product innovation, while the effect on new to the industry product innovation is only significant at the 0.10 level. For the truly novel innovations (new to the industry), this seems to confirm the dual core logic stating that innovations in the administrative core of an organization are more driven by top-down processes than are product innovation. However, this does not explain

why TMT diversity increases the likelihood of new to the firm product innovation, while not significantly influencing new to the firm management innovation.

Table 4. Regression results

Results of multinomial regressions predicting managememt innovation and product innovation (baseoutcome = no innovation)

Management innovation			Product innovation		
	New to the firm	New to the industry		New to the firm	New to the industry
Performance decline	0.00	0.02***	**Performance decline**	-0.01	-0.01
	(0.58)	(0.00)		(0.14)	(0.11)
Communication	-0.27	-0.28	**Communication**	0.29	0.77**
	(0.31)	(0.36)		(0.35)	(0.01)
TMT diversity	0.18	0.46*	**TMT diversity**	0.57*	0.44'
	(0.35)	(0.04)		(0.01)	(0.05)
Middle management support	0.18	0.08	**Middle management support**	0.39	0.40
	(0.40)	(0.75)		(0.26)	(0.26)
Previous experience	-0.03	0.05	**Previous experience**	0.14	0.29*
	(0.82)	(0.71)		(0.27)	(0.02)
CEO novelty	0.06'	0.10**	**CEO novelty**	0.02	0.02
	(0.05)	(0.01)		(0.46)	(0.32)
Size	0.64*	0.43	**Size**	0.33	0.42*
	(0.02)	(0.16)		(0.13)	(0.04)
Industry dummy	-0.41	0.10	**Industry dummy**	-0.28	-0.00
	(0.47)	(0.87)		(0.57)	(0.10)
Group dummy	-1.34'	-1.00	**Group dummy**	-0.53	0.24
	(0.09)	(0.23)		(0.27)	(0.61)
Product innovation dummy	1.42*	2.40**	**Management innovation dummy**	1.57*	1.78**
	(0.01)	(0.00)		(0.03)	(0.00)
Constant	-2.92	-7.33*	**Constant**	-9.26**	-12.97***
	(0.22)	(0.02)		(0.00)	(0.00)
Wald (chi2)	47,81		Wald (chi2)	51.00	
Pseudo R-squared	0.14***		Pseudo R-squared	0.15***	
Observations	203	203	Observations	203	203

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, 'p<0.1

Hypothesis 2 is partly supported in the data. Richness of communication has a significant impact on the likelihood of implementing new to the industry product innovation but has no significant effect on the other categories of innovation. While a positive relationship between communication and all innovation outcomes was expected, the fact that

the most important influence seems to be on new to the firm product innovation may support the assumption that product innovation more than management innovation arises out of dispersed, bottom up processes in the organization (Daft, 1978; Damanpour, 1987).

Hypothesis 3 regarding CEO novelty is also partly supported. In this sample, CEO novelty significantly increases the likelihood of new to the industry management innovation, while the effect on new to the firm management innovation is significant at the 0.10 level. On the other hand, there is no significant influence on product innovation. This, again, may indicate that management innovation to a higher extent than product innovation grow out of top-down processes and hence are more influenced by changes at the executive level.

Overall, results for the three first hypotheses indicate that the factors involved in firms' ability to recognize, diagnose and develop innovative solutions in the management and product domains, respectively, cannot be assumed to simultaneously support both types of innovations. In fact, only TMT diversity influences both types of innovation. In a world with scarce resources, this may indicate a trade-off between pursuing a management innovation or product innovation strategy.

When examining the implementation capability variables, hypothesis 5 stipulating that middle management support increases the likelihood of innovating is not supported in the data. Similarly, there is only weak support in the data for hypothesis 6. Previous experience with large organizational changes only significantly influence the likelihood of implementing new to the industry product innovation. Since management innovations generally affect the administrative structures and work routines of an organization more directly than product innovations do, it was discussed that the variables pertaining to implementation capability (hypothesis 5 and 6) would have a more significant effect on management innovation than on product innovation. However, this could not be confirmed in the data.

Finally, hypothesis 6 is partly supported, since performance decline increases the likelihood of implementing new to the industry management innovation. However, performance decline in this sample does not have a significant effect on any of the other innovation outcomes. The implications of these findings will be discussed in the following section.

CONCLUDING DISCUSSION

Overall, the findings indicate that the behavioral theory of the firm (Cyert & March, 1963; Pierce et al., 2008) is a relevant theoretical framework for analyzing management and product innovations. Although the results are mixed, the concepts of diagnostic and implementation capability has also proved a useful framework for a discussion of innovation determinants. However, clearly more empirical and theoretical clarification is needed in order to fully grasp the similarities and differences between determinants of management innovation and product innovation. Nevertheless, these findings constitute a first step in building an understanding of the similarities and differences between management and product innovation.

This study indicates that the determinants of product innovation and management innovation may differ quite a bit. Only TMT diversity increased the likelihood of both types of innovation in this sample. Some of the differences observed between determinants of product and management innovation may be explained by the logic proposed by Daft (1978) and others: That innovation pertaining to the administrative core of an organization are characterized by top down processes, whereas innovations pertaining to the technical core of an organization (such as product innovation) are more characterized by bottom up processes. This may explain why CEO novelty and TMT diversity are more important drivers of (at least new to the industry) management innovation than of product innovation. Likewise, the fact

that communication in this study has a more significant influence on product innovation may be explained by the bottom up processes associated with this type of innovation. However, the finding that TMT diversity increases the likelihood of adopting new to the firm product innovation, while it has not influence on new to the firm management innovation, cannot easily be explained by the theories addressed in this paper.

Also, this study indicates that external stimuli in the form of performance shortfalls may be a more important driver of management innovation than of product innovation. While performance decline was expected to increase the likelihood of adopting all categories of innovation, it is not all that surprising that the effect may be most important for new to the industry management innovation. Due to the political nature of management innovation, i.e. the fact that this type of innovation shifts power structures and distribution of decision and income rights in the organization, it is likely that stronger pressures are needed in order to overcome the resistance and inertia that may in particular be a barrier for this type of changes of managerial practices, processes and structures (Birkinshaw et al., 2008; Chandler, 1962).

Implications for Theory and Practice

This study indicates that the behavioral theory framework may be useful for comparing management and product innovation. Also, most of the variables identified as pertaining to the diagnostic and implementation capabilities are significant determinants of firms' innovation activities. This paper only uses diagnostic capability and implementation capability as an organizing framework, but future studies may investigate whether these capabilities are in fact latent variables with a number of underlying drivers. Scientific endeavors of this nature may advance our understanding of firms' innovation behavior considerably. Also, future studies may include additional types of innovation (e.g. process innovation) and include other potential determinants. In particular, it may be interesting to

investigate whether a number of organizational design variables that have been found to promote product innovation are also determinants of management innovation.

Also, this study indicates that the implementation of either type of innovation increases the likelihood of also implementing the other. This finding may not be surprising, since the technical and administrative cores of an organization are related and interdependent (Daft, 1978; Damanpour, 1987). Therefore, it is likely that product innovation and management innovation may be complementary. A few studies have addressed the combinative effects of simultaneous adoption of different types of innovation over time (e.g. Damanpour et al., 2009), but more research is needed in order to fully comprehend the potential complementary effects of different innovation types.

Managers wishing to increase the innovativeness of their organizations may benefit from these findings in two ways. First, if they desire to increase the likelihood of adopting both management innovations and product innovations, they may benefit from focusing in particular on the diversity of the top management team. Also, managers should take notice of the fact that high CEO tenure may decrease the likelihood of implementing management innovation. Other initiatives may compensate for this effect. For example, firms could focus on increasing diversity of the top management team. Furthermore, firms wishing to increase the likelihood of implementing product innovation may focus on building experience with implementation of changes and on establishing rich and frequent internal communication flows.

Limitations

As with most empirical studies, a number of limitations apply to this research. Since the survey is based on cross sectional data on Danish firms, results represent only a specific point in time and may not apply to all other national contexts. Except for the variable regarding

previous experience with change and the performance decline variable, all measures refer to the same time period. Therefore, causality and time-order of events for these variables are theoretically assumed and cannot be verified in the data. Furthermore, most of the measures in this study are collected from the same respondent. The analysis, hence, is based on the perception of the top managers and may to some extent suffer from social desirability bias and common method bias (this is discussed in the method section). Variables such as middle manager support may be more accurately measured by collecting data directly from middle managers. Collecting rich data at both the individual and organizational level is very time and resource demanding. However, doing so would strengthen the validity of measures and allow for including multi-level perspectives in the analysis.

Furthermore, this study only includes some of a range of observable innovation types. Similarly, the determinants included in this research hardly exhaust the pool of potential drivers of innovation. Another approach could have been to study the most common predictors of product innovation in order to test whether they also promote management innovation. For example, a range of organizational design variables have been found to predict product innovation in previous studies (Damanpour, 1991; Wolfe, 1994). Future studies may, thus, elaborate on these findings by investigating other determinants and innovation types.

Finally, this study does not measure the performance consequences of the different types of innovation. Obviously, an important reason for studying the differences between management innovation and product innovation involves exploring the differential performance effects of different innovation types. The fundamental purpose of strategic management research is to explain superior firm performance. The relative importance of management innovation and product innovation in organizational value creation is still unknown. Therefore, in order to guide decision makers in their efforts towards building and

sustaining superior performance, the question of the relative value creation of management innovation vis-à-vis product innovation is an important and valuable direction for future research.

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CONCLUDING DISCUSSION: LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

A number of limitations apply to this dissertation. Since specific limitations to each of the papers are outlined in the corresponding chapters, this section will focus on general limitations of the dissertation.

Conceptualizing and Theorizing Management Innovation

While this dissertation contributes to a clarification of management innovation types and characteristics, important issues concerning conceptualization of the core construct still remain. It is characteristic for all of the extant contributions to the management innovation literature that management innovation itself is not problematized, except for the issue of what is the proper standard of comparison in deeming a change in management practice, process, structure, or technique an "innovation" (this newness issue is discussed above). Implicitly, the literature asserts that (save for this issue) there is agreement on the basic nature of the phenomenon. This is, however, hardly the case for the basic reason that the notions of management practices, processes, structures, or techniques refer to several units of analysis, potentially placed at different levels of analysis in an organization, spanning different functional areas, and encompassing formal as well as informal aspects of organization. It is not immediately apparent that a new kind of corporate culture (to the extent that this can be designed to "further organizational goals") can be indiscriminately lumped together with, for example, new ways of arranging internal corporate venturing in an overall category of management innovation. Of course, empirical analysis may reveal that such managerial technologies in fact belong together (in a factor analysis sense), for example, regarding their impact on performance, but this is fundamentally an empirical issue.

The problem is that the literature has not provided a unifying theoretical conceptualization of management innovation. In lieu of such a conceptualization, it may be problematic to argue, for example, that different kind of management innovations have the same antecedents, performance consequences and process dynamics. Implicitly, this is, however, what the literature currently does, but this does not reflect any underlying agreement in, notably, organizational theory.

Traditional organization design theory usually thinks of organizations as consisting of certain elements that are common to all organizations (e.g. Greenwood & Hinings, 1993). What makes organizations differ in this view is that the elements are combined in different ways. Mintzberg's (1983) treatment is a particularly well-known contribution to this view. He synthesizes a massive amount of research on organizational designs into four clusters of organizational elements: Namely, the "(1) five basic parts of the organization-the operating core, strategic apex, middle line, technostructure, and support staff; (2) five basic mechanisms of coordination-mutual adjustment, direct supervision, and the standardization of work processes, outputs, and skills; (3) the design parameters-job specialization, behavior formalization, training and indoctrination, unit grouping, unit size, action planning and performance control systems, liaison devices (such as integrating managers, teams, task forces, and matrix structure), vertical decentralization (delegation to line managers), and horizontal decentralization (power sharing by nonmanagers); and (4) the contingency factors-age and size, technical system, environment, and power" (Mintzberg, 1983: p. 322). Combinations of these four elements yield the famous five configurations, Simple Structure, Machine Bureaucracy, Professional Bureaucracy, Divisionalized Form, and Adhocracy. Somewhat similarly, research in the information systems and management literatures have outlined a number of components describing a firm's business model. For example, Hedman and Kalling (2003) suggest a generic business model composed of seven causally related

components: 1) customers, 2) competitors, 3) offering, 4) activities and organization, 5) resources, 6) supply of factor and production inputs, and 7) scope of management.

While such macro-views of organizations are extremely helpful for many purposes, it is questionable whether they are useful for the purposes of understanding management innovation. First, because the strong emphasis on complementarity of organizational elements (cf. Grandori & Furnari, 2008) seems to preclude the innovative combinations of elements that might otherwise constitute a management innovation, and, second, the aggregate perspective on organizations and organizational elements seems to make many relevant management innovations disappear from the perspective. A more fine grained view would therefore seem to be warranted.

Future research should deal more thoroughly with these questions by for example discussing and distinguishing explicitly between more types of management innovation. Therefore, it may be considered a weakness of the measure of management innovation in this study that new management practices and new management structures are considered equally as parts of an overall management innovation construct. Differences between drivers of structural changes vis-à-vis changes in practices may have been overlooked. Also, additional types of management innovation may be included. For example, as discussed by Foss et al. (2011), innovative changes to corporate culture, management philosophies or belief systems of the organization may constitute management innovations. How different types of management innovation come about and function in the organization is likely to differ enormously. These issues call for further investigation in future studies.

Management Innovation Capabilities

Paper I in this dissertation outlines a model of the foundations of management innovation. While, some firms may implement a management innovation once or twice out of

pure luck or coincidence (Winter, 2003), the model attempts to explain the ability of some firms to repeatedly reconfigure and develop their management practices and resources. For this purpose, the notion of management innovation capabilities is introduced. Management innovation capabilities refer to the ability of a firm to purposefully create, extend and modify its managerial resource base to address rapidly changing environments. This definition is developed based on the dynamic capabilities literature and stresses the ability of the organization to reliably reproduce the desired outcome (Helfat et al., 2007; Helfat & Peteraf, 2010; Teece, Pisano & Shuen, 1997; Winter, 2003). However, it is a weakness of the dissertation that management innovation capabilities are not actually measured or operationalized. The model and the notion of management innovation capabilities constitute a first attempt at outlining the foundations and causal drivers of the phenomenon of management innovation. In order for management innovation capabilities to be a useful construct for future research, much more work is needed to disentangle and specify its origins and microfoundations. As such, management innovation capabilities as a construct suffer from the same weaknesses that characterize the literature on routines and dynamic capabilities.

Dynamic capabilities is still a relatively new field of inquiry and, hence, terms and constructs remain somewhat vague and "rough around the edges" (Helfat & Peteraf, 2009). At least two important questions remain unanswered (Abell, Felin & Foss., 2008; Felin & Foss, 2005, 2009): First, what are the origins and emergence of routines and capabilities? Second, how do routines and capabilities influence other firm-level outcomes such as financial performance or management innovation? In an editorial essay, Felin and Foss (2005, p. 441) criticized this absence of microfoundations in capabilities research: "Organizations are made up of individuals, and there is no organization without individuals. There is nothing quite as elementary; yet this elementary truth seems to have been lost in the increasing focus on

structure, routines, capabilities, culture, institutions and various other collective conceptualizations in much of recent strategic organization research."

Routines and capabilities can be understood as complex patterns of individual actions and interactions. Therefore, in order to fully understand macro-phenomena such as management innovation and management innovation capabilities, we need to observe and theorize about the patterns of individual action underlying them (Abell et al., 2008; Coleman, 1990; Gavetti, 2005; Hayek, 1952). It may, for example, be the case that management innovation capabilities lead to actual innovation outcomes by influencing the conditions for organizational members' motivation, opportunity and ability to recognize problems or opportunities for improved performance and to develop managerial solutions in response. A non-simple aggregation of the actions and interactions of organizational members may then lead to the implementation of management innovations (Coleman, 1990).

Obviously, this line of argument remains speculative. In order to make sense of complex real life phenomena such as management innovation, theories and ideas often need a long time to develop into neatly defined constructs. Therefore, the dynamic capabilities view, in spite of its weaknesses, has been a useful frame for developing ideas and theories about management innovation in the dissertation. I have argued that management innovation capabilities comprise two subparts, diagnostic capability and implementation capability, which are likely to emerge out of managerial cognition and organizational resources. However, future research should go further in specifying, observing and discussing the microfoundations of these capabilities.

What Do Management Innovations Do?

It is a limitation of this dissertation that the impact of management innovation on firm performance is not studied. Presumably, management innovations arise and are adopted

because of their beneficial consequences for the firm(s) that adopts them. Indeed, Mol and Birkinshaw (2009) found that new to the firm management innovation was associated with subsequent productivity growth. However, apart from this study, the beneficial outcomes remain under studied in the literature. On a highly abstract level and drawing on organizational economics (e.g. Milgrom & Roberts, 1992; Roberts, 2007), management innovations may be understood as novel ways of increasing created value by coordinating activities, motivating stakeholders and signaling to these. Again rather abstractly this includes new ways of configuring and coordinating the internal division of labor in firms, new ways of rewarding employees, new ways of allocating decisions rights ("authority"), new ways of measuring input and output performance, new standard operating procedures, etc. In principle, many different beneficial consequences may flow from such management innovations, including reductions of costs of coordination and motivation, reduced production costs and increased innovativeness. Even when innovations do not directly reduce costs or improve efficiency, they may be *symbolically efficient:* "An innovation that makes an organization appear innovative or ethical, for instance, may help it either to raise capital from other organizations or to attract customers" (Abrahamson, 1991, p. 608). Such benefits may translate into competitive advantages.

However, very little systematic knowledge about performance exists beyond this highly abstract level. Thus, there is no systematic mapping of the differential performance consequences of different types of management innovations. Also, there is no knowledge concerning the relative importance in terms of appropriable value creation of management innovations *vis-à-vis* technological innovations. The evidence concerning competitive advantage is anecdotal, and again there is no knowledge concerning the relative contribution of management innovation to competitive advantages and the sustainability of competitive advantages that such innovation may conceivably confer.

Finally, as it has been suggested in the management fashion literature (Abrahamson, 1991; Abrahamson & Fairchild, 1999), not all management innovations are efficient or value creating. Rearranging the organizational configurations, however new the result may be, does not guarantee success. As it is the case with technological innovations, a hundred failed attempts may be made before a truly successful innovation is created. However, compared to technological innovations, management innovations are typically more systemic in nature and their implementation is more disruptive and costly for the organizations. Whereas companies can often experiment with and test technological innovations on a small-scale, partial adoption or testing of management innovations is rarely feasible (Teece, 1980). Therefore, it is even more important to gain a better understanding of the characteristics of management innovations that are value creating and under what conditions they can be implemented with success.

What Is the Process of Management Innovation?

This dissertation does not investigate the actual process of developing and implementing management innovations. Although attempts have been made to map the different phases in the management innovation process at an abstract level (e.g. Hamel, 2006; Birkinshaw & Mol; 2006; Birkinshaw et al., 2008), little is known about how management innovations in practice are invented or implemented. How internal and external determinants spur the innovation process and how internal organizational structures, power dependencies, capabilities, and culture affect the implementation remain largely speculative.

By intuition, it makes sense that changes in management practices may be spurred by perceived crises and external pressures (Cyert & March, 1963; Tushman & Anderson, 1986; Tushman & Rosenkopf, 1996). Indeed, research in change management have found that radical changes are more likely in periods of crises or decline (e.g. Boeker, 1997; Romanelli

& Tushman, 1994). But by what process a perceived problem translates into a management innovation is understudied. There are a number of historical accounts of management innovations that describe the process in some detail (e.g. Chandler, 1962; Stjernberg & Philips, 1993), but what actually goes on inside a company when developing and implementing a management innovation remains somewhat black-boxed. A host of questions have not been adequately answered. For example, what phases does the innovation go through? To what extent is the process linear or iterative? How do culture, power and organizational design influence this process? In short, can anything general be said about the process of management innovation?

CONCLUSION

The aim of this dissertation is to increase our understanding of the antecedents of management innovation at the firm level. The studies conducted as part of the dissertation confirm that a behavioral theory and dynamic capabilities framework for understanding determinants of management innovation is relevant and useful. The dissertation contributes to management innovation research by clarifying characteristics, theoretical foundations and measures of management innovations. Also, the dissertation constitutes the first attempt to empirically measure management innovations that are new to the industry. Finally, the dissertation has outlined a number of areas for future research.

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