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Microfoundations of dynamic managerial capabilities: A personality perspective

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MICROFOUNDATIONS OF DYNAMIC MANAGERIAL CAPABILITIES: A PERSONALITY PERSPECTIVE

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Microfoundations of Dynamic Managerial Capabilities: A Personality Perspective

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I hereby declare that this PhD dissertation is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in this dissertation.

This PhD dissertation has also not been submitted for any degree in any university previously.

Alan Tea Jiun Haw
31 October 2020

ABSTRACT

Microfoundations of Dynamic Managerial Capabilities: A Personality Perspective

Alan Tea Jiun Haw

Research in dynamic capabilities (Teece 2007) looks at how organizations derive and potentially sustain competitive advantage by dynamically making sense of opportunities, marshalling and manipulating assets and resources in response to these opportunities (Eisenhardt & Martin, 2000; Teece, 2007). The study of dynamic managerial capabilities is concerned with the microfoundations – attendant attributes as it were – that underpin managers' ability to effectively participate in the dynamic capabilities of sensing, seizing and reconfiguring (Helfat & Martin, 2015b; Helfat & Peteraf, 2015). Apart from the predominant cognitive account of microfoundations, there remains an under-theorized and under-researched gap in the field of strategic management on the dispositional attributes of middle managers as potential microfoundations of dynamic managerial capabilities.

The personality disposition of extraversion followed by conscientiousness are generally regarded as the two strongest personality predictors of leadership effectiveness and emergence in the organizational psychology literature (T. A. Judge, Bono, et al., 2002; Cogliser, Gardner, Gavin, & Broberg, 2012). This study thus hypothesizes that extraversion would similarly show up as a predictor of the sensing, seizing, and reconfiguring aspects of dynamic managerial capabilities; while conscientiousness, on the other hand, would be negatively related to the sensing and reconfiguring aspects of dynamic managerial capability. The study examines non-public archival data on 323 focal managers from a publicly listed Japanese multinational company, a global leader in its mainstay business segment of industrial materials in the advanced manufacturing industry.

The personality disposition of extraversion was found to positively influence managerial performance in the dynamic managerial capabilities of sensing, seizing, and reconfiguring, while that of conscientiousness was found to be negatively related to sensing and reconfiguring. The results on extraversion is not surprising given the behavioral imperative for middle managers to actively scan the internal and external environment for opportunities, engage with multiple stakeholders to develop and deploy strategic initiatives, as well as influence organizational constituents towards a vision for change.

The results on conscientiousness raises an interesting conundrum for practitioners and organizations alike seeking to hire and develop the ‘best’ managers, as the very qualities of conscientiousness that support managerial performance in task and operational effectiveness would appear to also inhibit performance in dynamic capabilities, thus signalling that what's best for organizational structure and stability may not be best for strategic adaptability. The research calls to attention the potentially equivocal and complex issues involved in the selection, retention and deployment of managerial human resources, especially in the middle management rung of an organizational hierarchy, as firms undergoing strategic change consider how best to shore-up and preserve the competitive advantage arising from its human capital.

Table of Contents

List of Tables & Figures

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When I began my PhD journey in May 2017, never in my wildest imagination would I foresee writing and completing my dissertation with a global pandemic raging on around me. To say the journey hasn't been an easy one will be a severe understatement. But the fact is here I am, penning the Acknowledgement page of my manuscript, and looking back with a sense of marvel and gratitude how I've managed to make it to this point. As Isaac Newton famously said, "If I have seen further, it is by standing on the shoulders of giants."

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1. Introduction

In this study, I seek to elucidate the microfoundations of dynamic managerial capabilities by focusing on the personality dispositions of middle managers. I shall examine the relationships between middle managers' personality dispositions of extraversion and conscientiousness and their behavioral performance along Teece's (2007) dynamic capabilities of the sensing and seizing of opportunities, as well as the reconfiguring of firm resources.

The research on dynamic capabilities focuses on the organization as a unit of analysis. This body of research looks at how organizations derive and potentially sustain competitive advantage by dynamically making sense of opportunities, marshalling and manipulating assets and resources in response to these opportunities (Eisenhardt & Martin, 2000; Teece, 2007). In contrast, the study of dynamic managerial capabilities shifts the unit of analysis from the firm-level to the individual-level. In dynamic managerial capabilities, scholars are concerned with the microfoundations – attendant attributes as it were – that underpin managers' ability to effectively participate in the organizational processes of sensing, seizing and reconfiguring (Helfat & Martin, 2015b; Helfat & Peteraf, 2015).

On the microfoundations of dynamic managerial capabilities, the cognitive account seems hitherto to be the more prevalent explanation. It sheds light on how the mental processes of managerial cognition such as attention, perception and representation (to name a few) lead to strategic managerial capabilities under conditions of change (Helfat & Martin, 2015b; Helfat & Peteraf, 2015). On the other hand, noncognitive accounts of dynamic capabilities have looked at organizations as a collective body of predispositions and non-

deliberately learned behaviors, and how individual actors in such an ecology respond in situ to stimuli from within and without the firm (Nayak, Chia, & Canales, 2020).

Notwithstanding these accounts, there remains an under-theorized and under-researched gap in the literature on the dispositional attributes of managers as potential microfoundations of dynamic managerial capabilities. A rich heritage of organizational research points to personality traits as dispositional qualities that influence managerial behaviors and outcomes, from job fit and performance to leadership impact (Barrick & Mount, 1991; Barrick, Mount, & Judge, 2001; Hurtz & Donovan, 2000; T. A. Judge, Bono, Ilies, & Gerhardt, 2002; T. A. Judge, Heller, & Mount, 2002; Salgado, 1997; Tett & Burnett, 2003; Tett, Jackson, & Rothstein, 1991, 2006).

Research in dynamic managerial capabilities would stand to gain from the infusion of a personality perspective, as well as the application of that perspective to the at times overlooked middle management rung of hierarchical organizations. Academics and practitioners alike can intuitively attest to the complex phenomenon that is personality, and indeed it is a multidimensional construct and its impact on managerial behavior can similarly be multifaceted and intricate. Leadership and management, on the other end of the equation, are themselves certainly not monolithic notions as well. In bigger or more complex organizations, for instance, divisions of labor in the strategic function could well exist between the firm's top management team and its middle managers, resulting in potential differences in the roles played in strategic change, as well as the attendant qualities involved.

While CEO personality in strategic management research has garnered attention (Colbert, Barrick, & Bradley, 2014; Colbert, Judge, Choi, & Wang, 2012; Herrmann &

Nadkarni, 2014; Nadkarni & Herrmann, 2010; Peterson, Martorana, Smith, & Owens, 2003), there is in contrast far fewer studies on the personality dynamics of middle managers despite the important role middle management also play in the organizational hierarchy (Bartlett & Ghoshal, 1993; Maritan, 2001; Martin, 2011; Taylor & Helfat, 2009). Even scarcer still is the study of personality as potential microfoundations of dynamic managerial capabilities even though the scholarship on microfoundations recognizes the importance of individual differences and the heterogeneity in such individual attributes as precursors of competitive advantage.

In looking at managerial personality, this study focuses on the personality domains of extraversion and conscientiousness as outlined in what is commonly referred to in the research as the Big Five model (or Five Factor Model) of personality (Barrick & Mount, 1991; Barrick et al., 2001; McCrae & Costa, 2008; J. Wiggins & Pincus, 1992). Given that extraversion followed by conscientiousness are generally regarded as the two strongest personality predictors of leadership effectiveness and emergence (T. A. Judge, Bono, et al., 2002; Cogliser, Gardner, Gavin, & Broberg, 2012), this study hypothesizes that extraversion would, perhaps unsurprisingly, also show up as a predictor of dynamic managerial capabilities, while conscientiousness, on the other hand, would be negatively related to the sensing and reconfiguring aspects of dynamic managerial capability.

If conscientiousness were, indeed, to be negatively related to dynamic managerial capability, it raises an interesting conundrum for practitioners and organizations alike seeking to hire and develop the 'best' managers – the very qualities of conscientiousness that support managerial performance in task and operational effectiveness would appear to also inhibit

performance in dynamic capabilities, thus signaling that what's best for organizational structure and stability may not be best for strategic adaptability.

This study makes a potential theoretical contribution to our understanding of dynamic managerial capabilities by cross-pollinating with the research in personality, in the process expounding on the mechanisms and microfoundations of sensing, seizing and reconfiguring. It also makes a potential contribution to practice by calling attention to the potentially equivocal issues involved in the selection, retention and deployment of certain managerial qualities as a way to shore-up and preserve firm competitive advantage.

2. Dynamic Capabilities

The research on dynamic capabilities tends to define it as idiosyncratic and strategic routinized practices and processes, both at the firm level and the managerial level, that emerge from the path-dependent histories of the firm, and result in firm assets and resources being adaptably marshalled, managed and manipulated to extract strategic value in existing and new markets (Eisenhardt & Martin, 2000; Fredrickson, 1984; Grant, 1996; W. Q. Judge & Miller, 1991; Teece, 2007; Teece & Pisano, 1994; Teece, Pisano, & Shuen, 1997).

The dynamic capabilities of firms are thought to be a source of sustained competitive advantage since they enable a firm to adapt in shifting competitive landscapes, and to respond to opportunities and threats in rapidly changing environments (Eisenhardt & Martin, 2000; Teece et al., 1997). Since competitive advantage is often short term, dynamic capabilities by virtue of its adaptive nature help firms to generate a series of temporary advantages in response to emergent market conditions (Lengnick-Hall & Wolff, 1999).

In contrast to the resource-based view of the firm where firm resources are often seen in terms of somewhat static bundles and stable configurations, dynamic capabilities as an area of study focuses its attention on the mechanisms by which firm resources contribute to competitive advantage, especially against the backdrop of high-velocity markets (Galunic & Rodan, 1998; Lengnick-Hall & Wolff, 1999; Priem & Butler, 2001). In this regard, scholars have drawn a distinction between the notion of technical fitness and evolutionary fitness (Teece, 2007). While the former entails optimized configurations of firm resources to achieve operational effectiveness and capabilities, this in itself, while valuable, is not regarded as strategy nor dynamic capability (Porter, 1996). In contrast, dynamic capabilities, through

high-level mechanisms of resource management and manipulation, help drive evolutionary fitness where long-run value is created in spite of changing market conditions (Teece, 2007).

The scholarship on dynamic capabilities outlines the three high-level organizational and managerial mechanisms as the capability to sense and shape opportunities and threats, to seize opportunities, and to reconfigure a firm's intangible and tangible assets (Teece, 2007, p. 1319; Teece & Pisano, 1994; Teece et al., 1997). The dynamic capability of sensing opportunities is described as a "scanning, creation, learning, and interpretive activity" (Teece, 2007, p. 1322). These processes are posited as essential in striving for sustained firm competitive advantage in a business landscape where emergent opportunities and trajectories can be hard to discern.

The dynamic capability of seizing opportunities entails a capacity to "make high-quality, unbiased but interrelated investment decisions in the context of network externalities, innovation, and change" (Teece, 2007, pp. 1326–1327). As the firm seeks to address and seize opportunities, it not only needs to constantly maintain and improve its technological competences and strategic designs, it also needs to have the gumption to invest heavily in the right assets that are deemed to help it achieve its marketplace penetration.

Explicating the third aspect of dynamic capabilities, that of reconfiguring assets and managing threats, Teece (2007) argues for the firm's ability to recombine and reconfigure assets and organizational structures as key to support and sustain profitable growth. The dynamic capability of reconfiguring assets, he asserts, is "needed to maintain evolutionary fitness and, if necessary, to try and escape from unfavorable path dependencies" (2007, p. 1335). Processes and practices involved in organizational asset orchestration, redeployment

and reconfiguration can include, and are not limited to, business model redesign, asset realignment, revamping of routines, sharing of capability between different parts of the firm, and the geographic transfer of capability between markets (Capron, Dussauge, & Mitchell, 1998; Helfat & Peteraf, 2003).

3. Dynamic Managerial Capabilities

Stemming from the concept of dynamic capabilities is the notion of dynamic managerial capabilities, where the unit of analysis shifts from the organizational level to the individual level. As Teece asserts, it's necessary to "separate the microfoundations of dynamic capabilities from the capability itself" and to recognize the distinctions between organizational processes and managerial underpinnings (2007, p. 1321). Consequently, dynamic managerial capabilities is described as "the capacity of managers to create, extend, or modify the resource base of the organization" (Helfat et al., 2007, p. 3). Moreover, since strategic change and innovation within the firm is a function of managerial and entrepreneurial capacities in sensing and seizing opportunities, the concept of dynamic managerial capabilities has also been extended to describe the capacity of managers to take advantage of resources not just within the firm, but also in the firm's external environment (Harris & Helfat, 2013; Helfat & Martin, 2015b, 2015a).

There is immense value to be gained from directly focusing on managers as the subject of analysis in dynamic capabilities. First, managers are crucially involved in driving strategic change and innovation within the firm (Eisenhardt & Martin, 2000). For instance, research on product design demonstrates the role of managers in knowledge brokering and new product development (Hargadon & Sutton, 1997). In industries such as pharmaceuticals and precision engineering, managers are intimately embedded in knowledge creation routines to build new thinking within the firm (Helfat, 1997; Henderson & Cockburn, 1994).

Second, the study of managers can help shed light on the nature of the firm's path dependence. Besides environmental factors, path dependence can be traced to the learning mechanisms associated with managers' psychological attributes, and how the managerial

behavioral tendencies stemming from such attributes eventually get encoded as organizational routines and histories (Argote, 1999; Eisenhardt & Martin, 2000; Teece, 2007).

Third, studying the variance amongst managers helps to uncover managerial qualities that could serve as sources of competitive advantage in firms. Helfat and Martin (2015b) outline empirical research which shows variability in managers' impact on strategic change. For instance, variance in firm performance can be attributed to differences in managerial cognition, social capital, and human capital. Underscoring the value of understanding managerial qualities, Teece (2007, p. 1345) posits that the attendant and requisite managerial qualities of dynamic capabilities are often "enigmatic [and] cannot be out-sourced". The notion of dynamic managerial capabilities therefore provides a useful lens to examine the links between heterogeneity in managerial capabilities and heterogeneity in firm performance under conditions of change (Adner & Helfat, 2003; Helfat & Martin, 2015b, p. 1282).

Research on the strategic management impact of managers has typically focused on the enterprise's top management teams (Castanias & Helfat, 1991; Crossland, Zyung, Hiller, & Hambrick, 2014; Finkelstein, Hambrick, & Cannella, 2009; Hambrick, 2007; Hambrick & Mason, 1984; Maritan, 2001). For example, Teece claims that dynamic capabilities reside "in large measure" with top management teams (2007, p. 1346), as is also the case with entrepreneurial management who often bear the load of sensing and seizing opportunities, shaping the business ecosystem in the process.

Notwithstanding the continued interest in top management teams, scholars have asserted that it would also be productive to look below the uppermost managements as

delayering, decomposition, and decentralization of large organizations have often resulted in the need for middle managers (such as business unit general managers or the heads of smaller organizational units) to exercise more autonomy while remaining connected with and coordinated within the larger organizational whole (Bartlett & Ghoshal, 1993; Maritan, 2001; Martin, 2011; Simon, 2002; Taylor & Helfat, 2009; Teece, 2007).

To underscore the value of middle management research, Helfat and Peteraf (2015) stress that individuals other than those at the top could and do affect strategic change in organizations. They postulate that "analyzing the cognitive capabilities of managers below the top executive level would further enrich our understanding of strategic change [and that] explicit consideration of cognitive capabilities at the middle manager level could yield additional insights regarding the process of strategic change" (Helfat & Peteraf, 2015, p. 846).

Indeed, when the lens of analysis move away from the top management team to middle managers, as shall be the case in this study, the context and concerns that circumscribe the expression of dynamic managerial capabilities at the middle management level would shift as well. In organizations where hierarchical differentiations between top management and middle management exist, the strategic roles played by top management teams would likely differ from that played by middle management. Strategy formulation would more directly come under the ambit of the top management team, while execution and implementation of those strategic intents, ideas, and initiatives are apt to be what are expected of middle managers. Practices, routines, and managerial behaviors that characterize execution and implementation of strategy would reasonably differ from that of strategy

formulation, and thus frame our understanding of dynamic managerial capabilities for the middle management level differently.

Unlike top management teams whose priorities are typically on firm-level outcomes, middle managers tend to focus on their business units or departments and are responsible for translating the so-called ‘big picture’, organization-wide strategic goals into tangible actions, outcomes, and deliverables at their level. In the process of strategic change, middle managers could at times find themselves having to manage potential tensions and tradeoffs between what is strategically critical for their business units or departments and that of the larger organization or other business units. The stakeholder landscape middle managers are embedded in also tend to encompass numerous and potentially diverse groups, such as fellow peers who are also middle managers at varying proximal distance within the firm, direct reports who could be individual contributors or first line managers and supervisors, customers and suppliers, and of course the top management rung in the organization which typically comprises the top management team and the senior managers reporting into them. Each of these stakeholder groups could impinge differently on the development and expression of dynamic managerial capabilities in middle managers. These (non-exhaustive) contextual differences between top management and middle management could yield nuanced perspectives on the influence of attendant managerial qualities on dynamic capabilities, also termed as the microfoundations of dynamic managerial capabilities, which is where we shall turn our attention to next.

4. Microfoundations of Dynamic Managerial Capabilities

4.1 Cognitive Perspective

The study of cognition in strategic management has had a long and rich heritage (Daft & Weick, 1984; Smircich & Stubbart, 1985; Sims & Gioia, 1986). In competitive strategy for example, scholars have explored how decision makers develop cognitive categories when making sense of organizational diversity and defining the competitive other (Porac & Thomas, 1990, 1989).

In their magisterial review and extension of the cognitive approach to competitive strategy, Porac and Thomas (1990) highlight the importance of considering the mental models of competitive strategists by positing that organizational decision makers "act on a mental model of [the firm's competitive] environment" (p. 224), and in the process of competitive sensemaking, are required to "possess a mental representation of their own organization's characteristics and capabilities" (p. 231).

Setting the scene for a dynamic capability view of the firm within the theory of organizational adaptation, particularly foreshadowing the dynamic capabilities of reconfiguring and sensing, Porac and Thomas (ibid.) allude to "creative recombination[s which] could very well be part of the cognitive bases for entrepreneurial innovations" (p. 235) and how "cognitive [taxonomies] provide a summary of the broad interorganizational environment that is reasonable enough to allow decision makers to restrict the scanning of potential competitors to a cognitively tractable number of other organizations" (p. 233). Acknowledging that taxonomically organized cognitive categories may not adequately account for all areas of managerial knowledge and expertise, Porac and Thomas (ibid.)

recognize how variance in managerial cognition could herald a potential stream of further research.

Indeed, subsequently, in looking at the microfoundations of dynamic managerial capabilities, research has centrally focused on the cognitive capabilities that underpin such dynamic managerial capabilities (Adner & Helfat, 2003; Barr, Stimpert, & Huff, 1992; Finkelstein et al., 2009; Gary & Wood, 2011; Helfat & Peteraf, 2015; Kaplan, Murray, & Henderson, 2003; Smith & Tushman, 2005). These strands of research leverage theories of cognition in cognitive science, cognitive psychology and neuroscience to inform thinking on microfoundations as well as to explain heterogeneity of cognitive capacities among managers in relation to strategic change. Drawing from cognitive science and cognitive psychology for example, scholars invoke the notions of mental processes and operations (such as where and how attention is applied), as well as mental structures and representations (such as how information is encoded, stored and retrieved) (Gavetti, 2012; Luger, 1994; Schneider & Angelmar, 1993) to explore and explain the mechanisms in the cognitive microfoundations of dynamic managerial capabilities.

Likewise, Teece (2007) acknowledges the cognitive microfoundations of the dynamic capability of sensing and seizing of opportunities as well as reconfiguring of assets. He postulates that the cognitive capacities of management teams are where opportunity discovery and creation could originate. Allocation of managerial attention and decision making to seize opportunities under conditions of change similarly draw on managerial cognitive resources. In the reconfiguring of assets, just as how cognitive mechanisms could enable dynamic managerial capability, deeply ingrained and inflexible cognitive mechanisms

such as information filters, cognitive limitations and framing biases could, conversely, inhibit strategic capacity (Teece, 2000, 2007; Tripsas & Gavetti, 2000).

There is consensus in the field that heterogeneity in the microfoundations of managerial cognitive capacities are associated with differing outcomes in the exercise of the dynamic capabilities of sensing, seizing and reconfiguring. (Denrell, Fang, & Winter, 2003; Kaplan et al., 2003; Peteraf & Bergen, 2003). For instance, such heterogeneity may be associated with individual differences in how the manager rely on automatic versus controlled mental processes when making sense of opportunities (Helfat & Peteraf, 2015). In the seizing of opportunities through, for example, business model adaptation and the corresponding investment deployment (Teece, 2007), differences in the cognitive capabilities involved in problem solving and decision making are apt to influence variance in the speed and soundness of managerial actions and decisions (Athanasiou, 2000; Helfat & Peteraf, 2015; Maritan, 2001; Stanovich & West, 1997). Lastly, in terms of asset orchestration and reconfiguration, given the manager's need to influence and persuade co-workers to undertake new initiatives, variance in cognitive capacities relating to social cognition and perception are likely to result in heterogeneity in outcomes, such as overcoming organizational resistance to change and managing power relations among stakeholders (Bingham, Eisenhardt, & Furr, 2007; Galinsky, Magee, Inesi, & Gruenfeld, 2006; Helfat & Peteraf, 2015; Krackhardt, 1990; MacMillan & Guth, 1985).

4.2 Noncognitive Perspective

More recently, scholars have advanced a perspective of the noncognitive microfoundations of dynamic capabilities where a firm's strategic superiorities are derived from its tacit, complex, and idiosyncratically refined sensitivities and predispositions (Nayak

et al., 2020). Nayak and colleagues (2020) assert that the noncognitivist microfoundational aspects of firm dynamic capabilities is an undertheorized area as adaptive actions in strategic change need not only follow from symbol inference and manipulation (a fundamental aspect of cognitivism) but can be explained without allusion to mental processes or representations (Dreyfus, 2002; March, 1972). They argue that such tacitly honed noncognitive capacities for adaptive action or "predispositions" are "unconsciously acquired in situ through extensive immersion in changing environmental conditions", and "historically sedimented [and] nurtured and shaped by a firm's habitus" (Nayak et al., 2020, p. 282).

The noncognitivist framework is ecologically informed in that it differentiates the planned, deliberate strategic actions from the experiential, iterative, and unconscious adaptations and learnings at the intersections of firm and environment, with the latter (i.e. the unconscious adaptations) argued to result in the nondeliberate emergence of dynamic capabilities, which are eventually internalized as firm habitus (Bateson, 1972; Dreyfus, 2014; Gibson, 2015; Ingold, 2000; Merleau-Ponty, 2012; Nayak et al., 2020). The notion of habitus draws from Bourdieu (1977, 1990) and refers to the internalized inclinations and propensities that, as a whole, "underpins the "art of inventing" and enables actors to spontaneously fashion effective novel responses to the changing circumstances they find themselves in" (Nayak et al., 2020, p. 289). Heterogeneity in habitus across firms suggests variance in how firms are predisposed to sense and seize opportunities and act strategically, which translates to heterogeneity in firm competitive advantage.

According to the noncognitivist account, a firm's noncognitivist microfoundations reside at all levels of an organization where its "collectively shared, historically shaped practices and dispositions… percolate through an entire firm, making its outlook and

approach unique and idiosyncratic" (Nayak et al., 2020, p. 284). This underscores that firm heterogeneity is not just a function of the top management, but also the individuals and middle managers who enact the ordinary activities and behaviors which constitute a firm's dynamic capabilities and idiosyncratic adaption under conditions of change over time (Salvato, 2009).

5. Towards a Personality Perspective of the Microfoundations of Dynamic Managerial Capabilities

5.1 Personality as a Dispositional factor in a Noncognitive account

The cognitive and noncognitive accounts of the microfoundations of dynamic managerial capabilities discussed above, while conceptually rich, do not adequately account for other key factors related to individual differences that could contribute to management heterogeneity within firms. For instance, beyond cognitive states and processes emphasized in the cognitive perspective, scholars have broadly alluded to other individual underpinnings such as motivation, values and beliefs that could be associated with the variance in individual performance of strategic actions (Helfat & Peteraf, 2015; Rokeach, 1970). In looking at managerial human capital (Becker, 1964) for example, Helfat and Martin (2015b) suggest the potential of other dispositional factors at the individual level, such as the psychological attributes of personality, as underpinnings of dynamic managerial capabilities.

Apart from the cognitive account, Nayak and colleagues recognize that "if dynamic capabilities can be easily defined and communicated through language and conscious cognition, competitive advantage deriving from it would not last" (2020: 287). This seems to echo Teece's observation that attempts to pinpoint the microfoundations of dynamic capabilities "must be necessarily incomplete, inchoate, and somewhat opaque… [o]therwise sustainable competitive advantage would erode with the effective communication and application of dynamic capability concepts" (2007: 1321). Therefore, as Nayak and colleagues assert, a noncognitive framework would be useful since the mechanisms elucidated will be more inimitable.

Though it is reasonable from an ecological noncognitive perspective to attribute organizational differences in the sensing, seizing and reconfiguring of opportunities and resources to heterogeneity in firm habitus, it is important to realize that firms themselves are made up of individual actors each with their respective dispositions. Just as how Nayak and colleagues (2020) have marshalled March's observation of how individuals in firms "act before they think" (March, 1972, p. 423) and Dreyfus's observation that strategic actions can be explained "without recourse to mind or brain representations" (Dreyfus, 2002) to advance the noncognitive perspective, I would highlight that these very observations precisely underscore the potential role of individual disposition such as personality traits in explaining variances in strategic actions and capabilities.

We ought to be mindful, therefore, to not neglect the role of managerial disposition and its behavioral effects when seeking to unpack firm habitus. In fact, it will be problematic to assume that the firm somehow functions without friction in a uniform and cohesive manner in achieving its strategic aims, without recognizing how variance in managerial dispositions could influence firm dynamic capabilities. Managerial dispositions, at the middle management rung for example, would likely be variously manifested and constrained depending on a variety of factors such as role objectives, its relation to top management, organizational and competitive contexts, and so on. The resultant social complexity, an idiosyncratic composite that is firm habitus, could indeed be an inimitable source of competitive advantage (Barney, 1991). Consequently, as an alternative noncognitive account, the study of individual dispositions such as the personality traits of managers would be important as such an endeavor could shed light on the nondeliberate emergence of dynamic capabilities in a firm.

To that end, I draw on an enormous body of empirical research and meta-analyses that points to personality as a stable and enduring disposition which can explain individual differences in behavior; and how the dispositional effects of personality relate to innumerous aspects of organizational life, from job-performance, -satisfaction, and -fit, to leadership (Barrick & Mount, 1991; Barrick et al., 2001; Furr & Funder, 2019; Hurtz & Donovan, 2000; T. A. Judge, Bono, et al., 2002; T. A. Judge, Heller, et al., 2002; O'Reilly, 1977; Robertson & Kinder, 1993; Salgado, 1997; Tett & Burnett, 2003; Tett et al., 1991, 2006).

Scholars have suggested that personality as a dispositional factor could be valuable in offering insights into the development and deployment of dynamic capabilities within the firm (von den Driesch, Da Costa, Flatten, & Brettel, 2015). A personality perspective on the microfoundations of dynamic managerial capabilities certainly does not reduce the importance and contributions of the cognitive and the noncognitive ecological perspectives. In fact, by isolating and addressing the under-researched area of personality, such an account will only serve to supplement and enrich our understanding of the plurality of factors that underpin dynamic managerial capabilities.

5.2 CEO Personality in Strategic Management Research

The body of personality research in strategic management has hitherto largely focused on the personality attributes of senior executives like chief executive officers (CEOs). Personality as a dispositional factor is thought to influence how senior executives give attention to and process information about their own capabilities and that of the firm's as well as signals about the firm's competitive environment (Finkelstein et al., 2009). Studies focusing on CEOs have shown that personality dimensions influence a variety of behavioral and organization outcomes such as leadership, strategic flexibility and firm performance

(Colbert et al., 2014, 2012; Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010; Peterson et al., 2003).

In the upper echelons perspective, the theory essentially holds that CEO behavior as a result of their interpretation of strategic opportunity is a function of personal attributes like experience, values, and personality, and this ultimately influences firm outcomes (Hambrick & Mason, 1984). Subsequently, the link between CEO personality and firm outcomes has been a subject of academic interest (Hambrick, 2007; Liu, Fisher, & Chen, 2018; Wang, Holmes, Oh, & Zhu, 2016).

For example, drawing on the prominent Big Five personality model (also referred to as the Five Factor Model) where personality is conceptualized as the five domains of openness, conscientiousness, extraversion, agreeableness and neuroticism (Barrick & Mount, 1991; Barrick et al., 2001; McCrae & Costa, 2008; J. Wiggins & Pincus, 1992), studies have shown that CEO openness and extraversion are positively related to strategic flexibility and change while conscientiousness and neuroticism are negatively related to those outcomes (Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010). In the same studies, agreeableness is shown to be negatively related to strategic change while exhibiting an inverted U-shaped relationship with strategic flexibility. However, in the broader literature on leadership and personality, the effects of agreeableness and neuroticism on leadership tend to be mixed, while the effects of openness tend to be more context specific (Colbert et al., 2012; Graziano & Eisenberg, 1997; Hogan, Curphy, & Hogan, 1994; T. A. Judge, Bono, et al., 2002; Zaccaro, Foti, & Kenny, 1991).

5.3 Personality and the Microfoundations of Dynamic Managerial Capabilities in Middle Managers

While the focus on the personality of top managers is fascinating and, understandably, a strategic avenue of research, the role that middle managers play in facilitating the dynamic capabilities of a firm cannot be ignored. Concurring, Salvato (2009, p. 397) posits that "individuals… at all levels in the organizational hierarchy are central to determining the idiosyncratic content of capabilities and their dynamic adaptation over time".

Moreover, in the distribution, delayering and decentralization of the management function across the firm, middle managers such as heads of business units are often called upon to lead more autonomously (Bartlett & Ghoshal, 1993; Maritan, 2001; Martin, 2011; Simon, 2002; Taylor & Helfat, 2009; Teece, 2007), and to effect strategic change (Helfat & Peteraf, 2015). As such, just as how CEO personality has become a productive area of study, it is pertinent too to understand how the personality disposition of middle managers influence their dynamic capabilities in the process of implementing and executing the strategic initiatives mandated by top management.

The Big Five personality model, looking at personality dimensions along the five domains level of extraversion, conscientiousness, openness to experience, agreeableness, and neuroticism, has had much empirical support in the field of personality research (Digman, 1990; Goldberg, 1993; McCrae & Costa, 1996; O'Connor, 2002; Ostendorf & Angleitner, 1992; J. Wiggins & Trapnell, 1997), notwithstanding criticisms that the personality descriptions at the broad domain level tend to be too coarse (Block, 1995; Cattell, 1993; Eysenck, 1992; Hough, 1992; T. A. Judge, Bono, et al., 2002). There is consensus that the

Big Five model of personality describes the more salient aspects of personality and provide a more parsimonious account of individual differences (Goldberg, 1990).

In the following section, I shall hypothesize and elaborate on the potential effects of extraversion and conscientiousness on dynamic managerial capabilities. This study focuses on extraversion and conscientiousness since these two personality dimensions tend to have the strongest associations with leader performance – extraversion has been shown to be a primary predictor of leadership emergence and leadership effectiveness (Bono & Judge, 2004; T. A. Judge & Bono, 2000; T. A. Judge, Bono, et al., 2002), while conscientiousness has been found to be a predictor of leadership effectiveness, ethical leadership and task leadership (Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Hansbrough, Lord, & Schyns, 2015; Hirschfeld, Jordan, Thomas, & Feild, 2008; Kalshoven, Den Hartog, & De Hoogh, 2011; Vogel & Kroll, 2019).

Given this study's focus on managerial performance in the context of dynamic capabilities, which in essence boils down to leadership under conditions of strategic change, the two personality dimensions of extraversion and conscientiousness would be the most relevant. The implementation of strategic directives by middle managers, who typically are heads of business units and key departments, is both a leadership and a task execution responsibility. Middle managers' effectiveness in leading their teams and accomplishing the multitude of tasks involved in such strategic endeavors would therefore be relevantly associated with extraversion and conscientiousness. Not only that, middle managers would also be expected to be proactive proponents and ambassadors of such initiatives by top management, and those who do so successfully are more likely to be seen as emergent leaders of the firm, which again underscores the potential role of extraversion.

Apart from extraversion and conscientiousness, the remaining three personality dimensions in the Big Five model are agreeableness, neuroticism, and openness to experience. The study shall not look at agreeableness and neuroticism as the leadership research on these two personality dimensions tend to surface mixed results to begin with (Colbert et al., 2012; Graziano & Eisenberg, 1997; Hogan et al., 1994; T. A. Judge, Bono, et al., 2002; Zaccaro et al., 1991), potentially indicating the likelihood of confounding factors and contexts which may not be productive to control for in a study of this scope. The study shall also not look at openness and dynamic managerial capabilities in middle managers. While the personality dimension of openness has been linked to strategic flexibility in CEOs (Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010), there would be inherent difficulty in relating a broad dimension like openness to middle managers who are very unlikely to have a free hand in generating and deciding on strategic options. Unlike CEOs and top management teams whose roles deal with strategy formulation, where the various personality facets of openness may be relevant and useful, the personality dimension of openness at the domain level may be far too broad, encompassing a variety of facets, and not entirely relevant for middle management, whose role in strategic change tends to be constrained to some extent already.

By focusing only on extraversion and conscientiousness in this study, the research would readily meet its primary objective of exploring to what extent would a personality account of the microfoundations of dynamic managerial capabilities be tenable and worthwhile in the first place. It aims to achieve this by cross-pollinating into the domain of dynamic managerial capabilities the strongest research findings from the domain of personality and organizational leadership, where extraversion and conscientiousness have

demonstrated clearer and more consistent effects, as mentioned above. Still, some tradeoffs would need to be acknowledged in light of the decision to exclude the other three dimensions of the Big Five, notwithstanding their generally mixed results and potential confounding effects in the study of leadership. What the study stands to gain from a sharper focus on leadership effectiveness and emergence, it possibly relinquishes potential discoveries in regard to the aspects of emotional stability, creativity, and interpersonal sensitivity in dynamic managerial capabilities from examining neuroticism, openness to experience, and agreeableness respectively.

5.3.1 Extraversion and Dynamic Managerial Capabilities

Extraversion a personality domain defined in the Big Five model as the inclination to take social initiative, reach out and connect with others is thought to positively support effective social interactions in organizational settings (McCrae & Costa, 2008). Across numerous personality studies, extraversion is also the primary predictor of leadership effectiveness and leadership emergence (Bono & Judge, 2004; Gough, 1990; Hogan et al., 1994; T. A. Judge & Bono, 2000; T. A. Judge, Bono, et al., 2002; Watson & Clark, 1997). Moreover, extraversion has been found to be positively associated with feedback-seeking when employees are being socialized into the firm, and these extraverted employees are more likely to ask questions and clarify feedback (Bell & Arthur, 2008; Wanberg & Kammeyer-Mueller, 2000). The effects of extraversion on managerial behavior also include responding proactively in a team environment and promoting task accomplishment (Walter, Cole, der Vegt, Rubin, & Bommer, 2012).

A key dispositional facet of extraversion is assertiveness, commonly defined as the inclination to communicate information and ideas in a direct manner (Costa & McCrae, 1992;

McCrae & Costa, 2008; McCrae & John, 1992; Caliper, 2017, 2004). Assertiveness can be seen as a form of individual agency in the sense of exercising one's right to speak, and by extension to lead (Do & Minbashian, 2014; T. A. Judge, Piccolo, & Kosalka, 2009; Minbashian, Bright, & Bird, 2009; Vinchur, Schippmann, Switzer, & Roth, 1998).

In terms of dynamic capabilities, when sensing opportunities, middle managers who are dispositionally inclined to be assertive are more likely to be proactive in engaging with stakeholders, sharing ideas, asking questions and seeking feedback. As alluded to previously in Section 3, middle managers by virtue of their role and hierarchical position in the organization are likely to have a more diverse and wider range of stakeholder groups, both within and without the firm, to communicate with on a regular basis, compared to top management teams who, I would argue, generally tend to have a narrower spectrum and with less regularity. The diversity and range of stakeholder groups could potentially connote different needs, interests and positions by virtue of each stakeholder group seeing their role, the organization, and the markets from their own vantage point. Unlike top management teams who may have stronger positional or formal authority to ask questions, seek feedback, and stimulate ideation, middle managers when attempting to achieve the same with peers (such as other middle managers who are heads of other business units at the same hierarchical rung), or external parties (such as customers) would need to fall back on strong communicative performances to achieve a desirable outcome in such sensing activities.

Similarly, in the seizing of opportunities and the reconfiguring of firm assets, middle managers need to direct the efforts of others to take a quick action as well as induce cooperation, overcome resistance, and persuade others in their organization towards strategic change (Helfat & Peteraf, 2015). It can be argued that at the middle management level, the

likelihood of middle managers experiencing stakeholder resistances to their call for change could be higher, simply because of the larger number of organizational constituents they would have to directly deal with. Some of these constituents who middle managers need to persuade to buy into the firm's seizing and reconfiguring purposes could be at a lower proximity to the top management team as is the case for offshore or not-in-corporate business units, or even stakeholders outside of the firm such as customers, suppliers, or potential acquisition targets where alignment cannot be readily assumed and may need to be hard-won. Middle managers who are dispositionally more assertive may in fact relish the inherent behavioral challenges involved in sensing, seizing, and reconfiguring, and consequently, 'stay in the game' longer than those who are less extraverted.

Extraversion also extends to the dispositional facets of gregariousness and sociability which together describe the inclination to be comfortable meeting new people and initiating conversations, as well as the enjoyment of being around and working with people (Costa & McCrae, 1992; McCrae & Costa, 2008; McCrae & John, 1992; Caliper, 2004, 2017). The scholarship on dynamic managerial capabilities has often highlighted the value of managerial social networks and social capital in the form of personal relationships and alliances both within and outside of the firm (Eisenhardt & Martin, 2000; Helfat & Martin, 2015b).

Since the process of search in sensing is particularly thought to "embrace potential collaborators — customers, suppliers, complementors — that are active in innovative activity" (Teece, 2007, p. 1324), middle managers would need to reach out beyond their immediate business units to proactively navigate multiple stakeholder groups, sensing for strategic signals, as opposed to operating within a more socially familiar, comfortable, but siloed environment. In seizing and reconfiguring, extraverted middle managers may be more

inclined to tap on their social networks and capital, leveraging personal relationships with organizational constituents to facilitate interpersonal consensus and help alleviate any potential discomfort involved in a call to action under conditions of change.

Lastly, scholars have discussed the potential relationships between the sustainability of dynamic capabilities and the rate of change in markets, suggesting that it may be more difficult to sustain dynamic capabilities in high-velocity markets (Eisenhardt & Martin, 2000). Extraversion as a personality disposition could also be relevant in this regard since one of the facets of extraversion pertains to one's inclination to sustain a high level of activity over extended periods (Costa & McCrae, 1992; Caliper, 2004). Middle managers who are more extraverted are more likely to effectively sustain at the interpersonal performative behaviors required in sensing, seizing and reconfiguring especially in high-velocity markets.

In view of the above, I hypothesize as follows:

Hypothesis 1a: *The middle manager's personality dimension of extraversion is positively related to their managerial performance in sensing.*

Hypothesis 1b: *The middle manager's personality dimension of extraversion is positively related to their managerial performance in seizing.*

Hypothesis 1c: *The middle manager's personality dimension of extraversion is positively related to their managerial performance in reconfiguring.*

5.3.2 Conscientiousness and Dynamic Managerial Capabilities

According to research on the Big Five personality domain of conscientiousness, individuals who are high on conscientiousness are more likely to be deliberative, acting carefully and paying attention to details, as well as valuing precision of decision-making over

quick heuristics (Hansbrough et al., 2015; Vogel & Kroll, 2019). They also tend to be more orderly and planful while those low on the dimension may be more spontaneous (Hoyle, 2010). In meta-analyses, conscientiousness has also been found to have association with leadership effectiveness (T. A. Judge, Bono, et al., 2002). At the facet level of this personality domain, there are various nuances in terms of behavioral tendencies towards successful self-regulation (Paunonen & Ashton, 2001; Roberts, Chernyshenko, Stark, & Goldberg, 2005), as well as detail and deliberation (Costa & McCrae, 1992; Caliper, 2004).

While there is ample evidence to highlight the positive association conscientiousness has with leadership effectiveness, ethical leadership and task leadership (Cogliser et al., 2012; T. A. Judge, Bono, et al., 2002; Kalshoven et al., 2011; Hansbrough et al., 2015; Bartone et al., 2009; Hirschfeld et al., 2008; Vogel & Kroll, 2019), would this personality dimension with its emphases of rigor, detail and deliberation have a similar effect on dynamic managerial capabilities?

The dynamic capabilities of sensing and reconfiguring are said to involve search and sensemaking in "emerging trajectories [that are] hard to discern" (Teece, 2007, p. 1322), and are needed to "maintain evolutionary fitness and, if necessary, to try and escape from unfavorable path dependencies" (Teece, 2007, p. 1335). The managerial underpinnings of these dynamic capabilities seem to emphasize the value of agile responsiveness in fluid contexts where "existing knowledge can even be a disadvantage if managers overgeneralize from past situations" (Eisenhardt & Martin, 2000, p. 1111).

Despite the evidence concerning conscientiousness and leadership effectiveness, managerial behaviors that are too preoccupied with details, deliberation and precision would

likely not serve the aims of sensing and reconfiguring as such managers could be bogged down with the need to be 'correct'. Likewise, managers who are too rule-bound may more likely be path-dependent, seeking precedents and being less spontaneous about strategic possibilities. In a similar vein, conscientious managers who, as a function of their self-discipline, need to exert control over their work through having clearly defined goals and methods (Crant, 1995; Frese, 2012; Seibert, Crant, & Kraimer, 1999) may risk being too fixated over their 'game plan', sacrificing adaptability in the process.

While some level of conscientiousness is likely useful, a key point in the argument presented here is the potential downside of being *too* conscientious. Given the wider research on the benefits of conscientiousness to leadership and task effectiveness, middle managers could have gotten to where they are in their career precisely because of their conscientiousness (Lim Leung & Bozionelos, 2004; Cogliser et al., 2012; Prochazka, Vaculik, Smutny, & Jezek, 2018). Yet, in a firm undergoing strategic change, these middle managers would be expected to step up and respond dynamically to opportunities and threats, in spite of the potential uncertainties and ambiguities involved, which such middle managers may try to limit and control for, given their likely sense of conscientiousness.

Such middle managers would be simultaneously constrained by not having an entirely free hand to generate and determine strategic direction and options due to their role, as well as by expectations, both explicit and implicit, to execute on strategic initiatives reliably. Conscientious middle managers may hence find themselves preferring to err on the side of caution, deferring to what they think would be the most fundamental expectation of their role, that of quality and reliability in implementation. Such middle managers may operate under the assumption that after all, the top management team ultimately bears the burden of

strategic exploration and formulation, downplaying their own (that is, the middle managers') potential contribution to the process.

Therefore, for middle managers who are highly conscientious, such a personality disposition is more likely to inhibit, rather than enable, the effective managerial performance in the dynamic contexts of sensing and reconfiguring. For these middle managers, the clarity from fundamental role expectations in ensuring operational reliability would far outweigh the challenge from boundary ambiguity and porosity involved in sensing and reconfiguring activities. The former, that of ensuring quality and reliability, would better and more immediately play to the dispositional strengths of conscientiousness. Middle managers with these very dispositional strengths could likely be less comfortable having to navigate the ambiguous and porous boundary conditions involved in change, since such exploratory activities by its very nature would require some level of experimentation and adaptation, breaking free from path dependencies, and without the assurances that come from the certainty of control over quality outcomes.

In terms of the seizing of opportunities, the research describes it as involving both the maintenance and improvement of technical competencies, as well as high-quality decision-making in order for opportunities to be capitalized on quickly and resources deployed effectively (Teece, 2007). This seems to suggest the importance of maintaining operational fitness even as the firm seeks to be evolutionarily fit under conditions of change. Given that the dynamic capability of seizing is somewhat paradoxical in its emphasis of both rigor and responsiveness, the personality disposition of conscientiousness is not likely to be associated with seizing.

In view of the above, I hypothesize as follows:

Hypothesis 2a: *The middle manager's personality dimension of conscientiousness is negatively related to their managerial performance in sensing.*

Hypothesis 2b: *The middle manager's personality dimension of conscientiousness is negatively related to their managerial performance in reconfiguring.*

6. Methods

6.1 Sample

In this study, I analyze non-public archival data on 323 focal managers from a publicly listed Japanese multinational company in the advanced manufacturing industry (henceforth, referred to as "focal company"). The focal company, a global leader in its mainstay business segment of industrial materials, has had over the period of 2016 to 2019 undergone extensive structural reform with significant investments in strategic initiatives, such as introducing new business lines for growth, while both making acquisitions and developing internally new and advanced technological capabilities for its cash-generating business lines. This section shall elaborate further on how the context of the focal company, described along the lines of its competitive landscape and evolving market environment, makes it potentially productive for the study of dynamic managerial capabilities.

In the leadup to the period of structural reform and deliberate strategic change, the focal company had enjoyed steady growth due to demand for its industrial materials in the fast-expanding smart technology and devices market. However, its operating and competitive environment was becoming increasingly complex and challenging. Besides a couple of principal competitors in North America and Western Europe, the company faced fierce competition within Japan even though it had a dominant lead. On top of that, due to improving industrial infrastructures, production capacities, and the competitiveness of neighboring China, Taiwan and South Korea, the company had to contend with cheaper alternatives especially from smaller Chinese players in the same industrial materials space.

Operationally, there was intense pressure to innovate in order to keep up with technological developments in the industry verticals where the focal company's industrial materials were used. Failure to do so could likely result in obsolescence of their mainstay industrial products and the resultant loss of their dominant market share to more agile and innovative market players. One soul-searching moment for the company which likely precipitated the deliberate structural reform and strategic change was when the operating profit of one of their mainstay industrial materials businesses plunged to nearly half of what the company used to achieve. This was due in large part to decreasing demand for the industrial material in the form it was offered in at that time. This therefore spurred the urgent need for the company to develop more advanced forms of the industrial material so as to meet the evolving needs of the market.

Also pressing was the need for the focal company to take advantage of emergent opportunities in the wider market more effectively, though these opportunities also came with their own set of challenges. The development of emerging economies, such as those in south and southeast Asia, were seen to be promising production bases and markets for the focal company. These emerging markets provided opportunities to improve supply chains through new production bases, as well as to directly cater to demand originating within these emerging markets. Expansion into these markets could also help alleviate the human resource limitations faced by the focal company domestically such as Japan's aging, shrinking population as well as the size and availability of technically qualified human capital. At the same time, the company would need to contend with the risks of technology leaks resulting from expansion and acquisitions, thereby highlighting the concomitant imperative to develop ways to prevent the loss of intellectual property as well as to protect core technologies. Adding to the challenge was the level of political and economic stability in these emerging

markets. Perhaps unsurprisingly, the focal company apparently encountered regulatory and operating obstacles in these markets resulting in it having to restructure their business operations in ways less favorable to the company.

Throughout the period of structural reform and strategic change, management communication from the focal company articulated the need to practice “ambidextrous management”, which the company elaborated as that of deepening their existing core businesses while concurrently exploring new businesses and growing the latter until they become core businesses. It regularly emphasized the need to develop such a management capability to drive growth in an increasingly challenging landscape even as they required their core businesses to generate more cash by improving quality and production efficiency as well as to ensure that additional value was created across their entire end-to-end product value chains.

From a dynamic capability perspective, the focal company's management directive can be regarded as recognizing and prioritizing the imperative to sense for adjacent and related opportunities to create new markets, as well as the evolving needs of connected industry players (such as customers and suppliers) and society (such as the eventual end-consumer), all of which feature prominently in internal and external company communications. The company was also purposeful in emphasizing during the period of structural reform and strategic change that they were not merely adding on businesses by acquisitions, but acquiring and integrating key businesses to build organizational capability and technology. In terms of seizing, the company’s management communication came through as valuing and aspiring to decisiveness and speed when acquiring critical and promising new technologies, as well as rigor in the evaluation, deployment and integration of

such acquisitions in light of the overall business strategy. The company's focus on effectively integrating new acquisitions and technologies to generate a more compelling and strategic capability-mix for the firm in response to market needs and challenges was reflective of the process of reconfiguring in dynamic capabilities.

This period of deliberate strategic change had largely seen an uptrend in the focal company's earnings per share year on year, as well as a handful of first-in-the-world technological breakthroughs over the same period. For success in the longer term, the focal company expressed the pressing need for continuous innovation in industrial materials, improvements in energy efficiency, and exploration into renewables to support its stated aim of ultimately solving social issues in a sustainable fashion. Against such a backdrop, their five- and 10-year strategic vision, launched at the turn of the recent decade, expressed the ongoing focus and commitment to create new value for customers, employees, shareholders, and society.

The data on the focal company are obtained from Caliper Inc., of which the focal company is a client. Caliper is a commercial provider of psychometric assessments, known as the Caliper Profile, for the past 60 years. It operates globally and has administered more than 6 million Caliper Profile assessments worldwide to more than 30,000 companies for the purpose of employee selection and development. The Caliper Profile is a personality inventory with an additional measure for cognitive ability. The personality measures of the Caliper Profile are based on the trait theory of personality just like the Big Five model, and have an underlying factorial structure that is in alignment with the Big Five (Caliper, 2004, 2017; Barrick & Mount, 1991). The Caliper Profile also demonstrates psychometric

properties that render it robust for use in scientific analysis (please refer to section 6.3.1 on the psychometric properties of the Caliper Profile).

The obtained data are comprised of 323 focal managers' self-reported personality inventory scores and objectively measured cognitive ability scores obtained from their Caliper Profile inventories, as well as ratings of their managerial performance. Managerial performance ratings for each focal manager were given by their respective bosses, of whom there are 289 (i.e. some of the bosses rated more than one focal manager). There are 308 male and 15 female focal managers in the sample.

The focal managers in the sample were all middle managers from the focal company's Asia Pacific operations, including Japan itself where the company is headquartered. In the context of the focal company, middle managers are heads of departments or heads of business units. They typically have first line managers or supervisors, as well as individual contributors reporting into them. The middle managers themselves reported into senior management rungs comprising the top management team as well as the senior managers reporting into the top management team. The middle managers reflected in the sample were personally responsible for their respective parts in executing the focal company's strategic initiatives described above. Not all middle managers in the focal company are involved in roles or functions that directly relate to the company's strategic initiatives; such middle managers are, accordingly, not part of this data sample.

While specific data on age and tenure are not part of the archival data obtained, the provider of the data (i.e. Caliper Inc.) indicated that focal managers in the sample tended to have had at least 3 years of managerial experience and at least 8 years of working experience

in order to participate in the focal company's managerial development exercises from which the data is drawn. Lastly, the middle managers in this sample are largely comprised of Asian nationalities.

6.2 Procedure

Both the personality/cognitive ability inventory and managerial performance survey were administered by the focal company under the ambit of what they termed a "high potential talent development" initiative to identify and address developmental opportunities among the middle managers selected for the exercise who are responsible to navigate the market challenges as well as implement and drive the focal company's strategic initiatives as outlined in Section 6.1.

The focal managers' self-reported personality ratings and their responses to the cognitive ability section of the Caliper Profile inventories were collected online. Similarly, the boss ratings of each focal manager's performance were also collected online. All ratings and responses were collected over the period of 2016 to 2019 which was when the focal company undertook extensive structural reform in line with its strategic objectives.

Informed consent was obtained from both focal managers and their boss raters for the collected data to be analyzed for research purposes. Research-consenting participants also have the right at any time to require Caliper to stop using their personal data for such research. Accordingly, the archival data obtained for this research has been anonymized.

6.3 Measures

6.3.1 Personality and Cognitive Ability Measures

Table 1 below lists the scales from the Caliper Profile inventory which was administered to all focal managers in the sample. The first nine scales listed in Table 1 are self-reported personality measures of which the first eight serve as the observed independent variables in this study, while the ninth one (risk-taking) serves as an observed control variable. The tenth scale listed is an objective measure for cognitive ability (termed "Abstract Reasoning" in the Caliper Profile) and it also serves as an observed control variable in this study. By "*objective* measure for cognitive ability", I mean the scale is measured with right or wrong answers, as opposed to the personality scales which are all self-report measures.

Measures in the Caliper Profile	Definitions (extracted from Caliper, 2017)
1. Energy	• Potential to sustain a high level of activity over extended periods
2. Sociability	• Inclination to enjoy being around people and working with others
3. Gregariousness	• Comfort with meeting new people and initiating conversations
4. Assertiveness	• Potential to communicate information and ideas in a direct manner
5. Thoroughness	• Tendency to pay attention to detail
6. External Structure	• Degree to which a person is sensitive to existing rules
7. Self-Structure	• Preference for independently determining work methods
8. Cautiousness	• Inclination to make decisions carefully and think through relevant facts and alternatives
9. Risk-Taking	• Willingness to take chances
10. Abstract Reasoning	• Cognitive ability to solve problems and understand the logical relationships among concepts

Table 1: Definitions of measures from the Caliper Profile

6.3.1.1 Personality Measures

As alluded to in Section 6.1, the Caliper Profile is a personality inventory with an additional measure for cognitive ability. The personality measures of the Caliper Profile are based on the trait theory of personality just like the Big Five model, and have an underlying factorial structure that is in alignment with the Big Five (Caliper, 2004, 2017; Barrick & Mount, 1991). Moreover, as will be elaborated further in this and the following sections, the Caliper Profile demonstrate psychometric properties that render it robust for use in scientific analysis. (Section 6.4 subsequently shall also elaborate further on the alignment of the personality measures in this study with the Big Five factors of extraversion and conscientiousness.)

The elicitation format for the personality measures in the Caliper Profile is comprised of 57 self-report items in a semi-ipsative format. Each semi-ipsative item on the Caliper Profile inventory presents the respondent with four response options (i.e., a tetrad). Each of the four response options per tetrad corresponds to a different personality scale. Two of the four response options have a positive valence; for example, “Once I give priority to a project, I follow it through”, while the other two response options have a negative valence; for example, “If I can’t do something quickly, I get frustrated”. The respondent is asked to self-report one option as “most like me” and a different response option as “least like me”.

For the purpose of personality assessment, the semi-ipsative format is generally considered useful and less susceptible to response biases and issues like faking (Cheung, 2002; Welkenhuysen-Gybels, 2003). In particular, studies suggest inventories employing the forced-choice tetrad format tend to reduces fakability (Bowen, Martin, & Hunt, 2002; Converse et al., 2010; Heggestad, Morrison, Reeve, & McCloy, 2006; Jackson, Wroblewski, & Ashton, 2000). Evidence also suggests that ipsative and semi-ipsative scales, when

compared with Likert scales, offer stronger validity (Jackson et al., 2000). A common criticism regarding Likert formats is their susceptibility to social desirability bias and faking, which reduces the validity of the measurement (Caliper, 2017; Jackson et al., 2000).

With regard to the psychometric properties of the Caliper Profile personality measures listed in Table 1, such as the internal consistency of the scales used in this study, Caliper's technical manual reports the unadjusted Cronbach's alpha as ranging from .47 to .79, with a median value of .67 and a mean value of .65; and the adjusted Cronbach's alpha as ranging from .55 to .91, with a median value of .81 and a mean value of .76 (Caliper, 2017). Adjustments were made due to the scale interdependence of the semi-ipsative item format which can negatively impact internal consistency estimates (Bartram, 1996; Caliper, 2017; Saville & Wilson, 1991). As for criterion-related validity, Caliper reports the weighted correlation for a variety of management, sales, service, and technical positions across a diverse set of industries as ranging from .30 to .39, with the weighted correlation for management at .35 (Caliper, 2017). Based on these psychometric properties and the generally accepted criteria in the field (Cohen, 1988; Muchinsky, 2003), the Caliper's personality measures can be considered robust for the purposes of this study.

In regard to scoring for the personality measures, Caliper computes the raw scores from the number of respondent-selected items with a negative valence subtracted from the number of respondent-selected items with a positive valence. For reporting purposes, Caliper converts the raw scores for each scale into percentiles. The percentile distributions for each scale for this study's sample of 323 focal managers are based on one of Caliper's norm groups comprising 5,270 individuals (Caliper, 2017). The personality scores obtained from the archival data for this study are already in percentiles; raw scores are not available. For

various compliance purposes, Caliper also reports that scores are not adjusted on the basis of personal characteristics, such as race/ethnicity, age, or gender, of individuals who take the Caliper Profile. A single scoring procedure is applied, regardless of race, gender, age, educational level, religious affiliation, or disability status of the individual (Caliper, 2017).

6.3.1.2 Cognitive Ability Measure

The measure for the control variable of cognitive ability in this study is obtained from the abstract reasoning scale on the Caliper Profile inventory through multiple choice questions with one correct answer. Abstract reasoning is defined by Caliper as the cognitive ability to solve problems and understand the logical relationships among concepts (Caliper, 2017). To establish support for the construct validity of Caliper's abstract reasoning scale as a measure for cognitive ability, the convergent validity of Caliper's abstract reasoning scale with other established measures of cognitive ability is examined.

From concurrent studies in which the respondents who took the Caliper Profile also took another cognitive ability assessment, Caliper (2017) reports findings which demonstrate the convergent relationships between Caliper's abstract reasoning scale and other assessments' measures of cognitive ability. These assessments were the Watson-Glaser Critical Thinking Appraisal, the Wesman Personnel Classification Test, the Bennett Mechanical Comprehension Test, and Raven's Progressive Matrices. Appendix A reports the correlations between these test scales and Caliper's abstract Reasoning. Caliper's abstract reasoning was found to be moderately positively correlated with all of the other measures.

While the convergent validity coefficients reported in Appendix A suggest that none of the other assessments measure exactly the same cognitive ability construct as Caliper's

Abstract Reasoning, nor do they measure it in the same form (Caliper, 2017), the comparisons would still be considered good support for the construct validity of Caliper's abstract reasoning scale as a measure of cognitive ability. Given the spectrum of conceptualizations in the field for cognitive ability (Schmidt & Hunter, 2004, 1998; Schmidt, Hunter, & Outerbridge, 1986), the use of Caliper's abstract reasoning scale as a measure for cognitive ability in this study is satisficing.

Caliper's abstract reasoning scale can also be considered reliable, with a reported Cronbach's alpha of .75 (Caliper, 2017). In terms of scoring, the total number of correct responses from each respondent represents their raw score and, similar to the reporting of personality measures, these raw scores are converted by Caliper into percentiles without any adjustments on the basis of race/ethnicity, age, or gender (ibid.).

6.3.2 Managerial Performance Measures

Ratings on the 323 focal managers' performance serve as the observed outcome measures in this study. These managerial performance ratings were given by the focal managers' respective bosses through an online performance survey administered by Caliper. The framework and content for the performance survey, though, was internally developed by the focal company as a central part of its "high potential talent development" initiative to identify and address developmental opportunities among the middle managers selected for the initiative who are responsible to implement and drive the focal company's strategic objectives as previously described in Section 6.1.

The 43 rating items in the survey are phrased in behavioral terms to describe aspects of performance expected of each focal manager as the focal company implements its strategic

change initiatives (for example, “Scans the internal and external environment for new ideas”). The 43 rating items are organized under eight “competency” areas defined by the focal company (for example, “Innovation and Change”). Table 2 below lists the items in this survey from which managerial performance measures were collected.

1	Passion
1.1	Exhibits a dedication to the [focal company’s] mission, people, values and business
1.2	Aggressively pursues continuous improvement to advance the organization
1.3	Thinks deeply about conducting our business
1.4	Asks questions with curiosity as the core motive
2	Courage for “Challenge”
2.1	Expresses optimism and a positive attitude even when faced with adversity and crisis
2.2	Makes tough decisions
2.3	Learns from failure and recovers
2.4	Engages in life-long professional and personal development
3	Innovation and Change
3.1	Networks with a wide-range of contacts both inside and outside of the company
3.2	Stimulates, encourages and cultivates new thinking, ideas and experimentation
3.3	Scans the internal and external environment for new ideas
3.4	Builds initiatives and business models from "scratch" without depending on past ideas or existing structures and resources
3.5	Exhibits intolerance for maintaining the status quo without asking questions
3.6	Anticipates and quickly adapts to change
3.7	Takes calculated risks
4	Integrity
4.1	Behaves in a predictable, consistent and reliable manner
4.2	Follows through and delivers on commitments
4.3	Leads by example
4.4	Communicates an agenda with transparency

4.5	Acts in a manner that puts company interest before self interest
4.6	Exhibits unquestionable business ethics on a global basis
5	Leveraging Diversity
5.1	Aggressively seeks to eliminate barriers that inhibit collaboration across borders, companies, and people
5.2	Identifies and utilizes diverse talent from across the organization
5.3	Employs the strengths of diverse teams to facilitate cross-organizational strategy and initiatives
6	Selecting and Developing the Best People
6.1	Actively engages in identifying and developing successors and high potential candidates for future leadership roles across the organization
6.2	Sets and demands a consistent standard for selecting from inside or outside and puts them in right positions
6.3	Recognizes and mentors unrealized potential in others
6.4	Identifies and provides opportunities for growth and development
6.5	Provides feedback and coaching to achieve peak performance
6.6	Empowers teams to think and work independently
7	Influence and Communication
7.1	Expresses a clear and inspiring vision of the future
7.2	Overcomes resistance to change and builds a commitment for the future
7.3	Engages others in achieving more than they believe they can achieve
7.4	Takes time to get to know and communicate with others at every level of the company
7.5	Facilitates listening, open dialog, and two-way communication
8	Leading Towards Success
8.1	Empowers individuals and teams to translate vision into goals and goals into action
8.2	Provides the resources necessary to attain goals and complete actions
8.3	Confirms that actions taken are timely and consistent with "best practices" from both within and outside of the company and industry
8.4	Assigns specific accountabilities and holds self responsible for outcomes
8.5	Engages in a continuous process of "thinking and rethinking" goals, strategies, actions, and progress to arrive at optimal solutions and results
8.6	Promotes and engages in "fact-based" decision making that facilitates quick action
8.7	Eliminates barriers that impede progress toward key projects and goals
8.8	Persists until goals have been reached

Table 2: Items in the managerial performance survey

Section 6.4 on the statistical techniques employed in this study shall outline how the dependent variables of sensing, seizing, and reconfiguring could be distilled from the observed managerial performance measures in Table 2 using a process combining exploratory factor analysis and confirmatory factor analysis. Such an approach is adopted in this research as studies in dynamic managerial capabilities do not appear to indicate any direct measures of dynamic managerial capabilities whether as a single construct or along the three disaggregated constructs of sensing, seizing, and reconfiguring.

In empirical research focusing on more macro-levels of analysis, dynamic managerial capabilities were not directly measured but used instead to theoretically frame the variables in question, such as the effects of resource investment and deployment on firm performance (Sirmon & Hitt, 2009), and, as another example, managerial decisions on business performance (Adner & Helfat, 2003). Still, there are other studies that drew on existing scales that are conceptually similar to the dimensions and connotations associated with dynamic capabilities, such as, in a study of the influence of dynamic capabilities on competitive advantage in China-based enterprises (Li & Liu, 2014), the aggregation of strategic sense-making capacity, timely decision-making capacity, and change implementation capacity as a measure of dynamic capabilities.

In more micro-level empirical research, the approach typically involves measures of dynamic managerial capabilities at the microfoundational level such as the behavioral manifestations of managerial cognition, rather than a direct and specific measure of dynamic managerial capabilities themselves. For example, drawing on a publicly available database of board behavior in Norwegian companies, there are studies that examined how board leadership influences board dynamic managerial capabilities (Åberg & Shen, 2020; Åberg &

Torchia, 2019). In these studies, relevant behavioral items from the database were selected to represent the behavioral manifestations of the cognitive underpinnings of dynamic managerial capabilities disaggregated into sensing, seizing, and reconfiguring; and subsequently, subject to factor analysis. To measure, for example, the aspect of sensing in dynamic managerial capabilities, the research selected from the database, items relating to the cognitive constructs of perception and attention, such as items on the extent to which the board was active in seeking additional information and asking critical questions on reports from management. While the aforementioned studies focused on the aspect of cognition alone, other studies have drawn on Helfat and Peteraf's (2015) wider conceptual framework on the underpinnings of dynamic managerial capabilities, that of not just managerial cognition, but also managerial social capital, and managerial human capital; and have empirically surveyed these measures to arrive at a composite measure of dynamic managerial capabilities (Botts, 2017; Corrêa, Bueno, Kato, & Silva, 2019).

From the above, we see that surveys comprising behavioral items indicating managerial performance could indeed be a viable means of studying dynamic managerial capabilities (Åberg & Shen, 2020; Åberg & Torchia, 2019). Such an approach would be consistent with propositions surfaced in the strategic management research on framing dynamic managerial capabilities in the language of managerial competencies (Kor & Mesko, 2013). While criticisms of respondent bias and perception could be anticipated on the use of behavioral or performance survey ratings to study dynamic managerial capabilities, alternative methodologies do not necessary lend more directness or stronger specificity on the measure of such outcomes. For example, in a study of the effects of dynamic managerial capabilities on business diversification in the English Premier League (Holzmayer & Schmidt, 2020), dynamic managerial capabilities were determined by the joint-measures of

managerial cognition, social capital, and human capital, *a la* Helfat and Peteraf's (2015) conceptual framework, but these attendant measures were themselves approximated by proxy measures such as board directors' nationalities and cultural markers as an indicator of managerial cognition, and the average number of board positions as an indicator of managerial social capital – proxy measures which I would contend as certainly not unproblematic. In a similar vein, in a study of dynamic managerial capability antecedents in manufacturing (Mostafiz, Sambasivan, & Goh, 2019), the managerial human capital microfoundation of dynamic managerial capabilities was indicated by self-reports of prior management and entrepreneurial experience. In this case, while the proxy measures might again be argued to be somewhat acceptable, they in fact do not say very much about the actual performative quality of these prior management and entrepreneurial experiences.

In this study, the use of the focal company's managerial performance survey as outcome measures would therefore demonstrate promising utility, given some of its resemblance to previous empirical studies also employing behavioral ratings of items conceptually related to dynamic managerial capabilities and their microfoundations. A prima facie review of the content of the performance items in the focal company's survey suggests encouraging potential for conceptual alignment with managerial behaviors described in the dynamic managerial capabilities literature. Not only can the survey content be deemed conceptually relevant and appropriate, the context of what the focal company was going through during the period in which the survey was done would render the use of these outcome measures suitable as well (see Section 6.1 for a description of the competitive and strategic challenges faced by the focal company). Lastly, the outcome measures used in this study, in the form of performance ratings by bosses, avoid the issues associated with common method and common source biases, since these outcome measures are based on the focal

managers' respective boss ratings separately collected from the personality measures derived from the focal managers' self-report ratings.

6.4 Statistical Techniques

First, the statistical software SPSS was used to generate descriptive statistics, followed by an exploratory factor analysis on the outcome measures in the data comprising the focal managers' boss-ratings of their managerial performance, with principal component analysis selected as the method of extraction. Given the content nature of the managerial performance survey (that it assessed specific behaviors in "competencies" like "Innovation and Change") and the organizational backdrop against which the survey was introduced (that the organization was embarking on structural reform and strategic change), a prima facie review of the rating items suggested the potential for various aspects of dynamic managerial capabilities to be at work even though, obviously, the term "dynamic capabilities" was nowhere used in the performance survey. The aim of this step was, therefore, to discern the underlying factorial structure of the outcome measures (boss-ratings of focal manager performance), and assess whether these measures might potentially indicate factors that were aligned with the dynamic capabilities of sensing, seizing, and reconfiguring.

Next, following the exploratory factor analysis, a measurement model for the dependent variables in the eventual structural equation model was specified. The statistical graphics software AMOS was used to conduct a confirmatory factor analysis on the measurement model representing the three latent dependent variables of sensing, seizing, and reconfiguring and their respective observed indicators drawn from the findings of the exploratory factor analysis.

To construct the structural equation model, AMOS was used to create a path model laying out the hypothesized relationships between the latent factors and their associated observed indicators. The measurement model derived from the aforementioned confirmatory factor analysis of the latent dependent variables (sensing, seizing, and reconfiguring) was then incorporated into the path model.

For the independent variables, the personality dimensions of extraversion and conscientiousness were specified as latent variables consistent with a Big Five factorial perspective (Barrick & Mount, 1991) and also since these two dimensions were not measured directly in this study. The personality scales that were measured directly in the study through the Caliper Profile (such as assertiveness, gregariousness etc. listed in Section 6.3.1) were then employed accordingly as the observed indicators of the two personality factors of extraversion and conscientiousness.

The personality scales were associated with each latent independent variable as observed indicators based on results published in Caliper's technical manual describing the factor structure of the Caliper Profile measures and the convergent validity of the Caliper Profile demonstrating statistically significant correlations between Caliper measures and Big Five personality factors (Caliper, 2004, 2017). The scales of assertiveness, gregariousness, sociability and energy were shown to load strongly onto a factor that aligned with extraversion, while cautiousness, thoroughness, external structure and self-structure were shown to load strongly onto a factor that corresponded with conscientiousness (ibid.). In terms of convergent validity, Caliper's technical manual (ibid.) reports significant correlations between the personality scales used in this study and the NEO PI-R, a self-report measure of the Big Five factors (Costa & McCrae, 1992; McCrae & Costa, 1997), in the

following: Caliper's assertiveness, gregariousness, sociability and energy correlated with extraversion on the NEO PI-R as .43***, .44***, .28** and .38*** respectively; and cautiousness, thoroughness, external structure and self-structure correlated with conscientiousness on the NEO PI-R as .30**, .36***, .29** and .23* respectively (*p<.05, **p<.01, ***p<.001). Table 3 below lists the correlations between Caliper Profile measures and NEO PI-R domains, extracted from Caliper's technical manual.

	NEO PI-R Domains				
Caliper Profile measures	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Energy	-0.28**	0.38***	0.32***	0.02	0.42***
Sociability	-0.12	0.28**	0.15	0.03	0.09
Gregariousness	-0.27**	0.44***	0.32***	0.20*	0.01
Assertiveness	-0.37***	0.43***	0.41***	0.13	0.24**
Thoroughness	-0.12	-0.01	-0.19*	-0.02	0.36***
External Structure	-0.17	0.28**	0.06	0.21*	0.29**
Self-Structure	-0.35***	0.28**	0.23*	0.22**	0.23*
Cautiousness	-0.14	-0.08	-0.27**	0.01	0.30**
Risk-Taking	0.01	0.17	0.23*	0.01	-0.18

*Table 3: Correlations between Caliper Profile measures and NEO PI-R domains (*p<.05, **p<.01, ***p<.001)*

Finally, for robustness checks, the control variables of risk-taking and abstract reasoning were subsequently and separately incorporated into the path model. The Caliper scale of risk-taking represents a facet of Big Five's openness to experience. Caliper's technical manual (2004, 2017) reports the value of risk-taking's correlation with the domain of openness measured in the NEO PI-R as .23 at p<.05. While certainly imperfect, risk-taking shall serve as an exploratory proxy for the domain of openness for this study. As for the

Caliper scale of abstract reasoning, it represents a cognitive ability construct (see Section 6.3.1.2).

For the resultant structural equation models, four goodness of fit indices were used to evaluate the adequacy of the model fit, and they are: the chi-square test, the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) (Barrett, 2007; Bentler, 1990; Bollen, 1989). Criteria for what constitutes an absolute good fit tends to be somewhat arbitrary and often debatable (Lundqvist, 2008). On the one hand, values that have been used to describe an excellent level of goodness of fit tend to be in the range of .90 to .95 for CFI and TLI, and .05 to .08 for RMSEA (Browne & Cudeck, 1993; Hu & Bentler, 1999; Markland, 2007; Marsh, Hau, & Wen, 2004); while on the other, scholars have also adopted a more broadly encompassing threshold where only values greater than .1 for RMSEA are considered a bad fit (Dugard, Todman, & Staines, 2010).

7. Results

Table 4 below provides descriptive statistics such as the mean and standard deviation for all the observed measures. The first nine rows list the descriptive statistics for the personality measures, the tenth row for abstract reasoning (indicating cognitive ability), and the remaining rows for the managerial performance measures.

	N	Min.	Max.	Mean	Std. Deviation
Energy	323	1	99	62.96	28.518
Sociability	323	1	99	47.00	27.800
Gregariousness	323	1	99	42.03	27.796
Assertiveness	323	1	99	64.90	27.566
Thoroughness	323	1	99	60.30	28.048
External Structure	323	1	99	51.23	28.563
Self-Structure	323	1	99	52.82	29.277
Cautiousness	323	2	99	63.18	28.706
Risk-taking	323	1	99	56.79	26.374
Abstract Reasoning	323	10	99	79.18	20.016
1.1 Exhibits a dedication to company mission, people, values and business	323	4.00	10.00	8.0831	0.99512
1.2 Aggressively pursues continuous improvement to advance the organization	323	2.00	10.00	7.9118	1.09742
1.3 Thinks deeply about conducting our business	321	3.00	10.00	7.6802	1.13359
1.4 Asks questions with curiosity as the core motive	323	3.00	10.00	7.6646	1.24536
2.1 Expresses optimisim and a positive attitude even when faced with adversity and crisis	323	4.00	10.00	7.9051	1.09650

2.2 Makes tough decisions	318	4.00	10.00	7.5571	1.25421
2.3 Learns from failure and recovers	320	4.00	10.00	7.7016	1.06401
2.4 Engages in life-long professional and personal development	320	4.00	10.00	7.8854	0.96556
3.1 Networks with a wide-range of contacts both inside and outside of the company	322	4.00	10.00	7.4653	1.25735
3.2 Stimulates, encourages and cultivates new thinking, ideas and experimentation	320	2.00	10.00	7.3682	1.15700
3.3 Scans the internal and external environment for new ideas	323	2.00	10.00	7.2601	1.20734
3.4 Builds initiatives and business models from "scratch" without depending on past ideas or existing structures and resources	320	1.00	10.00	7.0427	1.27083
3.5 Exhibits intolerance for maintaining the status quo without asking questions	319	2.00	10.00	7.4551	1.22577
3.6 Anticipates and quickly adapts to change	323	2.00	10.00	7.5325	1.13261
3.7 Takes calculated risks	321	2.00	10.00	7.4424	1.14428
4.1 Behaves in a predictable, consistent and reliable manner	323	6.00	10.00	8.3375	1.03626
4.2 Follows through and delivers on commitments	323	3.0	10.0	8.252	1.0414
4.3 Leads by example	322	5.00	10.00	8.1232	1.01358
4.4 Communicates an agenda with transparency	323	5.00	10.00	8.2900	1.08388
4.5 Acts in a manner that puts company interest before self interest	323	4.00	10.00	8.3978	1.11272
4.6 Exhibits unquestionable business ethics on a global basis	323	5.00	10.00	8.4097	1.13725

5.1 Aggressively seeks to eliminate barriers that inhibit collaboration across borders, companies, and people	317	4.00	10.00	7.6362	1.18020
5.2 Identifies and utilizes diverse talent from across the organization	307	4.00	10.00	7.3708	1.14813
5.3 Employs the strengths of diverse teams to facilitate cross-organizational strategy and initiatives	315	4.00	10.00	7.5085	1.07714
6.3 Recognizes and mentors unrealized potential in others	312	3.00	10.00	7.3082	1.05250
6.4 Identifies and provides opportunities for growth and development	314	3.00	10.00	7.5282	1.02271
6.5 Provides feedback and coaching to achieve peak performance	311	3.00	10.00	7.4566	1.07722
6.6 Empowers teams to think and work independently	313	2.00	10.00	7.5394	1.07419
7.1 Expresses a clear and inspiring vision of the future	317	3.00	10.00	7.3039	1.05043
7.2 Overcomes resistance to change and builds a commitment for the future	318	1.00	10.00	7.4203	1.12180
7.3 Engages others in achieving more than they believe they can achieve	316	2.00	10.00	7.3586	1.14983
7.4 Takes time to get to know and communicate with others at every level of the company	320	3.00	10.00	7.4974	1.17567
7.5 Facilitates listening, open dialog, and two-way communication	320	4.00	10.00	7.7021	1.19604
8.1 Empowers individuals and teams to translate vision into goals and goals into action	318	4.00	10.00	7.7689	1.09484

8.2 Provides the resources necessary to attain goals and complete actions	316	4.0	10.0	7.533	0.9951
8.3 Confirms that actions taken are timely and consistent with "best practices" from both within and outside of the company and industry	320	4.00	10.00	7.4604	1.17726
8.4 Assigns specific accountabilities and holds self responsible for outcomes	317	2.00	10.00	7.8055	1.11419
8.5 Engages in a continuous process of "thinking and rethinking" goals, strategies, actions, and progress to arrive at optimal solutions and results	320	3.00	10.00	7.6484	1.15120
8.6 Promotes and engages in "fact-based" decision making that facilitates quick action	321	4.00	10.00	7.7991	1.14770
8.7 Eliminates barriers that impede progress toward key projects and goals	321	3.00	10.00	7.5784	1.08500
8.8 Persists until goals have been reached	322	5.00	10.00	7.9659	1.08936
Valid N (listwise)	282				

Table 4: Descriptive statistics for all observed measures

7.1 Factor Analyses of and Measurement Model for Dependent Variables

In the exploratory factor analysis of the outcome measures in the data using the principal components extraction method, the KMO measure of sampling adequacy was .961, well above the minimum value of .6 required for a good factor analysis. An eigenvalue of 1 was used as the criterion for retention of a factor, resulting in the extraction of six components from the outcome measures which consisted of boss-ratings across the 43 items of managerial performance.

Using the Varimax method for an orthogonal rotation, coefficient values greater than .5 were considered. Looking at the indicators for each component in the rotated component matrix, there were three components that emerged demonstrating strong content alignment with how the dynamic managerial capabilities of sensing, seizing, and reconfiguring are described in the literature (see Table 5). Component one represented a construct that is aligned with reconfiguring, component two seizing, and component five sensing.

Rotated Component Matrix	Component					
	1	**2**	**3**	**4**	**5**	**6**
Thinks deeply about conducting our business	0.688					
Aggressively pursues continuous improvement to advance the organization	0.683					
Stimulates, encourages and cultivates new thinking, ideas and experimentation	0.666					
Builds initiatives and business models from "scratch" without depending on past ideas or existing structures and resources	0.657					
Exhibits intolerance for maintaining the status quo without asking questions	0.630					
Asks questions with curiosity as the core motive	0.579					
Makes tough decisions	0.521					
Expresses a clear and inspiring vision of the future	0.518					
Anticipates and quickly adapts to change	0.513					
Takes calculated risks						

Expresses optimisim and a positive attitude even when faced with adversity and crisis						
Promotes and engages in "fact-based" decision making that facilitates quick action		0.718				
Engages in a continuous process of "thinking and rethinking" goals, strategies, actions, and progress to arrive at optimal solutions and results		0.697				
Confirms that actions taken are timely and consistent with "best practices" from both within and outside of the company and industry		0.696				
Provides the resources necessary to attain goals and complete actions		0.658				
Eliminates barriers that impede progress toward key projects and goals		0.639				
Persists until goals have been reached		0.632				
# Assigns specific accountabilities and holds self responsible for outcomes		0.591				
# Empowers individuals and teams to translate vision into goals and goals into action		0.539				
Learns from failure and recovers						
Acts in a manner that puts company interest before self interest			0.808			
Communicates an agenda with transparency			0.784			
Exhibits unquestionable business ethics on a global basis			0.778			
Behaves in a predictable, consistent and reliable manner			0.747			
Follows through and delivers on commitments			0.706			
Leads by example			0.596			

Exhibits a dedication to company mission, people, values and business						
Engages in life-long professional and personal development						
Provides feedback and coaching to achieve peak performance				0.677		
Identifies and provides opportunities for growth and development				0.676		
Empowers teams to think and work independently				0.643		
Engages others in achieving more than they believe they can achieve				0.623		
Recognizes and mentors unrealized potential in others				0.610		
Facilitates listening, open dialog, and two-way communication				0.530		
Overcomes resistance to change and builds a commitment for the future				0.513		
Networks with a wide-range of contacts both inside and outside of the company					0.715	
Takes time to get to know and communicate with others at every level of the company					0.668	
Scans the internal and external environment for new ideas					0.550	
Employs the strengths of diverse teams to facilitate cross-organizational strategy and initiatives					0.512	
Aggressively seeks to eliminate barriers that inhibit collaboration across borders, companies, and people						
Identifies and utilizes diverse talent from across the organization						0.680

Sets and demands a consistent standard for selecting from inside or outside and puts them in right positions						0.612
Actively engages in identifying and developing successors and high potential candidates for future leadership roles across the organization						0.504

Table 5: Rotated component matrix (last two items for component two, prefixed with #, were not incorporated into the measurement model for confirmatory factor analysis)

In the sensing component, the variables seemed to collectively describe managerial performance in networking widely both inside and outside of the firm, scanning the internal and external environment for new ideas, as well as communicating across the firm to facilitate organizational strategy and initiatives. In the seizing component, the variables seemed to collectively describe managerial performance in taking quick yet evidence-based actions, optimizing solutions and results through best practice alignment, deploying resources, and eliminating barriers until goals are achieved. In the reconfiguring component, the variables seemed to collectively describe managerial performance in questioning and challenging the status quo, embracing curiosity and breaking free from path dependencies to develop new business models, experimenting with new ideas, anticipating and adapting quickly to change, expressing an inspiring vision of the future, and making the necessary tough decisions to get there.

In terms of scale reliability, all three components of sensing, seizing, and reconfiguring demonstrated high internal consistency, with Cronbach's coefficient alpha close to or above the generally accepted value of .75. Component one which was aligned with reconfiguring had a Cronbach's alpha of .918, component two which was aligned with seizing

had a Cronbach's alpha of .926, and component five which was aligned with sensing had a Cronbach's alpha of .797.

The fact that the data on the outcome measures of managerial performance was analyzed in its entirety (i.e. all 43 rating items were subject to exploratory factor analysis instead of a shortlisted sample) is a significant one. Given that the managerial performance survey was not specifically designed with dynamic managerial capabilities in mind, but rather, based on the focal company's take on the "competencies" that were critical for them in a period of change, the factorial pattern of components that emerged, where three components corresponded well with sensing, seizing, and reconfiguring, is a very encouraging outcome. This suggests that dynamic managerial capabilities can emerge naturally as a concept, as can be seen from the exploratory factor analysis, which to some extent serves to validate the objectivity of the measure of dynamic capabilities.

Drawing on the aforementioned findings from the exploratory factor analysis, a measurement model was specified in AMOS to represent the three latent variables of sensing, seizing, and reconfiguring and their respective observed indicators (see Figure 1). From the exploratory factor analysis, the four variables from component five with coefficient values >.5 were retained as observed indicators of the latent variable of sensing in the measurement model. Similarly, the nine variables from component one with coefficient values >.5 were retained as observed indicators of the latent variable of reconfiguring in the measurement model. Lastly, six variables from component two with coefficient values >.5 were retained as observed indicators of the latent variable of seizing in the measurement model. Two variables from component two in the exploratory factor analysis were dropped

from this measurement model as they did not appear to correspond well with the conceptual content of seizing.

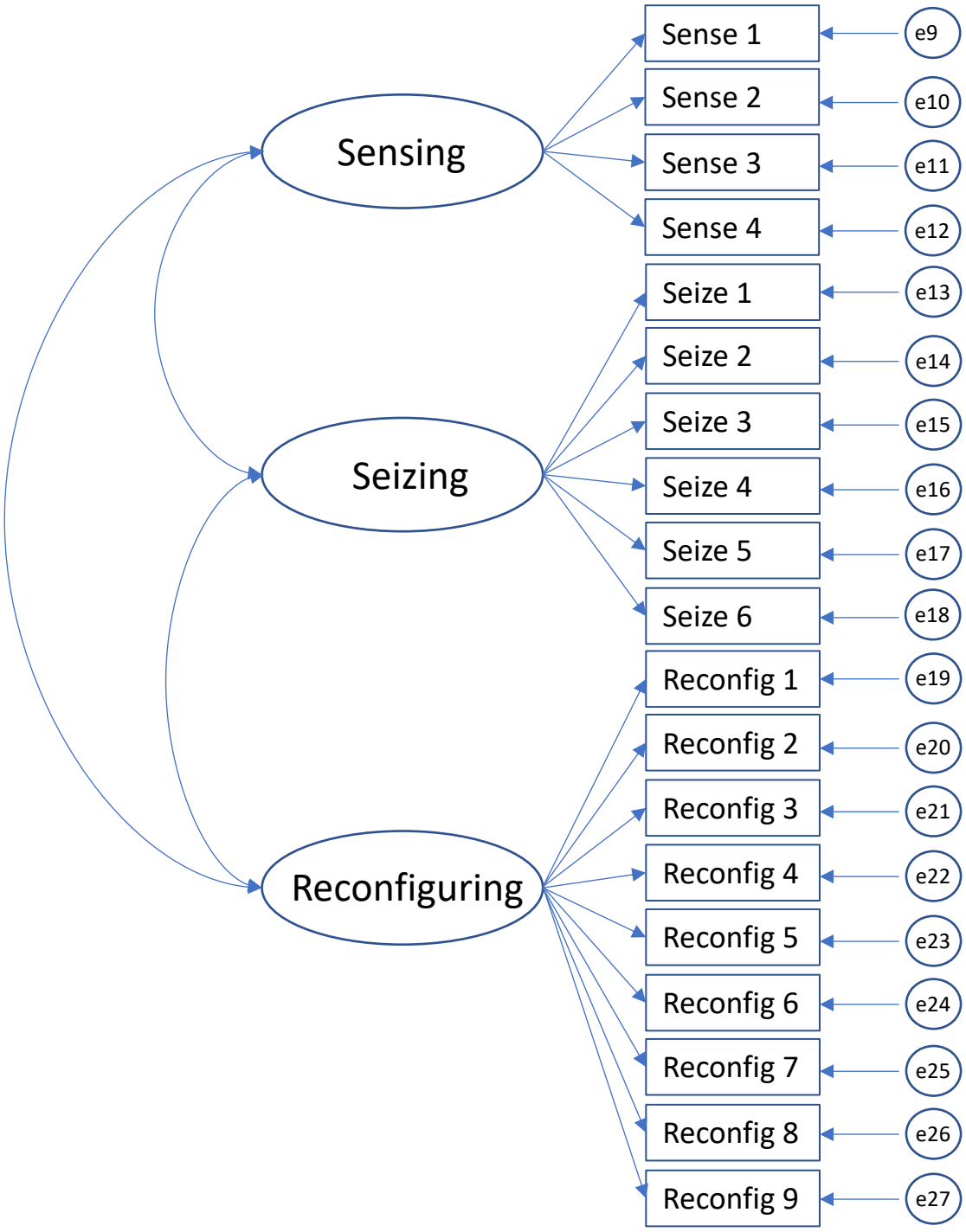

Figure 1: Measurement model for the three latent dependent variables of sensing, seizing, and reconfiguring

Output results from a confirmatory factor analysis of the measurement model in AMOS showed that the model could be considered an excellent fit to the data based on the narrower thresholds ($\chi^2 = 454$, df = 149, $p < .001$, CFI = .92, TLI = .90, RMSEA = .08). The chi square statistic in a confirmatory factor analysis tends to be highly susceptible to larger sample sizes (Dugard et al., 2010); hence the significant value for chi square obtained for a sample of this size did not necessarily lead to a rejection of the model. On the contrary, the model-fit results obtained for CFI, TLI and RMSEA supported the postulation that the three latent factors of sensing, seizing, and reconfiguring were strong reflections of their associated observed indicators. Results on regression weights and significance values are shown in Table 6.

			S.E.	C.R.	P	Standardized Estimate
Sense_1	<---	Sensing				0.689
Sense_2	<---	Sensing	0.085	11.715	***	0.732
Sense_3	<---	Sensing	0.088	12.665	***	0.8
Sense_4	<---	Sensing	0.078	11.609	***	0.728
Seize_1	<---	Seizing				0.833
Seize_2	<---	Seizing	0.057	17.014	***	0.805
Seize_3	<---	Seizing	0.059	16.126	***	0.776
Seize_4	<---	Seizing	0.05	16.775	***	0.8
Seize_5	<---	Seizing	0.053	17.36	***	0.815
Seize_6	<---	Seizing	0.055	15.595	***	0.757
Reconfig_1	<---	Reconfiguring				0.76
Reconfig_2	<---	Reconfiguring	0.069	13.67	***	0.735
Reconfig_3	<---	Reconfiguring	0.072	14.161	***	0.76
Reconfig_4	<---	Reconfiguring	0.079	14.125	***	0.758
Reconfig_5	<---	Reconfiguring	0.077	13.93	***	0.75
Reconfig_6	<---	Reconfiguring	0.078	13.95	***	0.748

Reconfig_7	<---	Reconfiguring	0.079	12.974	***	0.705
Reconfig_8	<---	Reconfiguring	0.067	12.138	***	0.665
Reconfig_9	<---	Reconfiguring	0.07	14.629	***	0.78

*Table 6: Regression weights for dependent variable measurement model (*** p<.001)*

7.2 Structural Equation Model

Using AMOS, a path model was specified laying out the hypothesized relationships between the latent independent variables and the latent dependent variables (see Figure 2). The measurement model derived from the confirmatory factor analysis of the latent dependent variables (described in Section 7.1 above) was incorporated into this path model. The independent variables were specified as the two latent variables of extraversion and conscientiousness and their respective observed indicators (as described in Section 6.4). Extraversion was reflected by the indicators of assertiveness, gregariousness, sociability, and energy. Conscientiousness was reflected by the indicators of cautiousness, thoroughness, external structure, and self-structure.

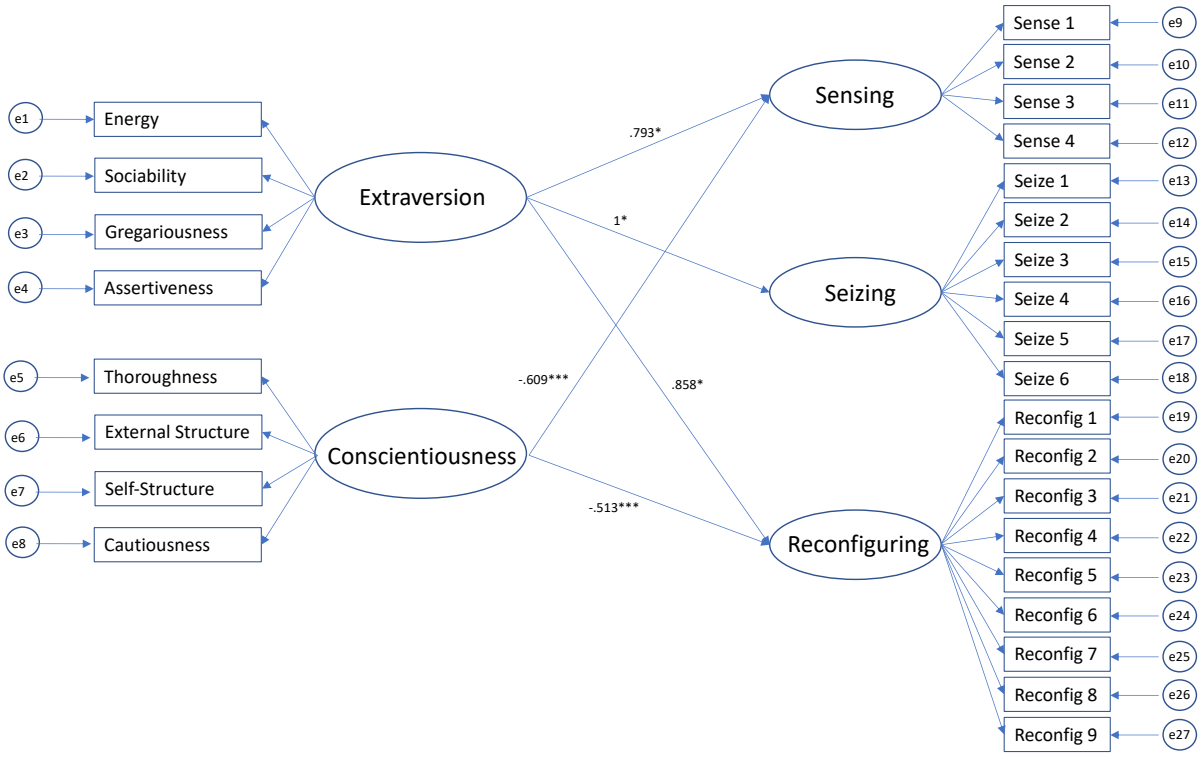

Figure 2: Path model laying out hypothesized relationships

From the output results, the model could be considered an adequate fit to the data based on broader thresholds (χ^2 = 1219.6, df = 321, p < .001, CFI = .80, TLI = .77, RMSEA = .09). Compared to the model-fit results of the measurement model of just the latent dependent variables alone (see Section 7.1 above), the results for this overall path model appeared weaker – CFI and TLI were lower, while RMSEA was higher. This is not unexpected due to the additional parameters in the path model. Despite that, the obtained results were still within generally accepted thresholds even though they did not necessarily indicate an excellent fit. Results on regression weights and significance values are shown in Table 7.

			S.E.	C.R.	P	Standardized Estimate
Sensing	<---	Extraversion	0.084	2.139	0.032*	0.793

Seizing	<---	Extraversion	0.125	2.184	0.029*	1
Reconfiguring	<---	Extraversion	0.095	2.161	0.031*	0.858
Sensing	<---	Conscientiousness	0.009	-4.64	***	-0.609
Seizing	<---	Conscientiousness	0.008	0.146	0.884	0.015
Reconfiguring	<---	Conscientiousness	0.008	-4.294	***	-0.513
Sense_1	<---	Sensing				0.628
Sense_2	<---	Sensing	0.097	10.405	***	0.675
Sense_3	<---	Sensing	0.102	11.548	***	0.77
Sense_4	<---	Sensing	0.089	10.359	***	0.674
Seize_1	<---	Seizing				0.822
Seize_2	<---	Seizing	0.059	16.822	***	0.807
Seize_3	<---	Seizing	0.061	16.018	***	0.78
Seize_4	<---	Seizing	0.051	16.28	***	0.791
Seize_5	<---	Seizing	0.055	16.833	***	0.807
Seize_6	<---	Seizing	0.057	15.302	***	0.754
Reconfig_1	<---	Reconfiguring				0.737
Reconfig_2	<---	Reconfiguring	0.073	12.994	***	0.717
Reconfig_3	<---	Reconfiguring	0.076	13.703	***	0.755
Reconfig_4	<---	Reconfiguring	0.084	13.414	***	0.74
Reconfig_5	<---	Reconfiguring	0.081	13.162	***	0.728
Reconfig_6	<---	Reconfiguring	0.082	13.532	***	0.744
Reconfig_7	<---	Reconfiguring	0.083	12.512	***	0.695
Reconfig_8	<---	Reconfiguring	0.07	11.813	***	0.66
Reconfig_9	<---	Reconfiguring	0.074	13.924	***	0.764
Assertiveness	<---	Extraversion				0.126
Gregariousness	<---	Extraversion	0.47	-0.365	0.715	-0.021
Sociability	<---	Extraversion	0.464	0.048	0.962	0.003
Energy	<---	Extraversion	0.495	0.613	0.54	0.037
Cautiousness	<---	Conscientiousness				0.422
Self-Structure	<---	Conscientiousness	0.165	2.344	0.019*	0.16
External Structure	<---	Conscientiousness	0.181	4.046	***	0.31
Thoroughness	<---	Conscientiousness	0.182	4.319	***	0.341

Table 7: Regression weights and significance values for path model (p<.05, *** p<.001)*

The latent independent variable of extraversion was positively associated with managerial performance in the dynamic capabilities of sensing, seizing and reconfiguring (all three at $p < .05$). This result provided support for hypotheses 1a, 1b, and 1c. The latent independent variable of conscientiousness was negatively associated with managerial performance in the dynamic capabilities of sensing and reconfiguring (both at $p < .001$). This result provided support for hypotheses 2a and 2b.

For robustness checks, the control variables of abstract reasoning and risk-taking were incorporated into the model individually and separately. As mentioned in Section 6.4, abstract reasoning represents a cognitive ability construct while risk-taking represents a facet of Big Five's openness to experience and shall serve as an exploratory proxy for this personality domain for this study. Cognitive ability would serve as a valuable control given its place within the cognitive account of the microfoundations of dynamic managerial capabilities, and of course the central premise of this study which argues for an alternative but supplementary account from the perspective of personality. Risk-taking would also be an interesting control to account for the presumably self-evident or obvious effects of the openness personality domain on dynamic managerial capabilities.

From the output results, the model, incorporating the control variable of abstract reasoning (see Figure 3), could be considered an adequate fit to the data based on generally accepted thresholds ($\chi^2 = 1247.5$, df = 343, $p < .001$, CFI = .80, TLI = .76, RMSEA = .09). In fact, the results for CFI, TLI and RMSEA were almost identical with the model without a control variable. After controlling for cognitive ability, the latent independent variable of extraversion was still positively associated with managerial performance in the dynamic

capabilities of sensing, seizing, and reconfiguring (all three at p< .05), providing support for hypotheses 1a, 1b, and 1c. The latent independent variable of conscientiousness, after controlling for cognitive ability, was still negatively associated with managerial performance in the dynamic capabilities of sensing (p < .005) and reconfiguring (p < .05), albeit with relatively weaker significance levels. This result provided support for hypotheses 2a and 2b. Interestingly, cognitive ability did not seem to have a significant effect on any of the dynamic managerial capabilities. Results on regression weights and significance values are shown in Table 8.

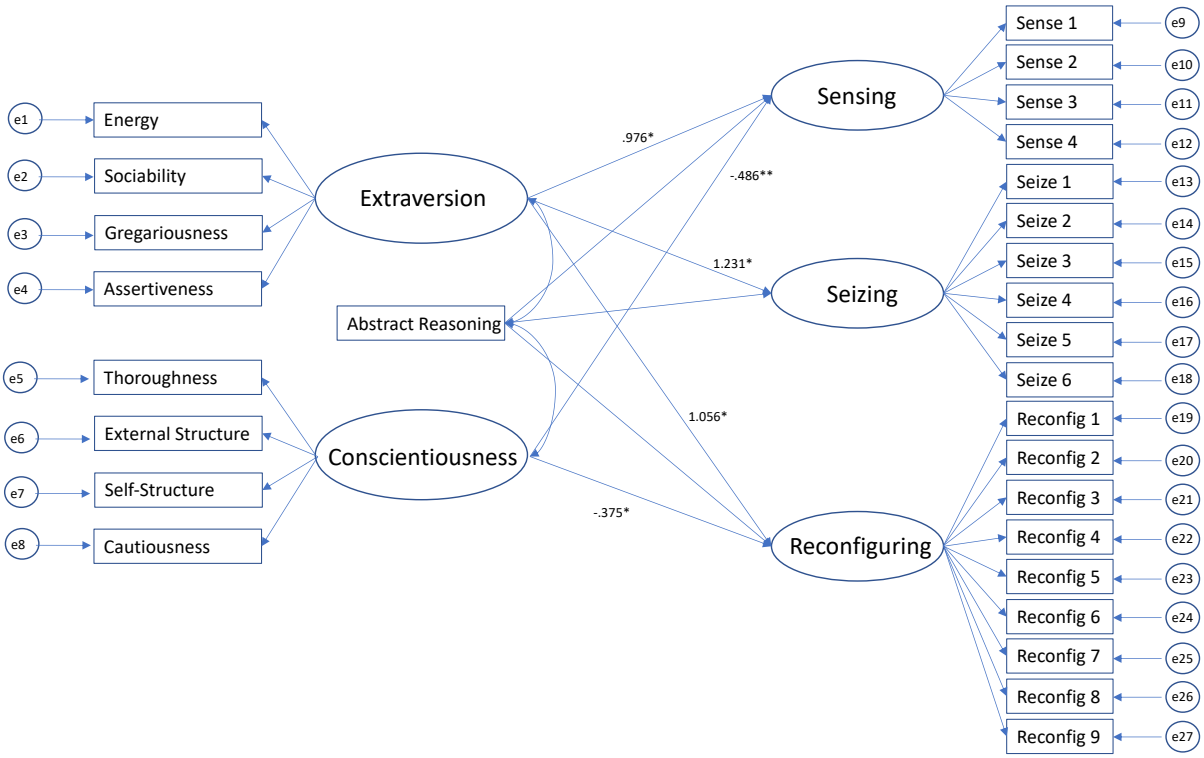

Figure 3: Path model, controlling for cognitive ability (Abstract Reasoning variable)

			S.E.	C.R.	P	Standardized Estimate
Sensing	<---	Extraversion	0.091	2.081	0.037*	0.976

Seizing	<---	Extraversion	0.137	2.113	0.035*	1.231
Reconfiguring	<---	Extraversion	0.104	2.1	0.036*	1.056
Sensing	<---	Conscientiousness	0.01	-2.919	0.004**	-0.486
Seizing	<---	Conscientiousness	0.013	1.03	0.303	0.19
Reconfiguring	<---	Conscientiousness	0.011	-2.244	0.025*	-0.375
Sensing	<---	Abstract Reasoning	0.018	-0.943	0.345	-0.43
Seizing	<---	Abstract Reasoning	0.027	-1.317	0.188	-0.75
Reconfiguring	<---	Abstract Reasoning	0.02	-0.979	0.328	-0.48
Sense_1	<---	Sensing				0.627
Sense_2	<---	Sensing	0.097	10.39	***	0.674
Sense_3	<---	Sensing	0.102	11.521	***	0.769
Sense_4	<---	Sensing	0.089	10.335	***	0.673
Seize_1	<---	Seizing				0.823
Seize_2	<---	Seizing	0.059	16.91	***	0.809
Seize_3	<---	Seizing	0.061	16.036	***	0.78
Seize_4	<---	Seizing	0.051	16.312	***	0.791
Seize_5	<---	Seizing	0.055	16.812	***	0.805
Seize_6	<---	Seizing	0.057	15.342	***	0.754
Reconfig_1	<---	Reconfiguring				0.736
Reconfig_2	<---	Reconfiguring	0.073	12.96	***	0.716
Reconfig_3	<---	Reconfiguring	0.076	13.673	***	0.754
Reconfig_4	<---	Reconfiguring	0.084	13.352	***	0.738
Reconfig_5	<---	Reconfiguring	0.081	13.143	***	0.728
Reconfig_6	<---	Reconfiguring	0.082	13.493	***	0.743
Reconfig_7	<---	Reconfiguring	0.084	12.528	***	0.697
Reconfig_8	<---	Reconfiguring	0.07	11.805	***	0.66
Reconfig_9	<---	Reconfiguring	0.075	13.919	***	0.765
Assertiveness	<---	Extraversion				0.146
Gregariousness	<---	Extraversion	0.391	-0.013	0.989	-0.001
Sociability	<---	Extraversion	0.392	-0.146	0.884	-0.008
Energy	<---	Extraversion	0.427	0.896	0.37	0.054
Cautiousness	<---	Conscientiousness				0.45

Self-Structure	<---	Conscientiousness	0.152	2.348	0.019*	0.157
External Structure	<---	Conscientiousness	0.161	3.959	***	0.288
Thoroughness	<---	Conscientiousness	0.168	4.737	***	0.367

Table 8: Regression weights and significance values for path model, controlling for cognitive ability (p<.05, ** p<.01, *** p<.001)*

From the output results, the model, incorporating the control variable of risk-taking (see Figure 4), could be considered an adequate fit to the data based on generally accepted thresholds (χ^2 = 1193.2, df = 343, p < .001, CFI = .82, TLI = .78, RMSEA = .088). The results for CFI, TLI and RMSEA were slightly better in this model compared to the model controlling for cognitive ability and the model with no controls. In this model, what is notable is that conscientiousness and, to a partial extent, extraversion demonstrated the hypothesized effects on dynamic managerial capabilities above and beyond that of risk-taking. Providing support for hypotheses 2a and 2b, conscientiousness was negatively associated with sensing and reconfiguring (both at p<.05). Providing partial support for hypothesis one, extraversion was positively associated with seizing (p<.05), but not too clearly so for sensing (p=.055) and reconfiguring (p=.05). Somewhat unexpectedly, risk-taking itself is negatively associated with sensing, seizing, and reconfiguring (all three at p<.05). Results on regression weights and significance values are shown in Table 9.

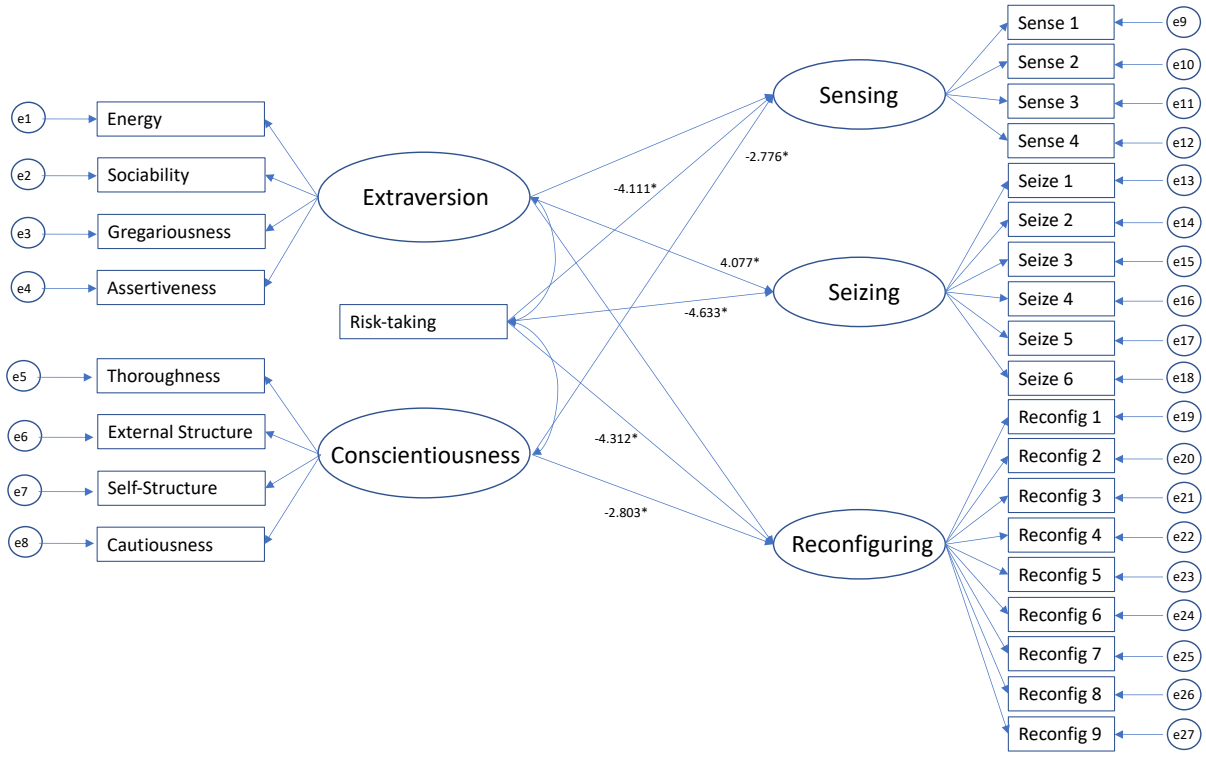

Figure 4: Path model, controlling for risk-taking

			S.E.	C.R.	P	Standardized Estimate
Sensing	<---	Extraversion	0.14	1.919	0.055	3.344
Seizing	<---	Extraversion	0.191	2.044	0.041*	4.077
Reconfiguring	<---	Extraversion	0.156	1.956	0.05	3.609
Sensing	<---	Conscientiousness	0.071	-2.363	0.018*	-2.776
Seizing	<---	Conscientiousness	0.095	-1.877	0.061	-2.467
Reconfiguring	<---	Conscientiousness	0.079	-2.269	0.023*	-2.803
Sensing	<---	Risk-Taking	0.063	-2.042	0.041*	-4.111
Seizing	<---	Risk-Taking	0.085	-2.019	0.044*	-4.633
Reconfiguring	<---	Risk-Taking	0.07	-2.026	0.043*	-4.312
Sense_1	<---	Sensing				0.63
Sense_2	<---	Sensing	0.096	10.47	***	0.679
Sense_3	<---	Sensing	0.102	11.591	***	0.772
Sense_4	<---	Sensing	0.089	10.49	***	0.683
Seize_1	<---	Seizing				0.819

Seize_2	<---	Seizing	0.059	16.724	***	0.806
Seize_3	<---	Seizing	0.061	15.866	***	0.777
Seize_4	<---	Seizing	0.052	16.217	***	0.791
Seize_5	<---	Seizing	0.056	16.793	***	0.808
Seize_6	<---	Seizing	0.057	15.274	***	0.755
Reconfig_1	<---	Reconfiguring				0.737
Reconfig_2	<---	Reconfiguring	0.073	12.996	***	0.717
Reconfig_3	<---	Reconfiguring	0.076	13.724	***	0.756
Reconfig_4	<---	Reconfiguring	0.084	13.408	***	0.74
Reconfig_5	<---	Reconfiguring	0.081	13.153	***	0.727
Reconfig_6	<---	Reconfiguring	0.082	13.502	***	0.743
Reconfig_7	<---	Reconfiguring	0.083	12.489	***	0.694
Reconfig_8	<---	Reconfiguring	0.07	11.83	***	0.66
Reconfig_9	<---	Reconfiguring	0.075	13.949	***	0.765
Assertiveness	<---	Extraversion				0.357
Gregariousness	<---	Extraversion	0.18	2.817	0.005**	0.18
Sociability	<---	Extraversion	0.188	3.361	***	0.224
Energy	<---	Extraversion	0.194	3.42	***	0.229
Cautiousness	<---	Conscientiousness				0.455
Self-Structure	<---	Conscientiousness	0.144	2.578	0.01*	0.166
External Structure	<---	Conscientiousness	0.161	5.049	***	0.372
Thoroughness	<---	Conscientiousness	0.161	5.223	***	0.391

Table 9: Regression weights and significance values for path model, controlling for risk-taking (p<.05, ** p<.01, *** p<.001)*

Some standardized regression weights were found to exceed one in Tables 8 and 9. This is commonly attributed to the presence of multicollinearity, and while it may be of some concern, such phenomenon in which coefficients exceed one have been shown to "legitimately occur" (Deegan Jr, 1978, p. 875). Although standardized regression coefficients are thought to be analogous to correlation coefficients, Deegan demonstrates analytically and

geometrically that they are in fact not correlations nor partial correlations *per se*, but rather rates of change, and therefore are not numerically bounded by plus/minus one and should thus be interpreted as all other rates of change (1978, p. 882). In the case of Table 9 where the degree of excess from one is more pronounced, the presence of multicollinearity could be attributed to the likelihood of positive correlation between risk-taking and extraversion, as well as the negative correlation between risk-taking and conscientiousness.

8. Discussion

The overall results demonstrated the influence of personality on dynamic managerial capabilities within the sample of middle managers involved in driving and implementing strategic change initiatives in the focal company, a leading advanced manufacturing firm undergoing structural reform and strategic transformation. Against a backdrop of scholarship in the cognitive tradition which has simply suggested the relevance of individual attributes such as personality as a microfoundation of dynamic managerial capabilities, this present study focused on and demonstrated that indeed, extraversion and conscientiousness, two of the strongest personality dimensions of the Big Five model of personality linked to leadership emergence and effectiveness, have influence on the strategic processes of sensing, seizing, and reconfiguring. This section shall first set the context by elucidating the role of middle managers in firm dynamic capability using the data's focal company as the example, before discussing the results in respect to individual managerial attributes of extraversion and conscientiousness, as well as the outcome measures of dynamic managerial capabilities.

8.1 Middle Managers in Firm Dynamic Capability

For a company caught in an increasingly competitive landscape with markets demanding for innovation and demonstrating an appetite for increasing technological complexity, the dynamic capability of sensing is critical in order for the focal firm to not be blindsided by evolving market needs or be blind to opportunities. In light of the sheer amount of market feedback and information available, some in the form of valuable signals and others perhaps just noise, the firm would be hard-pressed to simply rely on just the top management team to scan for market opportunities and threats to the firm. Middle managers vested in the firm's strategic goals would indeed play a pivotal role in sensing.

For middle managers in the focal company, sensing activities often go right down to frequent and intentional dialogues with customers to explore how existing products could be developed into what the focal company would term "next-generation technologies", and how existing products could be cross-pollinated into new areas thereby opening up new markets. Middle managers in the company were exhorted to maintain close contact with customers so as to "grow together" with them, an aspirational outcome frequently alluded to in the company's management communication. These managers were also expected to be more deliberate in forging stronger and more expansive relations with various stakeholder groups within the firm to facilitate the sharing and learning of market intelligence and ideas. The role of middle managers in sensing can therefore be argued to be just as important, if not situationally more so, than the sensing activities of the top management team, since top managers themselves tend to rely on feedback, analyses and recommendations from the middle management rung. Thus, if middle managers were not effective in sensing, top management could then be fed inferior signals, jeopardizing the formulation of the firm's strategic initiatives which is a role that top management plays.

Following on from an organizational process of sensing, once direction is determined and cast by the focal company's top management team, such as to acquire certain strategic assets, middle managers would then be expected to implement the strategic plan with both speed and precision. For the focal company to be successful in seizing and to outpace its competitors, all middle managers involved in strategic execution will need to ensure their actions and that of the business units they are responsible for dovetail with the strategic intents of the company's top management. Unlike the top management team which tend to be a relatively smaller unit, there are far more middle managers in the company and each of

these middle manager's functional purview would inadvertently be connected with or potentially overlap with other managers' ambit, thereby resulting in an intricate and complex web of interconnected workflow across the organization. Speed, coordination, and cohesion in decision-making and action-taking of the entire middle management rung would likely be more challenging to achieve compared to the relatively smaller top management team whose role concerns more with strategy formulation. Therefore, for the firm to seize potentially fleeting opportunities in a competitive landscape, the effectiveness of middle management in aligning with top management's strategic intents, coordinating seamlessly amongst themselves, and acting quickly and robustly would be an essential contributing factor.

From a reconfiguring perspective, the focal company's middle management would play an indispensable role in bringing about successful integration of the company's new acquisitions and technologies, which often entailed the need to strike a delicate balance between standardizing and aligning the new acquisitions with existing business objectives and processes, and allowing for flexibility and some leeway so as to not overly constrain the new acquisitions thereby risking the erosion of their unique advantages for which they were acquired. The process of reconfiguring to achieve a competitively viable synthesis of business assets can therefore be very chaotic and messy, since at any one point, there can be many moving parts and much ambiguity.

Middle managers therefore need to ensure timely communication with the focal company's top management in order to align on key strategic directives, yet to act with initiative and awareness of strategic intents even though direction from top management for the specific time and situation may not always be clear, consistent, or readily available. Onus is also on the middle managers' ability to lead 'on the ground', influencing an increased pool

of stakeholders both in the existing business and newly acquired ones, since organizational success from a dynamic capability perspective can only be achieved not just by the company seizing choice assets from their business environment, but by effectively integrating them, and reconfiguring organizational capability in the process.

As can be seen in the above, middle management plays a distinct and complementary role to the firm's top management team. While strategy formulation is likely the purview of top management teams across most firms, whether the resultant strategy is successfully executed can often lie in the hands of middle managers. Across an industry landscape, this study would postulate that heterogeneity across companies' middle management rungs could ultimately translate to variance in firm competitive advantage and the level of achievement of firm strategic outcomes. If a firm were to consistently extract competitive value through its dynamic capabilities, it bears to not just study the qualities of top management teams but those of middle management as well, for the characteristics of this organizational middle rung and how these attributes translate to dynamic managerial capabilities cannot be ignored given their role in strategy execution. It is with such an understanding that we now turn our attention to the effects of personality on managerial performance in dynamic capabilities.

8.2 Personality Attributes of Extraversion and Conscientiousness in Middle Managers

As hypothesized, extraversion was shown to positively influence performance in all three aspects of dynamic managerial capabilities. Middle managers who are more extraverted are likely to have stronger dispositions for the behaviors of reaching out and engaging with stakeholders across the firm, building relationships, sharing ideas, seeking and giving feedback, as well as sustaining a requisite level of activity under high velocity change conditions. These are also the very foundational behaviors that facilitate the processes of

sensing for opportunities collaboratively within and without the firm, seizing of opportunities through coordinated decision-making and deploying of resources, and reconfiguring of firm assets through proactive leadership and communication that break free of path dependencies and resistances to change, rallying their respective business units and organizational constituents towards top management's strategic vision of the future.

Taking a broader view, the process of learning at the organizational level (Argote, 1999), be it from failure or best practices, is likely to benefit from behaviors associated with managerial extraversion. As middle managers proactively build bridges and networks within and across organizational units, the negative effects of traditional 'silos' could be reduced, while facilitating stronger communication lines for collaborative cross-functional problem-solving, as well as the transfer and synthesis of knowledge. When the communication lifeblood, as it were, flows more smoothly and extensively throughout the firm, the organization stands to gain a potential competitive edge, especially in fast changing environments, from a superior level of intra-firm communication on and responsiveness to opportunities and threats on the horizon. As a result, top management teams could likely benefit from more holistic and circumspect feedback, analyses, and recommendations stemming from such middle management rungs. The effects of extraversion on managerial performance in the context of organizational learning, as suggested here, could, in part, enable organizations to sustain their dynamic capabilities.

Middle managers play a critical role in ensuring the strategic vision of top management percolates throughout the firm. Herein also lies the opportunity for middle managers to step up and be proactive in imbuing their teams with the firm's strategic imperatives, driving the execution of these strategic initiatives, and reporting promptly to top

management the progress made as well as challenges encountered. Not only does extraversion help in these endeavors, as described above, it also marks the middle managers who rise to the occasion as emergent leaders within the middle management rung, potentially putting them within visibility of top management who may be looking out for potential talent and successors. This is consistent with how extraversion has been shown to be one of the strongest predictors of leadership emergence in the wider personality literature (Ensari, Riggio, Christian, & Carslaw, 2011).

Hence, it is perhaps not surprising that in this sample, middle managers who seem to perform better in the dynamic capabilities of sensing, seizing, and reconfiguring tend to be more extraverted to begin with, since the effective demonstration of those capabilities would help to showcase these middle managers as up and coming leaders of the firm. However, given that managerial performance in this study was rated by the focal managers' bosses, one would question whether or not more positive ratings of managerial performance could really be attributed to 'actual' performance. Positive ratings could just as well indicate that extraverted middle managers have been successful in managing impressions and influencing opinions through proactively communicating to their bosses what they, the middle managers, have (apparently) accomplished in regard to the strategic objectives of the firm (Gardner & Martinko, 1988; Wayne & Liden, 1995). Moreover, extraverted middle managers might also be less hesitant to engage communicatively with upper management, such as naturally capitalizing on opportunity to bounce off ideas and gather feedback, proactively keeping upper management apprised of upcoming plans and actions, all of which could lend the extraverted middle manager a certain halo effect which could then influence boss-ratings positively.

Conscientiousness was found in this sample of focal middle managers to be negatively associated with the dynamic managerial capabilities of sensing and reconfiguring, as hypothesized. On the whole, the results are not entirely unexpected. The relatively stronger focus on quality and precision, the preference to deliberate over decisions carefully, and the consideration of and adherence to established rules and guidelines are behavioral manifestations of managers with a stronger disposition in conscientiousness. These resultant managerial behaviors from a conscientious disposition could inhibit unreserved participation in sensing and reconfiguring activities, not because the middle manager is uncommitted to the organization's strategic goals (s/he could well be, but that's besides the point), but because the middle manager may be concerned whether the ideas and initiatives being explored could realistically be implemented with attention to quality given the currently known conditions as well as uncertainties ahead. The conscientious middle manager may inadvertently operate under perceptions, real or imagined, of how top management may evaluate the quality of the middle manager's ideas and initiatives.

When presented with situations to explore and embrace change opportunities and initiatives, the conscientious middle manager may become hamstrung by self-imposed considerations of feasibility, practicality and attainability. This could then convey a sense of tentativeness to their stakeholders, such as their bosses, during which the middle manager might be perceived as unenthused and unconvinced about sensing and reconfiguring activities, resulting in lower managerial performance ratings in those areas.

Of course, perceptual issues aside, conscientious middle managers may indeed struggle with the agility and flexibility required to create and respond to conditions for strategic change. They may find themselves unable to act if boundary conditions are overly

ambiguous or not within their control. Top management might not always be clear, consistent, or timely in setting direction and providing a sense of boundary conditions, which could be vexing for conscientious middle managers who may well choose to 'play it safe' instead. And even if they do act, their need to discharge their actions responsibly and ensure robustness of outcomes may constrain their participation in the ideational processes in sensing and reconfiguring. In some cases, these conscientious middle managers may even opt out of the ideational processes of sensing and reconfiguring entirely, on the perception that such processes are overly fluid and divergent. Even if these ideational processes are not prematurely constrained or opted out from before the necessary free-form explorations run their course, the conscientious middle manager may become enmeshed in the details and deliberation, missing fleeting opportunities for intervention as well as timely and satisficing implementation of top management's strategic directions.

While the negative effects of conscientiousness on the dynamic managerial capabilities of sensing and reconfiguring can be readily rationalized, they do raise a particular conundrum for organizations looking to hire and develop the most optimal managerial talent to drive organizational success. Even as studies have demonstrated the positive effects of conscientiousness on leadership effectiveness, task leadership and ethical leadership (Bartone et al., 2009; Hansbrough et al., 2015; Hirschfeld et al., 2008; Kalshoven et al., 2011; Vogel & Kroll, 2019), the present study has raised the plausibility that higher levels of conscientiousness may in fact limit middle managers' performance under conditions of strategic change. Ideally, firms are likely to value both i) the stability that comes from operational excellence and effectiveness, and ii) the dynamic capability that arises from the sensing of opportunities and the reconfiguring of firm assets. Since conscientiousness in

middle managers is apt to contribute to the former and seems to inhibit the latter, firms are thus confronted with the inherent tension between the two desired outcomes.

Research in team shared leadership and self-leadership may shed some light on how firms and individual managers could navigate such a tension. Shared leadership is described as a dynamic process of influence and interaction among team members in which leadership is variously supplied by team members towards the achievement of team goals (Carson, Tesluk, & Marrone, 2007; Pearce, 2004; Pearce & Conger, 2003; Pearce & Manz, 2005). Inadvertently, there will most likely be heterogeneity in the conscientiousness disposition among middle managers in a firm even if we were to look at business units geared solely towards exploration or exploitation respectively, with the former focusing on demonstrating dynamic capabilities to take advantage of market opportunities, and the latter focusing on leveraging and deepening existing strengths to deliver operational stability and excellence. As such, it could be an imperative, therefore, for business units (as well as broader functional groupings of business units) to arrive at optimal configurations of team-mix, not just in terms of skills but also behavioral dispositions where leadership can be situationally shared, rotated or taken on by managers most suited for the task at hand at that point in the task or business cycle. Variance in managerial conscientiousness could then be harnessed as a strength. This is, obviously, a broad simplification since in practice, there will be numerous aspects to consider and issues to work through; and an in-depth discussion of them is beyond the scope of this study. That said, such team-mix configurations married with the practice of shared leadership, if done effectively, could result in localized idiosyncratic social complexity that, in itself, is inimitable and a potential source of firm competitive advantage (Barney, 1991).

Apart from the practice of shared leadership to navigate the quandary of managerial conscientiousness associated with desired organizational outcomes, the complementary practice of self-leadership at the individual manager level could also be useful. Self-leadership refers to how an individual self-regulates by first perceiving the situation and comparing its current state with identified standards; then, engaging in behavior to reduce the discrepancy from those standards; and finally, assessing and monitoring the outcomes of such behaviors (or behavioral skills), which serves as feedback to the individual's self-regulation cycle (Stewart, Carson, & Cardy, 1996; Stewart, Courtright, & Manz, 2011; Manz, 1986, 2015). Through cultivating the microfoundations of self- and others-awareness as well as self-regulation, middle managers may develop stronger self-leadership practices where they apply themselves beyond their personality dispositions in behaviors that are required for the situation or task at hand, even though the situation or task may not be one which they naturally or dispositionally enjoy. For instance, middle managers who are low in conscientiousness would need to be more mindful of situations calling for greater attentiveness to rigor, and to stretch their behaviors accordingly despite their dispositional preferences. In the same vein, these middle managers while more in their element when navigating conditions of change, could do well to recognize and involve the potentially complementary participation of their more conscientious counterparts. The practice of self-leadership and shared leadership in tandem could thus provide firms a perspective and a potentially productive approach to the conundrum of conscientiousness in managerial performance.

As a robustness check, cognitive ability was introduced as a control since the cognitive account of microfoundations has often alluded to managerial cognitive ability or general intelligence as an important component in cognition (Helfat & Martin, 2015b;

Ployhart & Moliterno, 2011; Teece, 2007). With cognitive ability as a control, the hypothesized influence of extraversion and conscientiousness on dynamic managerial capabilities still held, albeit with weaker statistical significance. Within this sample, cognitive ability itself did not seem to have any relationship with the three dynamic managerial capabilities of sensing, seizing, and reconfiguring. This is an interesting outcome as the cognitive account of the microfoundations of dynamic managerial capabilities (see Section 4.1) asserts that variance in the cognitive capabilities of managers involved in problem solving and decision making is likely to result in differences in the speed and soundness of managerial actions and decisions (Athanasiou, 2000; Helfat & Peteraf, 2015; Maritan, 2001; Stanovich & West, 1997), especially in the seizing of opportunities such as in business model adaptation and the deployment of investment.

The results regarding cognitive ability in this study certainly does not discount the research in the cognitive tradition. For the focal managers in this sample, cognitive ability *per se* may not be a significant driver of performance in dynamic managerial capabilities in light of i) their middle management position in the organizational hierarchy where execution and implementation of given strategic goals are likely emphasized over strategic thinking and conceptualization from scratch, and ii) the nature of their advanced manufacturing industry where it would be more important to be experienced and technically well-trained in a narrowly defined domain area, than to synthesize insights and cross-pollinate ideas across multiple knowledge domains where cognitive ability would be more valuable. In fact, the apparent lack of relationship between cognitive ability and dynamic managerial capabilities in this sample of middle managers would precisely underscore why it is important to also consider a noncognitive account, such as personality microfoundations, which is what this study has indeed set out to accomplish.

For risk-taking, which was the other control introduced separately into the model, the hypothesized relationships for conscientiousness continued to find support, albeit with weaker statistical significance, while the hypothesized relationships for extraversion found borderline support. What is interesting to note was the negative effects of risk-taking on all three dynamic capabilities of sensing, seizing, and reconfiguring. Risk-taking as a facet of Big Five's openness to experience describes venturesomeness and the willingness to take action despite uncertainty (Costa & McCrae, 1992; McCrae & Costa, 2008; McCrae & John, 1992; Caliper, 2017, 2004). Big Five's dimension of openness to experience has been associated with positive leadership outcomes in creative contexts (Feist, 1998; T. A. Judge & Bono, 2000; T. A. Judge, Bono, et al., 2002; Sosik, Kahai, & Avolio, 1998). It therefore stands to reason that risk-taking as a facet of openness could, in a similar fashion, be positively associated with at least sensing and reconfiguring given the ideational, creative and generative nature of these two dynamic managerial capabilities.

The fact that this presumption did not find support in this sample could once again highlight the potential differences in behavioral and performance expectations as well as boundary conditions between middle management and other rungs of the organizational hierarchy with regard to the demonstration of dynamic managerial capabilities. In an organization undergoing strategic change, although its CEO's openness to experience would be beneficial for strategic flexibility (Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010), a similar case may not be made for its middle managers who, interestingly, could also be expected to be dynamic and nimble, but apparently not too much. In this regard, lower dispositions in risk-taking could in fact serve to circumscribe the behavioral effects of low conscientiousness. If middle managers who tend to be effective in dynamic capabilities are

likely to be low on conscientiousness, then the behavioral outcomes arising from that lower conscientiousness combined with higher risk appetites may in fact spell recklessness or impulsiveness, which is unlikely to be a desirable behavioral disposition for middle managers who are tasked to drive the execution of strategic directives while ensuring operational stability.

Pulling the above discussion on middle manager personality together, this study ventures to offer a matrix in Table 10 below on the potential styles in the expression of dynamic managerial capabilities based on different configurations of extraversion and conscientiousness. The matrix explores and speculates on the qualitative aspects of managerial performances that could potentially result from the interaction effects of different levels of extraversion and conscientiousness in tandem, *ceteris paribus*. Four styles in the expression of dynamic managerial capabilities are proposed.

		Conscientiousness	
		High	Low
Extraversion	High	*Controller*	*Explorer*
	Low	*Doer*	*Dreamer*

Table 10: Styles of dynamic managerial capabilities based on different configurations of extraversion and conscientiousness

When a middle manager scores high on both extraversion and conscientiousness, they could be described as a Controller. Middle managers who are Controllers would be likened to natural leaders adept at marshalling their powers of influence and communication to direct the work of others to their own often exacting standards. Controllers would probably seek to showcase themselves to peers and top management as proactive and able to deliver on quality. They are likely to enjoy the processes of sensing, seizing, reconfiguring, being

predisposed to not just reach out in opportunity discovery, but also impose order and structure on the sensemaking of those opportunities. Controllers who also score high in risk-taking are likely to come across as particularly dynamic, albeit intense, since they may be found to push boundaries, striving to marry both operational excellence and strategic exploration. Given the constraints of the middle management rung, however, such Controllers may experience limitations to their dynamic agency and could feel restrained as a result. Controllers with lower risk-taking scores may prefer to err on the side of caution and stability, and may thus fit in more easily within the bounded conditions commonly associated with middle management.

When a middle manager scores low on extraversion and high in conscientiousness, they could be described as a Doer. Middle managers who are Doers may avoid the limelight and be somewhat reticent in situations where social initiative and being forthcoming in communication are called for, preferring instead to let their actions and work quality speak for itself. Since they seem to embody the antithesis of the ideal personality microfoundations of dynamic managerial capabilities (that of high extraversion and low conscientiousness), Doers are at risk of being relegated to performing operational tasks, eventually losing visibility and opportunity in a firm undergoing strategic change if its top management were to accord more prestige to and over-weight the performative behaviors of adaptability, stakeholder engagement, and the corresponding co-creation of opportunity through stakeholder engagement, far more so than the managerial behaviors that contribute to stability. High levels of risk-taking in Doers may serve as a compensatory mechanism to their low levels of extraversion and may even bring useful balance to their high levels of conscientiousness (even though high risk-taking and high conscientiousness may appear conflicting at first blush). For instance, Doers with some levels of risk-taking may be more

willing to let go of some of the minutiae to focus on the strategic possibilities associated with the so-called ‘big picture’, while still ensuring that a satisficing outcome can be attained with regard to quality. Conversely, Doers with low levels of risk-taking may find their conscientious behaviors further reinforced, and in situations where dynamic managerial capabilities are called for, such Doers may be perceived as an overly conservative ‘wet blanket’.

Middle managers who could be described as an Explorer are characterized by high scores in extraversion and low scores in conscientiousness, the apparent epitome of the personality microfoundations of dynamic managerial capabilities, at least within this study’s sample. This combination of personality scores would likely demonstrate many of the findings described earlier in this section. Explorers in the middle management rung are likely to be especially adept at sensing and reconfiguring, and could likely be seen to be at least outwardly aligned with the strategic intents and initiatives of top management. Explorers with high levels of risk-taking may run the risk of impulsiveness while those with low levels of risk-taking may derive some useful compensatory effects from their low risk-taking on their low conscientiousness, as alluded to in the discussion on risk-taking above. In the former, Explorers with high risk-taking would likely feel even more constrained within the middle management rung unless the firm particularly prizes opportunism and initiative in their middle managers, and has a strong bias towards ‘action first, consideration later’.

Middle managers who score low on extraversion and low on conscientiousness could be described as a Dreamer. As the label implies, Dreamers may come across as being in a world of their own, since the inclination to engage outwardly would not be as strong due to the low extraversion, and the impetus for rigor may be selectively or inconsistently applied to

their opportunity explorations due to the low conscientiousness. Notwithstanding the connotation associated with Dreamers, there may yet be roles for them in the middle management rung of an organizational hierarchy. Dreamers may find themselves better suited to the exercise of dynamic managerial capabilities in more constrained settings such as smaller teams with few direct reports or peers to manage and influence. Their role could likely be more ideational, abstract and analytical, without as strong a need to personally execute or to direct others to do so. If Dreamers have high risk-taking as well, they may be likened to 'armchair risk-takers', where they may be involved in the development of strategic ideas at their level, while others in the firm give attention to the operationalization and deployment. Dreamers run the risk of their ideational output seeming to be divorced from reality.

In relation to the earlier discussion on shared leadership and self-leadership (Carson et al., 2007; Stewart et al., 2011), the four styles painted here may provide some initial perspectives on how shared leadership teams could be configured for dynamic managerial capabilities based on the personality microfoundations of extraversion and conscientiousness, *ceteris paribus*, in its middle managers. The firm's organizational and competitive contexts, its strategic goals at that stage of their business cycle, the extent to which top management empowers middle management to act, the specific strategic mandates of the business units and departments from which the middle managers are part of, to name a few factors, would be important considerations in configuring teams of middle managers for shared leadership while sustaining dynamic capabilities. Individual managers could also facilitate the development of their self-leadership by identifying where they land within the above matrix, understanding the behavioral tendencies associated with each style, learning to play to their innate strengths while managing the behavioral risks involved.

8.3 Outcome Measures of Dynamic Managerial Capabilities

Finally, the use of the focal company's managerial performance ratings as-is, already framed in the language of managerial competencies or behavioral competencies (Kor & Mesko, 2013), as the outcome measures of the latent variables of sensing, seizing, and reconfiguring can be considered a novel methodological approach, theoretically relevant, and potentially contributive to existing measures of dynamic capabilities. It bears to highlight as a merit, not a deficiency that the data on the outcome measures of managerial performance was analyzed in its entirety without any *a priori* selection of items. What emerged, following factor analyses, were three components which corresponded well with dynamic managerial capabilities, suggesting that dynamic managerial capabilities can in fact emerge naturally as a concept, validating the objectivity of such a measure.

From a theoretical perspective, the nondeliberate conceptual emergence of dynamic managerial capabilities from the performance evaluation framework of a company undergoing strategic change hearkens back to the noncognitivist, ecologically-informed account expounded in Section 4.2. The noncognitivist perspective advanced by Nayak and colleagues (2020) postulates that experiential, iterative, and unconscious adaptations and learnings at the intersections of firm and environment could lead to the nondeliberate emergence of dynamic capabilities, which are eventually internalized as firm habitus (Bateson, 1972; Dreyfus, 2014; Gibson, 2015; Ingold, 2000; Merleau-Ponty, 2012; Nayak et al., 2020).

One could therefore see how the focal company, as it initiates structural reform and strategic change at a critical phase of its organizational trajectory, could come to value and

foreground the very behaviors considered necessary for its middle managers to perform in – behaviors which, if internalized as resultant firm habitus, would enable it to better overcome the competitive challenges of its time. Such managerial performative behaviors, "acquired in situ through extensive immersion in changing environmental conditions" (Nayak et al., 2020, p. 282), if shown to be effective, would eventually shape a company's internal managerial performance framework, just as expectations arising from the framework itself shape the in situ behaviors of managers driving change, thereby resulting in a mutually constitutive, ecologically-grounded, emergence of dynamic managerial capabilities in the firm. Firm heterogeneity is therefore not simply a function of top management, but an intricate layering and compositing of social complexity and internal feedback loops where middle managers and other organizational actors come to enact the behaviors which constitute a firm's dynamic capabilities and idiosyncratic adaption under conditions of change over time (Barney, 1991; Salvato, 2009).

Existing approaches to measure dynamic managerial capabilities tend to direct their measurement at the level of microfoundations (see Section 6.3.2), such as the microfoundations of managerial cognition, social capital, and human capital expounded by Helfat and Peteraf (2015). The approach adopted in this study is methodologically distinct and potentially contributive to existing research in that it does not conflate the measurement of microfoundations with the measurement of dynamic managerial capabilities themselves. Instead, an entirely different set of managerial antecedents which hitherto tends to be under-theorized, that of personality traits, were hypothesized and analyzed as potential microfoundations of dynamic managerial capabilities. Since microfoundations are antecedents and not the dynamic managerial capabilities themselves, the outcome measures of these capabilities were thus measured at the actual managerial performative level. As

discussed above, the fact that a framework was not imposed *a priori* upon the outcome data collection method, instead allowing the structure of the outcome data to naturally emerge and shown to be in alignment with the notion of dynamic managerial capabilities, would be considered a strength and a novel contribution from this study.

9. Potential Contributions, Limitations and Future Research

This study makes a theoretical contribution by drawing on the wealth of research on the effects of personality in management and organizations to inform the study of dynamic managerial capabilities. It not only adds to, but also complements the body of work on microfoundations, which hitherto tend to be more focused on managerial cognition. The cross-pollination between the two fields of personality and dynamic capabilities would yield valuable insights on how individual differences in personality dispositions underpin behavioral performances related to dynamic managerial capabilities in sensing, seizing and reconfiguring in organizations undergoing strategic change.

The research specifically raises the conundrum posed by the personality dimension of conscientiousness by situating the current findings, in which conscientiousness was shown to be negatively associated with sensing and reconfiguring, against the broader literature which demonstrates the positive effects of conscientiousness on leader effectiveness. The quandary experienced by firms attempting to optimize for both stability and operational excellence on the one hand, as well as dynamic capability and strategic flexibility on the other, would be a theoretically interesting problem to explore.

Furthermore, by looking at middle managers as the focal group, this study extends the scholarly coverage of personality effects in relation to management and leadership in hierarchical organizations, which has tended to focus more on top management such as CEOs. The study offers a perspective on how differences in boundary conditions between middle managers and top management could explain the influence and utility of attributes such as cognitive ability and risk-taking in middle managers in an advanced manufacturing context. For instance, cognitive ability had apparently no relationship with dynamic

managerial capabilities despite its status in the cognitive microfoundation literature. Risk-taking as a facet of openness was negatively associated with dynamic managerial capabilities, even though openness at the CEO level has been positively linked to strategic flexibility.

The study also brought the role of middle managers into sharper focus. At the point of writing, the COVID-19 pandemic still rages on in many parts of the world. There is unlikely another episode as recent and as global where the decomposition and decentralization of the management function and autonomy, alluded to several times in this study, have been more pressing. The pandemic has seen many relatively larger and/or more hierarchical organizations urgently shift into work arrangements previously impermissible. Middle managers would increasingly find themselves in not just the spotlight but also the hot seat, given how they have been suddenly thrust into an operating environment with changing boundary conditions with regard to their role, as well as their modus operandi of engagement with top management and their own direct reports. As direct reports look to them for leadership and clarity of direction in such a tumultuous time as this, the middle managers themselves may not be getting the same from top management who may just as likely be reeling from the ongoing pandemic impact. Yet, these top managers might continue to have the same expectations of their middle managers as before, while perhaps being none the wiser on how to navigate the business challenges in the so-called "new normal". If strategic change comes with its own share of ambiguity and uncertainty, the present pandemic-impregnated operating environment would only compound it further. In this regard, the study seeks also to call for greater scholarly attention on the middle management function and its evolving role as well as growing significance in strategic change.

In terms of methodology, I note that there are not a lot of empirical studies looking at dynamic managerial capabilities, and those that exist tend not to measure it directly. In this study, it is interesting to see that when the focal company's performance rating framework was used in its entirety for this study instead of parceling out relevant items based on 'expert opinion' or *a priori* frameworks, the concept of dynamic managerial capabilities emerged naturally. Other than the fact that the organization was going through strategic change, the performance rating survey was not designed with the specific notion of dynamic managerial capability in mind. Yet, factor analyses of the rating items, which obviously were what the focal company thought were important managerial performance aspects for it to successfully navigate change, surfaced the conceptual notions of sensing, seizing, and reconfiguring. This could serve to bolster the objectivity of the measure of dynamic managerial capabilities as a naturally occurring phenomenon that can be empirically verified. It also hearkens back to the noncognitive, ecologically-informed perspective of firm habitus and how managerial performative behaviors in situ at the intersection of strategic change could become both constituted and institutionalized over time. Finally, it is worth noting as well that the outcome measures in this study were managerial performances of what came to be the dynamic capabilities of sensing, seizing, and reconfiguring. They are not conflated with measures of microfoundations, such as cognition and social capital, which the few other empirical studies tend to be situated. Because such a conflation is not made, this allows the study to investigate the antecedent of personality disposition as another potential microfoundation of dynamic managerial capabilities.

Insights uncovered through this research could also potentially inform practice. The findings are likely to not just call attention to the human resource functions of selection and retention of managerial talent in the firm, but also offer a perspective to top management

teams on the potential constraints, conditions, and challenges faced by their middle managers. In principle, by selecting for certain dispositional qualities that are found to positively influence dynamic capabilities, firms could shore up sources of competitive advantage. By ensuring the retention of such managerial talent with said dispositional qualities, firms are more likely to better preserve their competitive advantage. But of course, reality is often messier and more complex. Given the conundrum posed by conscientiousness in relation to two seemingly contrasting firm outcomes, that of stability and agility, the study points to how organizations may begin searching for answers in shared leadership and self-leadership research. When managerial functions and teams are configured in ways that effectively navigates tensions and disparities in individual disposition, this study argues that the resultant social complexity can be an inimitable source of competitive advantage for the firm.

Some potential limitations would need to be addressed as well. Generalizability of the results is likely a concern in light that the sample is largely male-dominated and drawn from a single Japanese organization. Indeed, a more gender-balanced sample would be ideal. As to the generalizability of findings from studying a single organization (albeit a Japanese multi-national and a leader in the world for its industry segment), this research at the very least broadly established that personality as a dispositional factor is a noteworthy microfoundation of dynamic managerial capabilities. Such a primary aim is quite likely satisfied, even though indeed, a la trait activation theory, under different cultural and environmental conditions, there could be nuanced differences in terms of which personality dimensions are activated in association with dynamic managerial capabilities (T. A. Judge & Zapata, 2015; Tett & Guterman, 2000; Tett, Simonet, Walser, & Brown, 2013). Moreover, as alluded to earlier, differences likely exist between different managerial rungs in an organizational hierarchy; hence, the findings from this study should certainly be viewed with circumspection.

As with all studies isolating a single though expansive dimension for analysis – in this case, personality – one is mindful that ultimately, a multivariate approach to modelling microfoundations will be desirable. Echoing such a view in the context of leadership research, Zaccaro (2012) asserts that there is inherent limitation in looking at just personality (or just cognition or some other underpinning), since leadership being a "multifaceted performance domain [and a] complex behavior pattern, will be predicted by a constellation of attributes" (Zaccaro, Kemp, & Bader, 2004, p. 120). The same can be said for this research in dynamic managerial capabilities, and limitations are duly acknowledged. Though an aspect of cognition, that of cognitive ability was used as a control, much can still be done to model more comprehensively and robustly the potential interaction effects involved in the microfoundations of dynamic managerial capabilities.

Regarding the goodness of fit for the structural equation models presented in this study, the resultant fit indices were adequate though, admittedly, not the most excellent. Given the methodological nature of structural equation modeling, this could be seen as both a limitation and an opportunity. The opportunity lies in re-specifying the model where needed and confirming it with fresh data and alternative samples in further studies. As for the potential presence of multicollinearity, this may be deemed more a limitation than the goodness of fit results which, as mentioned, could be considered adequate. Deegan argues that researchers employing structural equation modeling should not "feel compelled to modify models simply because of concern that the presence of multicollinearity may render offered models vulnerable to criticism, [as a modification] to rid a model of standardized coefficients greater than one… risks the biasing effects of model specification error [which would] be considered most damaging since the presence of multicollinearity in a model

causes no bias in estimated coefficients [while] model specification errors, on the other hand, can occur which bias all estimated coefficients in a model, and consequently can completely distort interpretation of the results" (Deegan Jr, 1978, p. 887, 1974, 1976).

Various possibilities for future research could emerge from this study. To begin with, further research can be targeted at linking performance of dynamic managerial capabilities to performance of the firm. One promising opportunity lies in the multi-step process advocated by Helfat and Martin (2015b). Acknowledging that the measure of dynamic managerial capabilities is not tautologous with firm performance itself, Helfat and Martin recommend tracing "empirical assessments of the performance of dynamic capabilities… to their impact on intermediate outcomes in the form of strategic change and then [assessing] the impact of such change on measures of firm performance, such as survival, growth, and financial performance" (Helfat & Martin, 2015b, p. 1288). Future research could benefit from further thought on how these "intermediate outcomes in the form of strategic change" could be framed meaningfully. In this regard, the approach taken in this study could be extended to how the performance of dynamic managerial capabilities serves as potential mediators of the relationship between managers' personality antecedents and such intermediate outcomes of strategic change. Or, moving away from microfoundation research itself, further studies could look at the multi-step process from the performance of dynamic managerial capabilities (taking a leaf from how the present study arrived at these performance measures), to the intermediate outcomes in the form of strategic change, and then their impact on strategic outcomes at the firm level.

At the microfoundational level, if the managerial disposition approach were to be investigated further, future research could look at personality at the facet level instead of the

broad Big Five domain level since each of these Big Five personality domains really comprises a collection of distinct traits (Costa & McCrae, 1985, 1992; McCrae & Costa, 2008; McCrae & John, 1992). Scholars in strategic management research have advocated for the value of going beneath the broad personality domain level to look at how such personality facets can be differentially activated or constrained based on the situation, as well as how a constellation of multiple traits could potentially interact (Harrison, Thurgood, Boivie, & Pfarrer, 2019).

Indeed, what broad personality domains provide in terms of a more parsimonious account of individual differences, they trade off in richer content typically afforded by a facet-level analysis of multiple personality traits, which tends to be more capable of uncovering specific causes of behavioral performance in organizational settings (Dudley, Orvis, Lebiecki, & Cortina, 2006; T. A. Judge, Rodell, Klinger, Simon, & Crawford, 2013). Scholars postulate that not all traits are equally important or have similar impact on managerial performance associated with the broad personality domains; in other words, traits nestled within a domain could well "exert independent effects, even when there is no relationship at the domain level" (Robertson, Healey, Hodgkinson, Flint-Taylor, & Jones, 2014, p. 285), and that "aggregating personality traits into their underlying personality factors could result in decreased predictive accuracy due to the loss of trait-specific but criterion-valid variance" (Paunonen, 1998, p. 538). Circling back to the present research for example, future research could dig deeper to understand how the different facets of a personality domain, such as conscientiousness and its facets of rule sensitivity, deliberation, detail orientation etc., could potentially influence the performance of dynamic managerial capabilities differently.

10. Conclusion

Studies in dynamic managerial capabilities have largely focused on the cognitive account of microfoundations. This research set out to further elucidate the microfoundations of dynamic managerial capabilities by focusing on the personality dispositions of middle managers. The study of managerial disposition tends to be an under-theorized area in strategic management research despite how the broader scholarship on microfoundations recognizes the importance of individual differences and the heterogeneity in such individual attributes as precursors of competitive advantage.

To that end, the personality disposition of extraversion was found to positively influence managerial performance in the dynamic managerial capabilities of sensing, seizing, and reconfiguring, while that of conscientiousness was found to be negatively related to sensing and reconfiguring. The results on extraversion is not surprising given the behavioral imperative for middle managers to actively scan the internal and external environment for opportunities, engage with multiple stakeholders to develop and deploy strategic initiatives, as well as influence organizational constituents towards a vision for change.

The results on conscientiousness raises an interesting conundrum for practitioners and organizations alike seeking to hire and develop the 'best' managers, as the very qualities of conscientiousness that support managerial performance in task and operational effectiveness would appear to also inhibit performance in dynamic capabilities, thus signaling that what's best for organizational structure and stability may not be best for strategic adaptability. The research calls to attention the potentially equivocal and complex issues involved in the selection, retention and deployment of managerial human resources, especially in the middle management rung of an organizational hierarchy, as firms undergoing strategic change

consider how best to shore-up and preserve the competitive advantage arising from its human capital.

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Appendix A

Caliper Profile Scale	Watson-Glaser Critical Thinking Appraisal Scores					
	Inference	Assumptions	Deduction	Interpretation	Arguments	Total Score
Abstract Reasoning	.51**	.34**	.21*	.38**	.24**	.61**

*$p < .05$, **$p < .01$

Table A1: Correlations Between Scores on the Watson-Glaser Critical Thinking Appraisal Short Form and the Caliper Profile Abstract Reasoning Scale (n = 236); extracted from Caliper's Technical Manual (2017)

Caliper Profile Scale	Wesman PCT		
	Verbal	Numeric	Total
Abstract Reasoning	.33	.43*	.46*

*$p < .05$

Table A2: Correlations Between Wesman Personnel Classification Test Scores and the Caliper Profile Abstract Reasoning Scales (n = 23); extracted from Caliper's Technical Manual (2017)

Caliper Profile	BMCT Composite Score	Process Training	Basic Engineering	Technical	Production
Abstract Reasoning	.51**	.49**	.43**	.50**	.48**

** $p<.01$

Table A3: Correlations Between the Benett Mechanical Comprehension Test and the Caliper Profile Abstract Reasoning Scale (n = 55); extracted from Caliper's Technical Manual (2017)

Caliper Profile	Raven's Standard	Raven's Advanced
Abstract Reasoning	.41**	.32**

** $p<.01$

Table A4: Correlations Between Raven's Progressive Matrices Standard and Advanced Forms and the Caliper Profile Abstract Reasoning Scale (n = 77); extracted from Caliper's Technical Manual (2017)