Internal Antecedents of Management Innovation:
The effect of diagnostic capability and implementation capability

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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 adopting 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.
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 et al., 1985; Rogers, 2003; Urabe et al., 1988) and quite little attention has been dedicated to other types of service, administrative or management innovation (Birkinshaw et al., 2008; Damanpour et al., 2009; Mol & Birkinshaw, 2007a). 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\(^1\) and, arguably, is an important source of value creation in firms (Hamel, 2006; Mol & Birkinshaw, 2009; Mol & Birkinshaw, 2007b). 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, 2007a). 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 for that reason be important sources of sustainable competitive advantage (Barney, 1991; Foss, 2007; Grant, 1996; Teece et al., 1997).

\(^1\) For the benefit of readability, the term management practices is used to refer to both practices, processes, techniques and structures throughout the paper
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) and several mini-conferences at London School of Business and Copenhagen Business School have explicitly addressed management innovation. Also, a number of robust empirical and theoretical contributions have emerged (e.g. Ansari et al., 2010; Birkinshaw et al., 2008; Damanpour et al., 2009; Lazonick & Teece, 2010; Lazonick, 2010; Mol & Birkinshaw, 2009; Mol & Birkinshaw, 2007b).

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.

*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).

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 et
al., 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; Hamel, 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 both 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-shelf 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 et al., 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 et al., 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.

This paper posits that firms are more likely to innovate in the presence of a performance shortfall (Cyert & March, 1963). However, since firms perceive 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. Rather, in this study the notions of diagnostic capability and implementation capability are used to group variables thought to be related to these capabilities.

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 et al., 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; Barney, 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, A. H. et al., 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 et al., 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 observable construct. 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 with 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 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 are treated here: 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). 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 adopted. 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 (Buy1 et al., 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 et al., 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 et al. (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 et al., 1997; Frenz & Jetto-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 et al., 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.

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<tr>
<th>Management innovation outcome categories</th>
<th>Structures</th>
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<tr>
<td></td>
<td>No innovation</td>
</tr>
<tr>
<td>Practices</td>
<td></td>
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<tr>
<td>No innovation</td>
<td>33</td>
</tr>
<tr>
<td>New-to-the-firm</td>
<td>10</td>
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<tr>
<td>New-to-the-industry</td>
<td>4</td>
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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

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<tr>
<td>New-to-the-firm</td>
<td>2</td>
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<tr>
<td>New-to-the-industry</td>
<td>3</td>
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</table>

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 et al (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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.58</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>0.15</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>-0.02</td>
<td>1.00</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>1.52</td>
<td>0.21</td>
<td>0.10</td>
<td>0.05</td>
<td>1.00</td>
<td></td>
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<td></td>
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<tr>
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<td>-0.01</td>
<td>-0.06</td>
<td>0.17</td>
<td>1.00</td>
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</tr>
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<td>0.07</td>
<td>0.03</td>
<td>0.09</td>
<td>0.14</td>
<td>1.00</td>
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<tr>
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</tr>
<tr>
<td>Middle manager support</td>
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<td>0.01</td>
<td>0.23</td>
<td>-0.04</td>
<td>-0.09</td>
<td>0.01</td>
<td>-0.14</td>
<td>1.00</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
<th>MODEL 5</th>
<th>MODEL 6</th>
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</thead>
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<td>0.35</td>
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<td>(2.55)</td>
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<td>(2.53)</td>
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<td>(2.61)</td>
<td>(2.56)</td>
<td>(1.37)</td>
<td>(2.53)</td>
</tr>
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<td>-0.75</td>
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<td>-0.78</td>
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</tr>
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<tr>
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<td>(0.24)</td>
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<tr>
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<td>0.19</td>
<td>0.47**</td>
<td>0.17</td>
<td>0.45**</td>
<td>0.21</td>
<td>0.57**</td>
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<tr>
<td>(0.95)</td>
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<td>(1.89)</td>
<td>(1.89)</td>
<td>(1.89)</td>
<td>(1.89)</td>
</tr>
<tr>
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<td>0.06**</td>
<td>0.06**</td>
<td>0.06**</td>
<td>0.05**</td>
<td>0.06**</td>
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<td>0.06**</td>
</tr>
<tr>
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<td>(2.61)</td>
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<td>(0.50)</td>
<td>(1.18)</td>
<td>(1.29)</td>
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</tr>
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<td>0.14***</td>
<td>0.14***</td>
<td>0.14***</td>
<td>0.14***</td>
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<tr>
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<td>0.14***</td>
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</tbody>
</table>

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1
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.

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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