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## DO BOARDS OF DIRECTORS FOSTER STRATEGIC CHANGE? A DYNAMIC MANAGERIAL CAPABILITIES PERSPECTIVE

### 1. Introduction

*"The speed of change is one of the key messages of today's world. Even the most powerful company in the world knows they have to move dramatically or risk getting left behind".* – John Chambers, Chairperson of Cisco (Spring, 2015).

The importance of strategic change is a central issue to any board of directors, as illustrated by the Chairperson of Cisco. Boards' involvement in strategic change has been widely recognized as an important area of investigation within the strategic management literature (Golden & Zajac, 2001; Westphal & Fredrickson, 2001). Previous studies have suggested that boards of directors do have an impact on strategic change (Golden & Zajac, 2001; Haynes & Hillman, 2010; Jensen & Zajac, 2004; Westphal & Fredrickson, 2001) and that strategic change is a major source of competitive advantage and firm survival (Agarwal & Helfat, 2009; Augier & Teece, 2008; Carpenter, 2000).

In recent years strategic-management researchers have explored the role and impact of dynamic managerial capabilities on strategic change (Helfat & Martin, 2014). They have identified managerial human capital (hereafter MHC) as an important contributor to dynamic managerial capabilities (hereafter DMC) which in turn has been suggested to impact strategic change (Adner & Helfat, 2003; Helfat & Martin, 2014). In general, not much work examining boards of directors has expanded and applied the early works on the dynamic capabilities perspective (Teece, Pisano, & Shuen, 1997), nor recent works looking into DMC (Helfat & Peteraf, 2015; Teece, 2007). As such, most of our knowledge concerning boards and their impact on strategic change has not gone beyond the consideration of boards as composed of "static resources" (Golden & Zajac, 2001; Jensen & Zajac, 2004; Westphal & Fredrickson, 2001). Therefore, there is a need to explore the dynamic processes that contribute to strategic change, and a crucial question that remains unanswered is how strategic change is achieved within boards. This article addresses this issue by applying the dynamic managerial capabilities perspective to board of directors (Adner & Helfat, 2003; Augier & Teece, 2009; Eggers & Kaplan, 2013; Helfat & Martin, 2014). Through the use of this theoretical perspective we not only explore board resources (MHC), but also the dynamic processes (DMC), that impact boards' involvement in strategic change. We suggest that MHC measured as a team-construct at the level of

the board is an attribute that builds DMC, also at the level of the board (Helfat & Martin, 2014). Furthermore, we argue that board DMC can impact board level outcomes in terms of the boards' involvement in strategic change and thus explain differences in their level of involvement in strategic responses and actions (Adner & Helfat, 2003). As such, we examine a model where DMC mediate the relationship between MHC and strategic change (Beck & Wiersema, 2013; Helfat & Peteraf, 2015; Teece, 2007). More specifically, three classes of DMC (sensing, seizing and reconfiguring) are examined as mediators. The first group of *sensing* abilities includes alertness and discovery processes and is important for recognizing opportunities as they arise and for anticipating competitive threats (Helfat & Peteraf, 2015). Secondly, *seizing* is about responding to opportunities and threats and thus applying reasoning and problem-solving skills. This entails making strategic investments to develop new capabilities (Helfat & Peteraf, 2015). The third aspect of DMC is *reconfiguring*. It involves the ability of decision makers to enhance, combine, align and modify the firm's resources and capabilities in order to sustain growth and profitability (Helfat & Peteraf, 2015). To our knowledge these three dynamic managerial capabilities have not yet been investigated on a board level (Helfat & Peteraf, 2015; Zhang, 2010). However, we are convinced that studying boards from a dynamic managerial capabilities perspective will be fruitful for a number of reasons. First of all, research suggests that boards are increasingly involved in complex and ambiguous decision making where they are required to share information, knowledge and experience (Finkelstein & Mooney, 2003; Pugliese et al., 2009). With these developments it is logical to study boards from a dynamic managerial capabilities perspective as it can help them as decision makers outline relevant strategic actions in complex and ambiguous circumstances (Beck & Wiersema, 2013; Teece, 2007). Second, it has been suggested that boards need to be increasingly entrepreneurial in their efforts to foster strategic change by means of regulating levels of innovation and entrepreneurial activity (Stiles, 2001; Zahra, Neubaum, & Huse, 2000). Boards of directors and their dynamic managerial capabilities should therefore be studied as there is an entrepreneurial function embedded in the perspective that can be applied to different strategic levels, including boards (Teece, 2007).

In this article we draw from the more recently emerged literature which recognizes that cognitive capabilities influence the development of dynamic managerial capabilities (Helfat & Peteraf, 2015). In order to frame these arguments and examine the influence of cognitive capabilities we draw on insights from the upper echelons theory (hereafter UET) (Carpenter, Geletkanycz, & Sanders, 2004; Hambrick & Mason, 1984). Accordingly, we use this theory to explain how cognitive capabilities of boards of directors influence board level

outcomes (Forbes & Milliken, 1999; Hambrick, 2005; Hambrick & Mason, 1984). We focus on cognitive capabilities, referred to as the capacity of the board to perform mental processes, such as those involving attention, perception, reasoning, problem-solving, language and communication (Helfat & Peteraf, 2015). More specifically, our model recognizes that DMC depend in part on cognitive capabilities. As such, we rely on the work of Helfat and Peteraf (2015) who have identified specific types of cognitive capabilities that underpin the DMC for sensing, seizing and reconfiguring.

We formulated three sets of hypotheses proposing that boards' MHC impacts their involvement in strategic change. Moreover, we consider the mediating role of boards' sensing, seizing and reconfiguring abilities (DMC) in the above-mentioned relationship. We test these hypotheses using a survey consisting of a sample of 606 Norwegian firms. The survey fits the purpose well as it was developed to better understand the relationship between board level resources, processes and outcomes (Sellevoll, Huse, & Hansen, 2007). In addition, the Norwegian setting is to our advantage as board of directors in Norway have the highest decision making authority in organizations. They are the organizational unit responsible for the management of the company (Rasmussen & Huse, 2011). Additionally, board of directors in Norway have been described as active and influential boards (Minichilli, Zattoni, Nielsen, & Huse, 2012), which suggests that observing their dynamic managerial capabilities should be promising.

The main findings suggest that while MHC positively impacts strategic change, only boards' sensing and seizing abilities (not reconfiguring) positively mediate the relationship between MHC and strategic change. With these findings the study makes several contributions to theory and practice of strategic management. First, we contribute to board literature by, to our knowledge, providing the opening empirical testing of DMC in a board setting. Consequently, we go beyond the consideration of a static model to explore strategic change within boards by introducing a DMC perspective to this area of board research (Golden & Zajac, 2001; Haynes & Hillman, 2010; Westphal & Fredrickson, 2001). In doing so, we apply two interconnected and complementary theoretical frameworks that facilitate an understanding of how boards' MHC contributes to their DMC, which in turn impacts their involvement in strategic change. Our research shows that these theoretical perspectives are important perspectives to consider when studying boards and strategic change. Additionally, as the simultaneous use of these theoretical perspectives have mostly been used to study TMT's and CEOs our research brings light to a new unit of analysis (Herrmann & Nadkarni, 2014). Second, we contribute to strategic management literature by examining

three dimensions of DMC and how they impact strategic change from a cognitive perspective. Indeed, we go beyond the surface of measuring constructs which have often be measured based on demographic criteria. Instead, we test actual cognitive constructs from both UET (Buyl, Boone, & Matthyssens, 2011; Carpenter et al., 2004) and DMC (Eggers & Kaplan, 2013; Helfat & Peteraf, 2015) frameworks. As such, we make a contribution by showing that cognitive aspects matter and have an impact on strategic change. Third, we provide an empirical test of the Helfat and Peteraf (2015) theoretical model within boards. Thus, we are developing measures for sensing, seizing and reconfiguring which is an initial progress in the empirical enquiry of DMC.

## **2. Theoretical framework and hypotheses development**

We develop our research model building on two complementary frameworks, the UET and the DMC perspective. Indeed, both frameworks are helpful in understanding how strategic outcomes are shaped by managerial characteristics and capabilities. Based on these arguments it has been suggested that the two frameworks should be applied simultaneously (Buyl et al., 2011; Herrmann & Nadkarni, 2014) as UET provides rich predictions if integrated with theories that better explain managerial impact on strategic change (Carpenter et al., 2004). We use the basic ideas from the UET and the more specific conceptualizations from the DMC perspective about managerial resources and capabilities and their impact on strategic change. Hereafter, we first introduce the two theoretical frameworks, followed by the hypotheses formulation.

### **2.1. Upper Echelons Theory and Boards of Directors**

First introduced by Hambrick and Mason (1984), UET focuses on top decision makers within organizations suggesting that: top management teams act on the basis of their personalized interpretations of the strategic situation they face; and that personalized construals are a function of the executives' experience, values and personalities (Hambrick, Werder, & Zajac, 2008). Hence, it is argued that "an organization and its performance will be a reflection of its top managers" (Carpenter et al., 2004: p. 752). In this light, top management teams' cognition, values and perceptions influence the processes of strategic choices and in turn performance outcomes. Although UET originally focused on top management teams (hereafter TMT), we extend the theory to the study of boards of directors by linking boards to "supra top management teams" (Finkelstein, Hambrick, & Cannella, 2009: p. 11).

A big stream of research has followed the predictions of UET and investigated the direct relationships between TMT characteristics, strategic choices and performance (Buyl et al., 2011; Carpenter et al., 2004; Hambrick et al., 2008) with often reaching inconclusive and contrasting findings. Board research applying UET has followed a similar vein and investigated how demographic characteristics impact strategic outcomes (Jensen & Zajac, 2004). A growing criticism of these streams of research and UET's main assumptions have resulted in examination of the intervening and mediating processes occurring between team characteristics and firm performance (Carpenter et al., 2004; Yamak, Nielsen, & Escriba-Esteve, 2013). Hence, it has been argued that team characteristics should be treated as antecedents, rather than proxies for managerial cognition (Buyl et al., 2011). In particular, it has been suggested that taking into account cognitive processes (interpretative process in which managers engage) such as attention, scanning, sense-making, interpretation and decision-making into the UET framework could strengthen its ability in explaining strategic behaviors of decision makers (Buyl et al., 2011; Carpenter et al., 2004). Therefore, we use UET to understand how observable characteristics of board members such as human managerial capital shape the cognitive processes of sensing, seizing and reconfiguring which in turn are predicted to impact strategic change (Carpenter et al., 2004).

## **2.2. Dynamic Managerial Capabilities Perspective and Boards of Directors**

The emergence of the dynamic capabilities perspective, with its focus on the evolutionary nature of firm resources and capabilities in relation to changes in the environment (Teece et al., 1997) enhanced the resource based view (Barney, 1991). The resource based view was considered as being rather static in its view and unable to explain firms' competitive advantage in environments of rapid and unpredictable changes (Augier & Teece, 2008; Eisenhardt & Martin, 2000). In their seminal article, Teece et al. (1997: p.516) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". The term *dynamic* acknowledges the importance of the capacity to renew competences to address major changes in business environments (Augier & Teece, 2008; Eisenhardt & Martin, 2000; Peteraf, Di Stefano, & Verona, 2013). These capacities are required especially when market conditions are difficult to determine and when the rate of technological change is fast. The term *capabilities* emphasizes the importance of successfully adapting, integrating and reconfiguring internal and external organizational skills, resources and functional competences to achieve congruence with changing environments (Teece et al., 1997).

The dynamic capabilities perspective is very broad and spans different domains where multiple levels of analysis are applied; from managerial, to organizational, to competitive interactions and environmental change (Helfat & Peteraf, 2009). We take a managerial perspective on dynamic capabilities (hence the name dynamic managerial capabilities) and thus focus on the capabilities that explain managerial action and allow managers to adapt their organizations to changing environmental conditions and contribute to strategic change (Adner & Helfat, 2003; Augier & Teece, 2009; Helfat & Martin, 2014, 2015; Helfat & Peteraf, 2015). To understand dynamic managerial capabilities and how managers achieve change it is central to look at underlying managerial resources and processes (Helfat et al., 2009; Helfat & Peteraf, 2015). Here, the transformation of organizations through identifying, responding and implementing change requires underlying managerial resources and processes that achieve strategic change (Helfat et al., 2009). As such, we need to know not only what contributes to change but also how it is achieved. Specifically, we bring attention to MHC and DMC which can be team level resources and processes that explain differences in responses to and involvement in strategic change (Helfat & Martin, 2014). We apply these definitions to the board of directors and thus extend the concept to teams (Helfat & Martin, 2014; Helfat & Peteraf, 2015).

We refer to *managerial human capital* as the bundle of learned skills and resources, which are shaped by education and personal and professional experiences (Becker, 1964). Resource based literature on managerial resources suggest that MHC can consists of general, firm-specific, industry-specific and related industry skills (Castanias & Helfat, 1991, 2001). It also suggests that MHC can provide the means of achieving competitive advantage. In addition to the human capital of individual managers the concept of MHC also encompasses teams of managers (Helfat & Martin, 2014). This leads us to MHC at the level of the board. Here, MHC is important as boards are expected to make complex decisions, review and approve strategic plans, make major capital commitments, and develop executive succession and compensation plans (Forbes & Milliken, 1999; Khanna, Jones, & Boivie, 2014). Effective fulfillment of such decisions and duties requires in-depth skills, experiences and knowledge of the firms' business, technology, human assets and conditions of the industry (Kor & Sundaramurthy, 2008). Such skills, experience and knowledge will in turn impact what directors pay attention to and how they frame their decisions, thus impacting their response to strategic change and the direction of the company (Adner & Helfat, 2003; Helfat & Martin, 2014; Johnson, Schnatterly, & Hill, 2013; Kor & Mesko, 2013). Furthermore, researchers have observed that board members draw on their knowledge and personal experience in important decisions which

have direct impact on the strategy content and the conduct of the strategy process (McNulty & Pettigrew, 1999). Given the arguments above, MHC has been emphasized as an important construct in the UET (Carpenter et al., 2004). Researchers in this domain have argued that MHC helps explain and predict team processes, strategic change, strategic interactions and financial outcomes (Carpenter et al., 2004). Furthermore, it has been argued that MHC is the stock of resources that play a key role in shaping DMC (Adner & Helfat, 2003; Helfat & Martin, 2014; Lin & Wu, 2014).

*Dynamic managerial capabilities* are particular types of capabilities that direct attention to the abilities and use of resources of managers. Researchers have here devoted attention to managers' capabilities in sensing and seizing opportunities and reconfiguring assets. They are processes that help explain managerial actions and the quality of strategic decisions, which allow firms to respond to changing environmental conditions and achieve strategic change (Augier & Teece, 2009; Helfat et al., 2009; Helfat & Peteraf, 2015; Kor & Mesko, 2013). In this paper we have applied the definition of dynamic managerial capabilities as "the capabilities with which managers build, integrate, and reconfigure organizational resources and competences" (Adner & Helfat, 2003: p.1012) to boards of directors. As such, boards have an important role in using their DMC as mechanisms to redefine the growth and opportunity boundaries of the firm as well as redesigning the business model in constantly changing competitive environments (Adner & Helfat, 2003; Kor & Mesko, 2013). In this process, board members utilize environmental scanning to identify new opportunities (sensing), respond to opportunities and threats by integrating new ideas and knowledge to the firms existing capabilities (seizing) and sustain growth and profitability by enhancing, combining, aligning and modifying the firms' resources and capabilities (reconfiguring) (Helfat & Peteraf, 2015; Teece, 2007). Researchers have observed that managerial cognition has an important part in shaping DMC (Adner & Helfat, 2003; Eggers & Kaplan, 2013; Helfat & Peteraf, 2015). In line with these arguments Helfat and Peteraf (2015) explain how DMC can be disaggregated for analytical purposes, where each capability (sensing, seizing and reconfiguring) depends on specific cognitive capabilities. They argue that sensing capabilities depend on perception and attention, seizing of problem-solving and reasoning, and reconfiguring of communication and social cognition. We apply these assumptions to our model when conceptualizing dynamic managerial capabilities of boards which we measure as a team-construct at the level of the board.



### 2.3. The Impact of Managerial Human Capital on Strategic Change

Both the UET and the DMC perspective argue that there is a relationship between MHC and strategic change. The DMC perspective argues that MHC is a core resource which provides the capacity to achieve strategic change (Adner & Helfat, 2003). More specifically, it has been argued that MHC can be beneficial to firms as it consists of knowledge and expertise used for decisions leading to strategic change, thus impacting competitive advantage and firm survival (Agarwal & Helfat, 2009; Helfat & Martin, 2014). MHC is also argued to have a contributing factor to the way leaders conceptualize the business and make critical decisions as it shapes the key assumptions and priorities that managers use to perceive, interpret and evaluate specific business environments, thus impacting their involvement in strategic responses and actions. These assumptions and priorities are then converted into different paths and patterns of choices impacting aspects of firm growth, diversification, competitive positioning, and innovation (Kor & Mesko, 2013). The upper echelons theory argues that board characteristics such as their MHC can be linked to different outcomes where one such outcome is strategic change (Carpenter et al., 2004). We argue that MHC provides boards with resources that shape specific behaviors and direct their involvement in strategic change. Empirical research suggests that boards are involved in strategic change by supplementing managers' experience in strategic decision making and/or giving advice to management (Huse, 2007; Kor & Misangyi, 2008). Empirical research has also identified direct links between MHC of boards and specific strategic outcomes. As such researchers have found that board MHC positively affects strategic change in terms of diversification (Jensen & Zajac, 2004) innovation (Wincent, Anokhin, & Örtqvist, 2010) and acquisitions (Jensen & Zajac, 2004; Peng & Fang, 2010). Furthermore, a study analyzing boards' influence on strategy found a positive relationship between business occupations of board members and strategic change (Golden & Zajac, 2001). With these findings, Golden and Zajac (2001) argued that boards possession of expertise and experience are resources that have a positive impact on strategic change. Based on these arguments, we investigate whether boards' MHC, shaped by the education and professional experiences of its board members, positively impact the boards' involvement in strategic change. Therefore, we formulate:

*Hypothesis 1:* Boards of directors' managerial human capital has a positive impact on their involvement in strategic change.

## 2.4. The Impact of Managerial Human Capital on Dynamic Managerial Capabilities

DMC depend on a set of underlying managerial resources, namely managerial human capital, managerial social capital and managerial cognition (Adner & Helfat, 2003; Helfat & Martin, 2014). In this study we only give attention to the effects of MHC on DMC. We argue that MHC impacts three different components of DMC, namely sensing, seizing and reconfiguring (Teece, 2007). As such, we follow the notion that board members draw on their knowledge, skills and experience to sense opportunities and threats, seize opportunities, and reconfigure organizational resources and capabilities (Helfat & Martin, 2014). Next we discuss the specific impact of MHC on the three underlying components of DMC more explicitly.

**The impact of MHC on sensing.** The dynamic capabilities perspective builds on the assumption that firms demonstrating “*timely responsiveness and rapid product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences*” will be winners in the global marketplace (Teece et al., 1997: p. 515). With this assumption the sensing of opportunities and threats becomes an important managerial activity requiring scanning, searching, creation, learning and interpretive activity (Teece, 2007). It necessitates specific knowledge about the context that the firm is operating in, the ability to understand customers, suppliers and products, as well as practical wisdom (Teece, 2007). More specifically, MHC provides boards with familiarity of industry and understanding of industry dynamics in terms of technological developments, competitive conditions, and regulations (Johnson et al., 2013). This familiarity and understanding enhanced by the MHC of the board can then be used to detect emerging opportunities in the industry (Kor & Sundaramurthy, 2008). Therefore, it can be argued that board MHC is likely to increase the ability of the board to sense opportunities and threats. Hence, we formulate:

*Hypothesis 2a:* Boards of directors’ managerial human capital has a positive impact on the dynamic managerial capability of sensing.

**The impact of MHC on seizing.** The second area of DMC is that of seizing opportunities and responding to emergent threats which have been sensed. Seizing opportunities and threats can entail making investments into new products, processes or services. This requires boards to make strategic investments, commit large funds and decide on organizational efforts under complex and uncertain circumstances. Accordingly, boards need to strategize, make unbiased judgements and get timing right in responses to multiple growth trajectories

(Teece, 2007). These responses require special knowledge and experience but also problem-solving ability (Helfat & Peteraf, 2015; Teece, 2007; Wincent et al., 2010). Empirical research supports these arguments, suggesting that board MHC provides the means to effectively respond and solve problem situations (Kor & Sundaramurthy, 2008). As seizing has been argued to require problem-solving ability (Helfat & Peteraf, 2015), we argue that boards possession of MHC will positively impact seizing.

Teece (2007) argued that defining the business model is critical to seizing opportunities and responding to threats. Boards validating a business model presented by management require great judgment, insight and intelligence. As such, selecting the right business model necessitates boards to possess relevant knowledge and understanding, which is often built from prior experience (Westphal & Fredrickson, 2001). Kor and Sundaramurthy (2008) specifically find that MHC of boards is used to develop strategic understanding of industry dynamics and enable them to better evaluate managers' business models and growth proposals. In other words, MHC positively impacts the boards' ability to develop the business model and thus seize opportunities and threats. In sum the arguments above support the following:

*Hypothesis 2b:* Boards of directors' managerial human capital has a positive impact on the dynamic managerial capability of seizing.

**The impact of MHC on reconfiguring.** The successful sensing and seizing of opportunities and threats can lead to enterprise growth and profitability. A crucial aspect to sustainable profitable growth is the ability of the firm to reconfigure assets and thus maintain evolutionary fitness (i.e. how well the firm is making a living) (Teece, 2007). Hence, in order to escape unfavorable path dependencies and maintain evolutionary fitness, firms adapt, integrate and reconfigure assets, operational capabilities and organizational structures as they grow, and as business environments change (Teece, 2007). It is argued that organizations maintaining evolutionary fitness do so by establishing cumulative knowledge of how to efficiently transform the business (Zott, 2003). This knowledge resides in organizational members which have an ability to mobilize and combine resources to create change (Sirmon, Hitt, & Ireland, 2007). Boards have a great impact on decisions impacting how resources are mobilized and combined and they use their knowledge and experience as they ratify and monitor such decisions (Huse 2007). Teece (2007) specifically argues that an important reconfiguring activity of the board is to effectuate replacements

of the CEO and TMT members. In relation to such a reconfiguring activity empirical results show that board MHC has a significant positive impact on CEO selection as perceived by the market (Tian, Haleblan, & Rajagopalan, 2011). Empirical research has also found that MHC of board members has a positive impact on reconfiguring in terms of the boards' ability and likelihood to acquire other firms (Peng & Fang, 2010; Walters, Kroll, & Wright, 2008). Hence, MHC give the board an ability to use their experience and provide better advice regarding acquisitions which then leads to acquisition performance. Stemming from these arguments we propose:

*Hypothesis 2c:* Boards of directors' managerial human capital has a positive impact on the dynamic managerial capability of reconfiguring.

## **2.5. The Mediating Role of Dynamic Managerial Capabilities**

Authors using the dynamic managerial capabilities perspective argue that there is a relationship between MHC, DMC and strategic change (Adner & Helfat, 2003; Eggers & Kaplan, 2013). They show that MHC is an attribute that builds DMC (Helfat & Martin, 2014). Further they argue that DMC can impact strategic change and explain differences in strategic responses to changes in the external environment (Adner & Helfat, 2003). As such, it has been suggested that DMC mediate the relationship between MHC and strategic change (Beck & Wiersema, 2013; Eggers & Kaplan, 2013; Martin, 2011). The UET also supports this view as it argues that there are important mediating team processes between group characteristics, such as MHC and strategic change (Carpenter et al., 2004). In what follows we argue that each dynamic managerial capability (sensing, seizing and reconfiguring) mediates the relationship between boards of directors' MHC and their involvement in strategic change.

**Sensing as mediator.** Sensing abilities are important in dynamic and uncertain environments as they allow boards to sense opportunities before they fully materialize (Helfat & Peteraf, 2015). Sensing abilities lead to the recognition of opportunities and the anticipation of threats. These are the initial phases to creating change and reacting to it. It has been argued that active boards do not only ratify and control strategic decisions but also define and shape decisions needed to be taken (McNulty & Pettigrew, 1999). As such, board sensing abilities are used to anticipate and recognize aspects which need to be taken into consideration in the strategic process. Furthermore, boards are involved in sensing activities as they scan the environment for trends and opportunities thus shaping mission, vision and values, and identifying important strategic initiatives (Hendry & Kiel, 2004). Through their

perception and attention capabilities, boards with a strong sensing ability will identify more opportunities and threats and will thus be involved in strategic responses and actions to a larger extent. These arguments are in line with research suggesting that boards that possess capabilities in actively searching and collecting information positively impacts their involvement in different strategic tasks (Zhang, 2010). We therefore argue that the boards' ability to sense opportunities and threats will positively impact their involvement in strategic change. Since we proposed that MHC is positively related with sensing ability (Hypothesis 2a) and that sensing ability is positively related to strategic change, we hypothesize:

*Hypothesis 3a:* The dynamic managerial capability of sensing positively mediates the relationship between boards of directors' managerial human capital and their involvement in strategic change.

**Seizing as mediator.** The ability to seize opportunities and threats mainly encompasses senior leaders' responses to what they have sensed (Helfat & Peteraf, 2015). These responses often entail strategic investment decisions or shaping new business models which impact strategic change (Teece, 2007). As such, McNulty and Pettigrew (1999) find that boards are involved in strategic change by influencing strategic decisions as well as taking decisions related to capital investments and diversification of business activities. Furthermore, Stiles (2001) argue that boards determine and maintain the strategic change of businesses through three main aspects, all being connected to its ability to seize opportunities and threats. First, the board is the ultimate negotiator for constituting the focus of the business. Second, the board has the power to regulate the levels of innovation and entrepreneurial activities. Third, by examining and questioning the corporate strategy and the commitment to certain strategies, the board can be vital in breaking old organizational habits and forcing change (Stiles, 2001). In line with Helfat and Peteraf (2015) we argue that boards with superior seizing ability will with more confidence engage in problem-solving and decision-making as they face the challenges of these three aspects, and hence, positively impact their involvement in strategic change. Consequently, we predict a positive relation between seizing ability and involvement in strategic change. We have argued that boards' MHC is positively related to seizing ability (Hypothesis 2b) and that seizing ability is positively related to strategic change. We therefore hypothesize:

*Hypothesis 3b:* The dynamic managerial capability of seizing positively mediates the relationship between boards of directors' managerial human capital and their involvement in strategic change.

**Reconfiguring as a mediator.** In addition to impacting strategic change through their sensing and seizing abilities, boards may impact strategic change through their reconfiguring abilities (Golden & Zajac, 2001; Westphal & Fredrickson, 2001). As part of reconfiguring, boards need to possess abilities which allow them to support the enhancement and alteration of strategic assets. This is necessary in order to adapt the organization to the external environment and maintain evolutionary fitness (Helfat & Peteraf, 2015). Reconfiguring ability may be used in knowledge management activities, development of governance mechanisms, incentive alignment, and replacement of the CEO and other members of the TMT (Teece, 2007). Boards are often involved in these activities and their involvement in these activities are often related to strategic change and turnaround of firms (Mueller & Barker, 1997). We suggest that boards that possess reconfiguring abilities are more likely to get involved in strategic change and thus enhance and alter strategic assets. The selection of a new CEO can be used as an example. A board possessing significant reconfiguring abilities can by the means of selecting a new CEO get involved in a process which contributes to significant change (Westphal & Fredrickson, 2001). The process may result in a new strategy, vision, management team, altered employee motivation etc. In such a process the board needs to possess a wide variety of reconfiguring capabilities. An example of a reconfiguring capability used in the process of selecting a new CEO may include the skills of overcoming resistance to change (Helfat & Peteraf, 2015). With the possession of these capabilities we suggest that a board is more likely to get involved in strategic change through the selection of a new CEO as they can take on the process with more skills and confidence. These arguments support the idea that board reconfiguring ability positively impacts boards' involvement in strategic change. Since we have argued that MHC is positively related to reconfiguring ability (Hypothesis 2c) and that reconfiguring ability is positively related to strategic change, we formulate:

*Hypothesis 3c:* The dynamic managerial capability of reconfiguring positively mediates the relationship between boards of directors' managerial human capital and their involvement in strategic change.

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### 3. Method

#### 3.1. Data Collection and Sample

The hypotheses developed in the previous section were tested using the Value Creating Boards survey conducted among Norwegian companies from the end of 2005 until the first half of 2006 (Sellevoll et al., 2007). The database is unique since it contains a large number of validated scales and items related to the actual behavior of boards that is publicly available (Huse, 2007; Minichilli & Hansen, 2007; van Ees, van der Laan, & Postma, 2008; Zattoni, Gnan, & Huse, 2015; Zhang, 2010, 2011; Zona & Zattoni, 2007). Specifically, it contains appropriate items which have been used to study boards from a dynamic resource perspectives (Zhang, 2010). The questionnaire survey method follows the call that measures capturing actual board behavior should be applied in corporate governance research (Hambrick et al., 2008). The questionnaire used contained 265 questions, where all questions were short, specific and using simple formulations to avoid vague interpretations. The survey item responses were based on a 7-point Likert-type scale. The questionnaire was sent to 2954 firms in different categories: firms at the Oslo Stock Exchange, publicly tradable firms, private joint stock companies with > 100 employees, private joint stock companies with 50-100 employees and private joint stock companies with < 50 employees. We excluded micro enterprises which are those with less than 10 employees (EU, 2003) in order to look for companies more likely to have formal governance arrangements (Veltrop, Hermes, Postma, & Haan, et al., 2015; Zahra & Filatotchev, 2004).

The hypotheses were tested on CEO responses where the overall response rate was 33%. Excluding firms with less than 10 employees led us to a sample containing 606 responses from CEO's. As commonly acknowledged, gaining access to process data is one of the major challenges in conducting empirical research on boards of directors (Daily, Dalton, & Cannella, 2003). Consequently, researchers have frequently conducted studies using primary survey data based on single respondents (Pearce & Zahra, 1991; Zahra et al., 2000; Zattoni et al., 2015). As argued by other authors, we consider CEOs as good informants as they have the knowledge about board processes in the companies they work and they are in a better position than other board members to evaluate the boards' impact on strategy (Zahra et al., 2000).

As our data collection takes place in Norway one should be aware that Norwegian law requires a two-tier board system where the board delegates daily operations to a second tier consisting of a CEO or a managing

director (Huse, 2007; Seierstad & Opsahl, 2011). This is unlike the Anglo-American system where there is a one-tier system (no delegation), however Norwegian boards have been influenced by Anglo-American practices and have improved its performance as a result (Oxelheim & Randøy, 2003). Further, Norway has a political agenda to seek reforms in corporate governance by studying the practice of other countries (Huse, 2007). Norwegian boards are thus part of a larger corporate governance system that can provide interesting nuances to global practices of board work that can be transferred across countries (Aguilera & Cuervo-Cazurra, 2004; Huse & Rindova, 2001).

### **3.2. Dependent Variable**

The dependent variable is *strategic change*. The variable is a board level outcome that measures boards' involvement in strategic change. We follow the arguments of Helfat and Peteraf (2015) that teams and individual leaders impact strategic change through their involvement in opportunity recognition, strategic investments, business model designs and alteration of strategic assets. Boards can impact these aspects of strategic change through their involvement in strategic orientation and strategic adaption (Golden & Zajac, 2001). First, strategic orientation addresses the process of developing the strategic focus of the firm through activities such as initiating, ratifying, implementing and controlling strategies. These are the activities by which boards are involved in the strategic process (Huse, 2007; Zhang, 2010). It is argued that boards need to be involved in these processes if they aim to achieve competitive advantages and strategic change (Zahra, 1990). Second, strategic adaption represents important reactions to environmental changes that the board needs to respond to. It can be decisions involving acquisitions, restructuring, downsizing and new technological solutions (Golden & Zajac, 2001). Involvement in such decisions impact organizational change (Augier & Teece, 2008) and more specifically boards' participation in these types of decisions have been argued to lead to strategic change (Jensen & Zajac, 2004). We measure boards' involvement in strategic change using five items representing both strategic orientation and strategic adaption. Factor analysis shows that the five items belong to the same group. The Cronbach's  $\alpha$  statistic is on the acceptable level of 0.701. These results indicate a strong consistency among the items. Table 1 shows the items included in the variable, factor loadings and reliability.



### 3.3. Independent Variable

The independent variable is *managerial human capital*. MHC is a team-construct measured at the level of the board that captures the skills and experience that the board brings to decision processes. The construct has in previous literature been specified to consist of generic, industry-specific and firm specific skills (Castanias & Helfat, 1991). An expansion of the definition in later research leads to the introduction of the category emphasizing related industry skills (Castanias & Helfat, 2001). The expanded model includes the full range of managers in the organization, including boards of directors. Our six items used to operationalize board MHC capture firm-specific, industry-specific and related industry skills. We argue that there is a good conceptual match between these items and the construct of MHC as described in previous board research (Haynes & Hillman, 2010; Khanna et al., 2014). As it is important to capture the construct on a team level (Becker, 1962) we ask respondents to evaluate each item in terms of the board as a whole. Consequently, we avoid the pitfalls of aggregating individual resources to develop a group construct (Khanna et al., 2014). The Cronbach's  $\alpha$  statistic is on the acceptable level of 0.887. See Table 1 for details on the items included.

### 3.4. Mediators

Our multiple mediator model has three mediators that all represent a specific dynamic managerial capability measured as a team-level construct at the level of the board. They include the boards' sensing, seizing and reconfiguring abilities. In our model we measure the managerial cognitive capabilities that underpin these DMC as proxies for our mediators (Helfat & Peteraf, 2015). This conceptualization builds on the arguments that DMC can be disaggregated for analytical purposes into sensing, seizing and reconfiguring components that depend in part on managerial cognitive underpinnings.

The *sensing* variable represents the ability of boards to sense opportunities and threats. As discussed earlier, the cognitive capabilities of attention and perception contribute to a sensing ability (Helfat & Peteraf, 2015). Three items are used to measure attention and perception and thus capture board sensing capability (See Table 1 for a detailed description of the items included). In line with the argument that attention is about detecting signals and maintaining a vigilant or alert mind (Posner & Petersen, 1990), we have measures which capture the extent to which the board is active in finding additional information to reports from management. Perception is about construction of

useful and meaningful information leading to pattern recognition and different interpretations (Helfat & Peteraf, 2015). Measures are therefore used that capture the extent to which the board members ask critical questions regarding material they have received from management.

*Seizing* is related to business model design and the capacity to make appropriate strategic investments which requires the cognitive capabilities of problem-solving and reasoning (Helfat & Peteraf, 2015). Three items measure problem-solving and reasoning capabilities of boards and thus their seizing capabilities. Problem-solving is about finding a way around a problem to reach a goal (Helfat & Peteraf, 2015). As such, we used measures capturing the boards' ability to present and find creative and innovative solutions to capture problem-solving. There is a close relationship between reasoning and problem-solving but they can be distinguished as reasoning is more about evaluating information, arguments, and beliefs to determine if a conclusion is valid or reasonable (Helfat & Peteraf, 2015). We argue that board discussions can be a proxy for reasoning and therefore we used a measure capturing active conduct of board discussions to measure reasoning.

From a cognitive capability perspective *reconfiguring* has been argued to have two main sources; namely language and communication, as well as social cognition (Helfat & Peteraf, 2015). Communication and language capabilities are important in achieving understanding of and support for reconfiguring activities. In this study, questions representing language and communication capture the level of open discussions between board members. Social cognition are the mental activities related to perceiving, remembering, thinking about and understanding people which influence our social behavior in terms of relationships and interactions with other people (Helfat & Peteraf, 2015). The boards' capacity to foster values and attitudes, and build trust are important aspect of their social cognitive capabilities that builds reconfiguring capability (Gulati, 1995; Helfat & Peteraf, 2015). Consequently, we ask questions about trust between board members as well as their values and attitudes.

All the three constructs measuring the DMC have acceptable Cronbach's  $\alpha$  statistics (Sensing 0.792, Seizing 0.776, and Reconfiguring 0.759). Factor analysis was also carried out on these constructs. The tests indicate strong consistency among the items as seen in Table 1.

### 3.5. Control Variables

Consistent with prior research on boards, we apply control measures on board and organizational levels (Minichilli, Zattoni, & Zona, 2009). We include these variables as they are predicted to have an impact on strategic change and/or the mediating variables. On a firm level we control for firm size, firm age, firm industry and high tech. Previous empirical research has used *firm size* and *firm age* as control variables related to strategic change (Haynes & Hillman, 2010; Zúñiga-Vicente, de la Fuente-Sabaté, & Suárez-González, 2005). Accordingly, we control for firm size (logarithm of number of employees, man working years) and firm age (logarithm of 2005 minus incorporation year). Researchers have argued that industry complexity and dynamics may be important when studying strategic change and MHC (Haynes & Hillman, 2010). Therefore, we control for *firm industry* (dummy for service, manufacturing and production, and other industry) and *high tech* (dummy whether the firm is considered a high tech company or not).

At the board level we control for board size, CEO duality, meeting duration and background diversity. *Board size* (the number of board members with full voting rights) which is part of the well-studied group of “usual suspects” has often been controlled for in previous research. We control for it as it has been argued to impact strategic change (Goodstein, Gautam, & Boeker, 1994) and has been used as a control variable in studies of strategic change (Westphal & Fredrickson, 2001). CEO power has been found to have significant impact on strategic change (Haynes & Hillman, 2010). This construct has partly been captured by measuring *CEO duality* (the CEO is also the board chairperson) which we also control for in this study (Jensen & Zajac, 2004). We control for *length of board meetings* as this variable has been argued to have a positive impact on board level outcomes (Gabrielsson & Winlund, 2000). *Background diversity* (the mix of backgrounds represented on the board) is an item which has produced conflicting conclusions in board research (Johnson et al., 2013). We find it important to control for this item as it is closely related to board MHC (Johnson et al., 2013), has been found to inhibit strategic change (Goodstein et al., 1994) and has been argued to impact DMC and strategic change (Helfat & Peteraf, 2015). We measure background diversity using five items representing diversity in functional background, industrial background, educational background, personality and age (Minichilli & Hansen, 2007). As indicated in Table 1, factor loadings and reliability show strong consistency among the items.

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Insert table 1 about here  
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### 3.6. Data Analysis

The analysis involved the use of SPSS 23.0. Descriptive statistics and correlation data were calculated for each of the variables studied. Our main analysis was conducted in four steps where we applied the bootstrapping method described by Preacher and Hayes (2008). It is a nonparametric resampling procedure where samples are taken multiple times from an existing data set in order to create an empirical approximation of the sampling distribution. The bootstrapping method can be recommended over other methods used for testing mediation, for example the causal step approach (Preacher & Hayes, 2008). The bootstrapping method is preferred when examining mediation as it offers increased power and while maintaining reasonable control over type 1 error rates (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). To test our hypothesis in the mediation model, a series of steps were undertaken. First, our independent variable was regressed onto our dependent variable (i.e. Hypothesis 1). Secondly, our independent variable was regressed onto our three mediators (i.e., Hypotheses 2a,b,c). Thirdly, we test mediation using a multiple mediation model where mediation is tested simultaneously on multiple variables which is argued to be more precise and parsimonious compared to testing several simple mediation models (Preacher & Hayes, 2008). As such, we simultaneously test whether sensing, seizing and reconfiguring mediate the relationship between MHC and strategic change (i.e. Hypotheses 3a, b, c). By including all three mediators in the model allows us to determine the relative magnitudes of the indirect effects associated with the specific mediator (Preacher & Hayes, 2008). Hence, we can compare the effects of the three specific DMC and decide which one should be given more weight.

In our case mediation was tested using a 95% confidence interval while obtaining 5000 bootstrap samples using the biased corrected method. Mediation was tested using the SPSS PROCESS macro (Preacher & Hayes, 2008). It calculates confidence intervals to test the indirect effects associated with the mediation model. If the generated confidence interval does not include 0, then the variable is a significant mediator in the model. Finally, the Sobel test was used to test the robustness of our results.

#### 4. Results

Table 1 provides descriptive statistics and correlations for the variables used in the study. The correlation analysis as shown in table 2 gives an early insight into the relationship between constructs.

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Insert table 2 about here  
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As high levels of multicollinearity can result in unstable regression coefficients we inspected the values of variance inflation factors (VIF) to assess our data for multicollinearity. The VIF values ranged from 1.12 to 1.33 for the variables in our model, which is significantly lower than the commonly accepted level of 10 (Hair, Anderson, Tatham, & Black, 2006). Hence no serious multicollinearity problems were expected.

The first regression model was run to test the effects of MHC on strategic change. Hypothesis 1 was supported and therefore boards of directors' MHC is a significant and positive predictor of boards' involvement in strategic change (Beta=0.17,  $p < 0.01$ ). The  $R^2$  for the model was 0.11 and the model was significant ( $F(11, 594) = 6.91, p < 0.001$ ). The control variables length of board meetings, background diversity and firm size were found to have a significant impact on strategic change.

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Insert table 3 about here  
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A regression model was run to test the effects of MHC on the DMC of sensing (Hypothesis 2a). The impact of boards of directors' MHC was found to have a significant positive impact on their sensing capabilities (Beta=0.18,  $p < 0.001$ ), thus providing support for Hypothesis 2a. The  $R^2$  for the model was 0.13 and the model was significant ( $F(11, 594) = 8.17, p < 0.001$ ).

Similarly, we test the effects of MHC on seizing (Hypothesis 2b). Boards of directors' MHC was found to have a significant positive impact on their seizing capabilities (Beta=0.30,  $p < 0.001$ ), thus providing support for Hypothesis 2b. The  $R^2$  for the model was 0.20 and the model was significant ( $F(11, 594) = 13.50$   $p < 0.001$ ).

Hypothesis 2c was also tested and we found that boards of directors' MHC has a significant positive impact on their reconfiguring capabilities (Beta=0.29,  $p < 0.001$ ), thus support for the hypothesis was found. The  $R^2$  for the model was 0.20 and the model was significant ( $F(11, 594) = 13.77$   $p < 0.001$ ). Board member background diversity and board meeting duration were two control variables that had a significant impact on all three dynamic managerial capabilities. Furthermore, board size was found to have a negative impact on seizing.

Results of the mediation analysis supported the mediating role of sensing in the relationship between MHC and strategic change (Beta=0.02, CI=0.00 to 0.05). Hypothesis 3a is accepted.

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 Insert table 4 about here  
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Our results also supported the mediating role of seizing in the relationship between MHC and strategic change (Beta=0.06, CI=0.03 to 0.10). Hypothesis 3b is accepted. In addition, the results indicate that the direct effect of MHC is no longer significant (Beta=0.08,  $t(594)=1.27$ ,  $p > 0.05$ ), thus suggesting full mediation for both sensing and seizing. Our results show that the mediating role of reconfiguring in the relationship between MHC and strategic change is not significant (Beta=0.01, CI=-0.03 to 0.06). Hypothesis 3c can therefore not be confirmed.

Finally, we test robustness where the results of the Sobel test confirm our previous mediating results for sensing (Sobel test = 2,04,  $p < 0,05$ ), seizing (Sobel test = 3,26,  $p < 0,05$ ) and reconfiguring (Sobel test = 0,74, *ns*).

## 5. Discussion

The main purpose of this study was to investigate how boards' MHC affects DMC and in turn strategic change. We developed and tested a research model addressing boards' involvement in strategic change,

applying the UET and the DMC perspective. The tested model specifies how MHC may impact DMC of boards which in turn may reflect differences in boards' involvement in strategic change.

Our first set of findings (Hypothesis 1) suggests that boards' MHC positively impacts their involvement in strategic change. Consistent with our predictions it can therefore be suggested that MHC is a core asset providing the capacity to involve boards in strategic change (Adner & Helfat, 2003). More specifically, board members' knowledge and experience is valuable as it can be used to shape decisions which lead strategic change (Haynes & Hillman, 2010; Westphal & Fredrickson, 2001). This finding is in line with the theoretical argument that MHC is the stock of resources that creates the basis for human behavior, decision-making and action that result in strategic change (Helfat & Martin, 2014; Kor & Mesko, 2013). Furthermore, the finding support the arguments from the upper echelons theory that organizations and their strategic choices are a reflection of the demographics of its most powerful actors, in this case the members of the board (Carpenter et al., 2004; Hambrick & Mason, 1984).

We also find that MHC positively impacts specific types of DMC (Hypotheses 2a-c). These findings suggest that MHC impacts the cogitative capabilities that shape the boards' ability to sense and seize opportunities, and reconfigure the firm. As such, we show that boards' MHC is the set of resources that builds important capabilities that are required to respond to constantly changing conditions in the external environment (Helfat & Peteraf, 2015; Teece, 2007). Specifically, we find that MHC builds sensing abilities. It can therefore be claimed that board members' knowledge and experience positively impacts their scanning, searching and interpretative activities (Teece, 2007). It also suggests that boards' MHC is positively impacting their ability to detect opportunities and threats caused by movements in industry dynamics, technology developments, competitive conditions and regulations (Johnson et al., 2013). With respect to seizing, we find that it is positively impacted by MHC. This finding confirms that board members' knowledge and experience builds an ability to respond to opportunities and threats. It also suggests that MHC builds problem-solving ability and reasoning skills which are of great value when seizing investments and shaping new business models (Helfat & Peteraf, 2015; Teece, 2007). We hypothesized and found a positive relation between MHC and reconfiguring abilities. This finding is consistent with the notion that boards' MHC provide the ability to adapt, integrate and reconfigure assets as business environments change (Teece, 2007). Specifically, it suggests that reconfiguring activities such as replacing a CEO (Tian et al., 2011) or acquiring another firm (Walters et al., 2008) may be more effectively performed when the board has sufficient MHC.

We find that the mediating effects of sensing and seizing (Hypotheses 3a-b) in the relationship between human managerial capital and strategic change is positive. It means that the board MHC are the resources that build an ability to sense and seize opportunities which in turn provides the grounds for responding to constantly changing business conditions. This finding is consistent with the notion that board resources impacts board processes which in turn leads to board level outcomes (Forbes & Milliken, 1999). Testing these relationships brings true understanding to how boards impact strategic change. Specifically, it shows that the empirical measuring and testing of the mediating processes, using the UET (Buyl et al., 2011; Carpenter et al., 2004) and the DMC perspective (Eggers & Kaplan, 2013; Helfat & Peteraf, 2015), bring more light to the dynamic processes and “how” boards achieve strategic change.

Our last hypothesis (Hypothesis 3c) shows that the boards’ ability to reconfigure does not mediate the relationship between MHC and strategic change. Such a finding was unexpected and needs to be discussed further. The first explanation could be that boards reconfiguring abilities are not utilized as other organizational levels are in a better position to capitalize on such capabilities (Huse & Rindova, 2001). As argued by other authors, large-scale initiatives to reconfigure resource commitments are best managed by the corporate level executives (Martin, 2011). Secondly, reconfiguring, to a large extent, involves implementation of different initiatives (Teece, 2007). Boards have been argued not to be involved in implementation (Forbes & Milliken, 1999). For that reason, the boards’ ability to reconfigure may not impact their involvement in strategic change.

## **6. Conclusion**

In conclusion, this study has applied the DMC perspective and UET to investigate boards of directors’ involvement in strategic change. By embracing a dynamic and cognitive perspective to boards of directors, we have brought more understanding to the mediating processes that impact boards’ involvement in strategic change. In the following we present theoretical and managerial implications of the study as well as some limitations and directions for future research.



### **6.1. Theoretical Contributions and Implications for Research**

The study makes three theoretical contributions to board and strategic management literature. First of all, it has been argued that moving the research field of boards of directors forward requires new theoretical approaches, especially theoretical arguments from the strategic management literature (Shen & Gentry, 2012). By applying the DMC perspective and the UET, we provide the opening empirical testing, to our knowledge, of DMC and their impact on strategic change in a board setting. In doing so, we bring new insights to the already established research on boards and strategic change (Golden & Zajac, 2001; Jensen & Zajac, 2004; Westphal & Fredrickson, 2001). These new insights have a foundation in two complementary and interconnected theoretical frameworks that jointly facilitate a better understanding of the relationships between MHC, DMC and strategic change. Such, research moves beyond examining strategic change from a pure static perspective to a perspective where we are provided with answers on how (in terms of dynamic processes) strategic change is achieved. We therefore hope that our contribution will motivate researcher to use these theoretical perspectives when exploring boards of directors and strategic change as has been done in other fields (Bendig, Strese, Flatten, da Costa, & Brettel, 2018; Herrmann & Nadkarni, 2014).

Secondly, the study is the first to our knowledge to explicitly test DMC from a cognitive perspective in a board setting. We demonstrate not only that the cognitive capabilities that build DMC are important, but also how they are important. We specifically examine the mediating effects of sensing, seizing and reconfiguring from a cognitive perspective and thus open up parts of the “black box” bringing more understanding to the relationship between board resources and outcomes (Buyl et al., 2011; Huse, 2005; Sirmon et al., 2007). By doing so, we explore the cognitive capabilities of perception, attention, problem-solving, reasoning, communication and social cognition and their impact on boards’ involvement in strategic change. Our research reveals that cognitive capabilities can be measured and tested. In this process we find that they matter and have a clear impact on strategic change. Thus, we support the arguments of other researchers proclaiming that cognitive perspectives can bring research on the DMC (Eggers & Kaplan, 2013) and UET (Buyl et al., 2011) forward.

Thirdly, the ability of firms to grow and address major environmental changes is more important than ever before. As argued by numerous authors, DMC lie in the core of enterprise success as they have been argued to determine quality of managerial decision making and strategic change (Augier & Teece, 2009; Helfat &

Martin, 2014). As a result, the area has attracted increasing attention from management and strategy scholars. However, this attention has mainly focused on theoretical development while empirical research has lagged behind (Helfat & Martin, 2014). As such, the absence of valid measures has been a major shortcoming to the progress of research in this field (Danneels, 2015). The measures for sensing, seizing and reconfiguring which have been developed in this paper based on the conceptual work of Helfat and Peteraf (2015) is thus initial progress in the empirical enquiry of DMC. Refinement and precision of these measures can lead to more generally accepted ways of measuring DMC. Such developments will create possibilities in further enhancing theoretical rigor.

## **6.2. Managerial Implications**

The article has several implications for board members and corporate governance practitioners. First, given that board members' MHC has a significant impact on DMC and strategic change, the selection of board members becomes critical. As such, the MHC should be an important selection criterion that nomination committees take into consideration and assess in order to assure that individual and collective MHC is in place. In this process it is important that the MHC of board members are assessed in terms of requirements to achieve evolutionary fitness and adaption to changing environments. This may require integration, building and reconfiguring in order to align the boards' MHC to the firms' critical strategies, technologies, products and markets. Furthermore, as part of the selection process of board members, nomination committees should be aware that different types of directors will possess different levels of sensing, seizing and reconfiguring abilities. For example, entrepreneurial board members are likely to have their strengths in sensing abilities and board members with backgrounds of managing mature organizations are more gifted at reconfiguring (Helfat & Peteraf, 2015). Hence, practitioners should be aware that a board with a majority of board members with backgrounds in mature organizations may have difficulties in achieving strategic change.

A second implication for practice relates to the importance of continuously developing the processes through which boards create strategic change. Along these lines we argue that boards should develop their sensing and seizing capabilities as they positively impact strategic change. Board development activities are today frequently used and are in line with good corporate governance practice and requirements of most international codes (Minichilli, Gabrielsson, & Huse, 2007). As such, board evaluations represent formal routines that can develop the processes within boards (Minichilli et al., 2007). Such evaluations should assess and find ways to develop the

processes leading to attention and perception ability as part of developing sensing capability. Similarly, problem-solving and reasoning ability should be assessed in order to develop seizing capability.

Thirdly, our analysis suggests that boards with sensing and seizing capabilities are more likely to be involved in activities that impact strategic change. Depending on the situation the company is in, these capabilities can be applied to different strategic contexts and with different purposes. For example, some firms will be very keen in possessing sensing and seizing capabilities especially if they have a strategy to obtain early mover advantages (Helfat & Peteraf, 2015). With our findings we show that such companies could especially benefit from having a board with sensing and seizing capabilities as these could enhance the ability of the firm to sense and seize new opportunities, guide strategic change and thus move more quickly in markets. We can point to the prominent example of Uber that has successfully reshaped the taxi industry and its board which is consisting of board members with entrepreneurial backgrounds and thus sensing and seizing capabilities (Bensinger & Nicas, 2016). Naturally such a company would also need to possess reconfiguring capabilities too. However, our findings suggest that such capabilities should not be possessed by the board. Instead, they may be more efficient on other levels of the organization, for example possessed by the CEO (Helfat & Peteraf, 2015) or business unit executives (Martin, 2011) as suggested by other researchers.

### **6.3. Limitations and Future Research**

We acknowledge that the study has some limitations which could be improved in future research. Firstly, even though the study only explores Norwegian firms, the results can be generalized across other countries with similar governance systems and board structures. However, in order to strengthen the generalizability of the results we recommend that future research extends the examination to other countries with different governance systems. Secondly, we acknowledge that our study has not examined the boards' involvement in strategic change on any organizational level outcomes. Our study has a micro level focus and therefore contributes to a better understanding of board dynamics. Future studies could extend the model beyond board aspects and examine strategic (business strategy, corporate strategy, etc.) and performance (financial, market, innovation etc.) outcomes on an organizational level (Carpenter et al., 2004; Herrmann & Nadkarni, 2014). Thirdly, we have brought attention to MHC thus providing understanding to how knowledge and experience impacts DMC and strategic change. Examining managerial social capital, managerial human capital and managerial cognition as described by Helfat and

Martin (2014) at the same time could bring more understanding to the building blocks of DMC. Fourthly, our control variable, background diversity, has revealed to have a significant impact on DMC and strategic change. Its impact on these items could therefore be hypothesized in future studies.

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## TABLES

**Table 1: Construct Reliability and Factor Loadings**

Construct	Measures	Factor Loadings	Cronbach Alpha
Strategic Change (Golden & Zajac, 2001)	The board has with great authority been involved in putting decisions on long term strategies and main goals into action.	0.81	0.70
	The board has with great authority been involved in controlling the follow up of decisions on long term strategies and main goals into action.	0.80	
	The board has with great authority been involved in evaluation of acquisition of other firms.	0.59	
	The board has with great authority been involved in evaluation of restructuring and downsizing.	0.62	
	The board has with great authority been involved in evaluation of new technological solutions.	0.61	
Managerial Human Capital (Castanias & Helfat, 2001)	The board members have extensive knowledge of the firm's main operations	0.81	0.89
	The board members have extensive knowledge of the firm's critical technology and key competences	0.83	
	The board members have extensive knowledge of the firm's weak sides and its products and services	0.81	
	The board members have extensive knowledge of the development regarding the firm's customers, markets, products and services	0.79	
	The board members have extensive knowledge of the firm's suppliers and customers negotiation power	0.79	
	The board members have extensive knowledge of threats from entrants and new products and services	0.77	
Sensing (Helfat & Peteraf, 2015)	Our board members are very active in finding additional information to reports from management	0.75	0.79
	Our board members ask critical questions regarding proposals from management	0.89	
	Our board members ask critical questions regarding information from management	0.89	
Seizing (Helfat & Peteraf, 2015)	All board members participate actively in board discussion	0.71	0.78
	Our board members present a number of creative and innovative proposals in the meetings	0.90	
	Our board finds a number of creative and innovative solutions	0.89	
Reconfiguring (Helfat & Peteraf, 2015)	Between board members there are common values, attitudes and norms regarding ethics, justice and corporate responsibility etc.	0.66	0.76
	Between board members there are considerable weight on trust when conflicts are to be solved	0.74	
	Our board members appreciate being together in the meetings	0.75	
	Our board members have very good atmosphere together in the board meetings	0.80	
	Our board members communicate their personal preferences and considerations open and freely	0.62	
Background diversity (Minichilli & Hansen, 2007)	Our board members represent diversity with regards to functional background	0.73	0.71
	Our board members represent diversity with regards to industrial background	0.78	
	Our board members represent diversity with regards to educational background	0.74	
	Our board members represent diversity with regards to personality	0.66	
	Our board members represent diversity with regards to age	0.48	

**Table 2: Descriptive and Correlation Data**

<b>Pearson Correlation</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 CEO Duality	1.00														
2 Board Size	-0.22**	1.00													
3 Industry: Service	0.03	-0.10**	1.00												
4 Industry: Manufacturing	0.04	0.04	-0.53**	1.00											
5 Industry: Other	-0.05	0.00	-0.38**	-0.45**	1.00										
6 Board Meeting Duration	-0.12**	0.14**	-0.04	0.00	0.01	1.00									
7 Background Diversity	-0.07	0.03	-0.05	0.03	-0.02	0.08*	1.00								
8 Firm Size (ln)	-0.16**	0.58**	-0.06	0.12**	-0.04	0.12**	0.10**	1.00							
9 Firm Age (ln)	-0.01	0.15**	-0.07*	0.07	0.02	0.00	-0.01	0.12**	1.00						
10 High Tech	-0.04	0.13**	-0.13**	0.08*	0.06	0.01	0.13**	0.11**	-0.02	1.00					
11 Strategic Change	0.00	0.01	-0.06	0.05	0.01	0.05	0.27**	0.14**	-0.01	0.11**	1.00				
12 Managerial Human Capital	0.14**	-0.27**	0.01	0.03	-0.07	-0.03	0.30**	-0.16**	-0.07*	-0.04	0.20**	1.00			
13 Sensing	-0.07	-0.05	-0.03	-0.03	0.04	0.05	0.29**	0.03	-0.01	0.07	0.30**	0.24**	1.00		
14 Seizing	0.05	-0.19**	0.02	0.00	-0.01	0.04	0.33**	-0.15**	-0.03	0.02	0.31**	0.37**	0.44**	1.00	
15 Reconfiguring	0.03	-0.01	-0.05	-0.01	0.04	0.06	0.33**	0.00	0.01	0.02	0.26**	0.39**	0.33**	0.50**	1.00
Minimum	0.00	1.00	0.00	0.00	0.00	0.00	1.00	2.30	0.00	0.00	1.00	1.00	1.00	1.00	1.00
Maximum	1.00	14.00	1.00	1.00	1.00	75.00	7.00	10.37	5.88	1.00	7.00	7.00	7.00	7.00	7.00
Mean	0.07	5.26	0.31	0.38	0.24	3.71	4.76	4.49	3.33	0.35	4.18	5.29	4.41	4.37	5.28
Standard Deviation	0.25	1.98	0.46	0.49	0.43	3.10	1.27	1.39	1.06	0.48	1.34	1.00	1.27	1.29	0.92

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

N=606

**Table 3: Regression Results for Strategic Change and Dynamic Managerial Capabilities**

	<b>Model 1</b>			<b>Model 2</b>			<b>Model 3</b>			<b>Model 4</b>			
	<b>Strategic Change</b>			<b>Sensing</b>			<b>Seizing</b>			<b>Reconfiguring</b>			
	Beta	LLCI	ULCI	Beta	LLCI	ULCI	Beta	LLCI	ULCI	Beta	LLCI	ULCI	
CEO Duality	0.18	-0.27	0.63	-0.20	-0.62	0.22	0.31	-0.09	0.71	0.17	-0.12	0.46	
Board Size	-0.07	-0.14	-0.01	-0.07	-0.13	0.00	-0.06	-0.12	0.00	0.02	-0.03	0.06	
Industry: Service	0.01	-0.42	0.44	-0.11	-0.51	0.29	0.31	-0.07	0.70	-0.13	-0.41	0.14	
Industry: Manuf.	0.06	-0.36	0.49	-0.17	-0.57	0.23	0.16	-0.22	0.54	-0.14	-0.41	0.13	
Industry: Other	0.10	-0.34	0.54	0.06	-0.35	0.47	0.37	-0.03	0.77	0.00	-0.28	0.28	
Board Meeting Dur.	0.11**	0.03	0.18	0.13***	0.06	0.19	0.08*	0.01	0.14	0,05*	0.00	0.10	
Background Div.	0.17***	0.08	0.25	0.21***	0.13	0.29	0,23***	0.15	0.30	0,15***	0.10	0.21	
Firm Size (ln)	0.17***	0.08	0.25	0.02	-0.06	0.11	-0.10	-0.18	-0.02	-0.02	-0.08	0.03	
Firm Age (ln)	-0.02	-0.11	0.08	0.06	-0.03	0.14	0.06	-0.03	0.14	0.02	-0.04	0.08	
High Tech	0.22	0.00	0.43	0.10	-0.11	0.30	0.05	-0.14	0.25	-0.02	-0.16	0.12	
Man. Human Capital	0.17**	0.06	0.28	0.18***	0.07	0.28	0.30***	0.19	0.40	0,29***	0.22	0.36	
F(df1, df2)		F(11,594)=6.91			F(11,594)=8.17			F(11,594)=13.50			F(11,594)=13.77		
p		***			***			***			***		
R <sup>2</sup>		0.11			0.13			0.20			0.20		

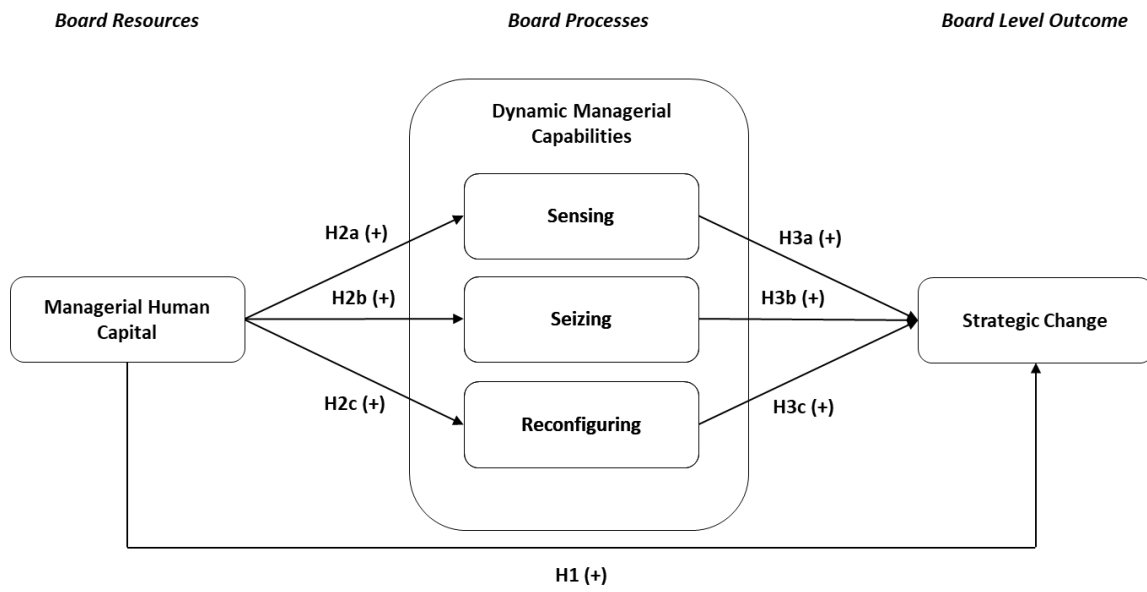
\* p<.05  
\*\* p<.01  
\*\*\* p<.001

LLCI=Lower level confidence interval, ULCI=Upper level confidence interval

**Table 4: Results from Mediation Analysis**

	Point Estimate	Product of Coefficients		BC 95%CI	
		SE	Lower	Upper	
Sensing	0.02	0.01	0.00	0.05	
Seizing	0.06	0.02	0.03	0.10	
Reconfiguring	0.01	0.02	-0.03	0.06	
TOTAL	0.09	0.03	0.04	0.15	

BC=Bias Corrected; 5000 bootstrap samples

**FIGURES****Figure 1: Research Model**