

**Relationship between managerial cognitive frame
flexibility and managerial role performance**

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Abstract

This study aimed to further the research on dynamic managerial capabilities as a mechanism that allows firms to determine when to renew their capabilities and to break inertial tendencies in strategic decision-making. These capabilities require managers to exercise a high degree of cognitive frame flexibility by taking account of the environmental and organisational context when deciding on an appropriate firm response. This approach improves the likelihood of the firm attaining a sustainable competitive advantage.

The specific purpose of this study was to test whether managerial role performance was impacted by managerial cognitive frame flexibility. This was supplemented by considering the roles played by managerial ambidexterity and market dynamism in this primary relationship. The quantitative study added to the research on managers' cognitive flexibility and was based on survey responses from 203 South African managers. The results indicated a positive relationship between managerial cognitive frame flexibility and managerial role performance. Managerial ambidexterity and market dynamism were in turn found to moderate this relationship under certain conditions.

The study's findings offer valuable insights to business people and academics, particularly in emphasising the importance of cognitive flexibility in decision-making, which in turn can be used to develop sustainable competitive advantages in an ever-changing business environment.

Keywords: Managerial cognitive flexibility; Dynamic capabilities; Managerial ambidexterity; Competitive advantage

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Philosophy in Corporate Strategy at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Signature

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1. THE RESEARCH PROBLEM

1.1. Background to the Research Problem

The rapid pace of change and increased levels of uncertainty characterise the current business environment and highlight the need for firms to learn and adapt at pace. Incumbents, despite their financial and scale advantages, have to develop their growth and reinvention capacity to remain competitive. The BCG Henderson Institute (Reeves, Hansell, Whitaker, Parikh & Lotan, 2018) highlight the fact that companies face many challenges in maintaining their competitive position today and also that fewer companies that are industry leaders retain their dominance over time. As a result, the need for reinvention and unshackling from the past is more important than ever. *How then does a firm go about doing this?*

According to Teece and Leih (2016, p. 9), “sensing capabilities more generally exercise the cognitive skills associated with sensing and sense-making that can benefit any organization”. Similarly, organisations that are able to respond effectively to the environment are more resilient against shocks. As firms mature, greater structure is put in place to improve efficiency and control (Helfat & Peteraf, 2003). In a stable environment, firms typically survive modest change, whereas in rapidly changing environments, inertia becomes problematic (Tushman & O’Reilly III, 1996). A firm therefore needs to be able to redefine itself by adopting a new strategy and/or structure to deal with rapid changes in environmental conditions. Teece and Leih (2016) offer the dynamic capabilities framework (discussed later) as a mechanism whereby firms can deal with an uncertain future by developing capabilities that allow them to continually adapt to their particular business context.

1.2. Research Problem and Purpose

Dynamic capabilities (DCs) are largely conceptualised as an organisational construct in the literature. Consequently, there is a need to further understand the role that individuals play in developing firms’ dynamic capabilities (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke, Hu & Helfat, 2018). This study examines dynamic managerial capabilities as the mechanism that enables firms to understand when to renew their capabilities and break inertial tendencies. The dynamic capabilities literature focuses on strategic change, with the dynamic managerial capabilities concept dealing specifically with the managerial impact on strategic change (Helfat & Martin, 2015). The concepts of learning (or innovation) and ambidexterity can

themselves be viewed as dynamic capabilities, if an organisation is able to build these routines to effect change. That said, these capabilities require managers to exercise a high degree of cognitive flexibility (which is the primary focus of this study) to take account of the environmental and organisational context and decide an appropriate firm response.

The research opportunity is that the cognitive flexibility of managers is not well understood within an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018). This is important because studies suggest that high cognitive flexibility improves decision-making (Laureiro-Martínez & Brusoni, 2018). In addition, the empirical study conducted by Kiss et al. (2020) on CEO cognitive flexibility in SMEs (small and medium-sized enterprises) displayed a positive relationship between managerial cognitive flexibility and information search. This implicitly impacts how organisations engage in “explore” and “exploit” activities, thereby supporting ambidexterity and leading to divergent firm outcomes. This research study aims to address the question of whether managerial role performance is impacted by managerial cognitive frame flexibility, based on the responses of 203 managers in a South African context.

1.3. Research Hypothesis

The primary objective is to test whether managerial role performance is impacted by managerial cognitive frame flexibility. This is supported by testing the roles that managerial ambidexterity and market dynamism have on the primary relationship between managerial cognitive frame flexibility and role performance. The study tests the following hypotheses:

- **Hypothesis 1 (H1):** *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)* (Aggarwal, Posen & Workiewicz, 2017; Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli, Glynn & Tushman, 2019; Welbourne, Johnson & Erez, 1998).
- **Hypothesis 2a (H2a):** *Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance* (Gibson & Birkinshaw, 2004; Kiss et al., 2020; Papachroni, Heracleous & Paroutis, 2016).

- **Hypothesis 2b (H2b):** *Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance* (Fainshmidt, Wenger, Pezeshkan & Mallon, 2019).

1.4. Research Aims

The heterogeneity of managers' cognitive capabilities can be a source of divergent firm outcomes. Within the context of cognition, the cognitive frame (or mental model or beliefs) can be a source of heterogeneity in cognitive capabilities. The flexibility of cognitive frames is important as it allows beliefs to adapt to the context. This ability to alternate between automatic and more deliberate mental processes is an important feature in determining potential firm outcomes (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli et al., 2019). Learning and cognitive flexibility are likely to be reinforcing activities (Aggarwal et al., 2017; Eggers, 2012; Eggers & Kaplan, 2009), with an organisation's capacity for learning a source of competitive advantage (Levinthal & March, 1993).

The aim of this study is to contribute to the empirical research on dynamic managerial capabilities, particularly in relation to managerial cognitive frame flexibility. Managerial role performance (discussed in section 1.6 under Scope of Research) is used as the outcome variable of the individual managers who are the focus of the study. The interpretation used for managerial role performance is a holistic view of managers' performance and is considered appropriate within the current business context. The dynamic capabilities (DCs) framework (while related to the resource-based school) emphasises the demand-side environment and the renewal of capabilities or resources in response – which is the area of focus within the literature review and the overarching theory supporting this study. These capabilities require managers to exercise a high degree of cognitive flexibility to take account of the environmental and organisational context and to decide what the appropriate firm response may be.

1.5. Research Contribution

This research contributes to the empirical research on managerial cognitive capabilities, specifically the testing of managerial cognitive flexibility within an organisational setting. The findings from the empirical study also contribute to the theory on managerial cognitive flexibility as an antecedent to managerial dynamic capabilities. The primary finding was that managers' cognitive flexibility is positively related to managers' role performance. The effect of managerial ambidexterity and

market dynamism on managerial role performance was assessed and found to be significant under certain circumstances. The scales used for the research instrument were found to be relevant in the study context.

1.6. Scope of Research

The scope of the research is limited to the direct and indirect relationships between managers' cognitive frame flexibility and managerial role performance in a South African context, and is based on individual managers. The study tests theory predominantly within the dynamic capabilities literature and, more specifically, the managerial dynamic capability (DC) subset of cognitive flexibility. The literature review also delves into related concepts with strong dynamic capabilities links, such as ambidexterity (in the organisational theory literature), market dynamism (in the dynamic capabilities literature) and learning intensity (in the innovation and entrepreneurship literature) as they pertain to dynamic capabilities and ambidexterity.

The study is bound by the following definitions for the main constructs that are outlined below. Role-based performance incorporates role theory and identity theory to develop a more generalisable measure of performance, and incorporates five different roles: job, career, innovator, team member and organisation citizen (Welbourne et al., 1998). This is a broad-based individual performance measure suitable for the aims of this study. Cognitive flexibility is based on Martin and Rubin's (1995, p. 623) definition of a person's "(a) awareness that in any given situation there are options and alternatives available, (b) willingness to be flexible and adapt to the situation, and c) self-efficacy in being flexible". For the purposes of this study, ambidexterity is expressed within an individual context as managerial ambidexterity, which is a manager's ability to host seemingly contradictory priorities between exploitation (of existing competencies) and exploration (of new competencies). Market dynamism is expressed as the extent of the firm's environmental dynamism, with participants expressing their assessment of the rate of industry change at their firm.

The extant literature exploring the individual (micro) level of dynamic capabilities is largely conceptual, predominantly focused on key individuals (top management team (TMT) members or entrepreneurial managers), with limited empirical testing to date of the role of individuals and the collective impacts within firms (Schilke et al., 2018). Cognitive capabilities (within the dynamic managerial capabilities framework) offer a mechanism for managers within firms to understand when to renew their firms'

capabilities and help bridge “changes in organizational context and strategic change, which in turn can affect firm performance” (Helfat & Peteraf, 2015 p. 845). The relationship with managers’ role performance is tested in this study. Similar studies, such as the empirical study conducted by Kiss et al. (2020) on CEO cognitive flexibility in SMEs (small and medium-sized enterprises), displayed a positive relationship between cognitive flexibility and information search. This implicitly impacts how organisations engage in explore and exploit activities, thereby supporting managerial ambidexterity which in turn leads to divergent firm outcomes. There appears to have been limited empirical testing of the impact of managerial cognitive flexibility on managerial performance. Given the importance of managers’ inputs to strategic decision-making, there is a need for this study.

1.7. Research Roadmap

The literature supporting this study is reviewed in Chapter Two, with an overview of the literature set out in Table 1. The study analyses the data collected through managers’ responses, which is tested against a set of hypotheses outlined in Chapter Three. The methodology and research design are set out in Chapter Four.

2. LITERATURE REVIEW

2.1. Introduction

Sustainable competitive advantage is a focal area in strategic management (Barney, 1991; Helfat & Peteraf, 2003). The drivers of sustainable competitive advantage are debated in the strategy literature by the competitive strategy school and the resource-based school, with both largely centred on value capture and supply-side interactions, as opposed to value creation and demand-side interactions (Adner & Zemsky, 2006). In contrast, the dynamic capabilities (DCs) framework (while related to the resource-based school) emphasises the demand-side environment and the renewal of capabilities or resources in response. This is the area of focus in the literature review and the overarching theory supporting this study.

As described by Teece (2007, p. 1319) in response to open economies, the global dispersion of knowledge and greater competition, dynamic capabilities allow firms to “continuously create, extend, upgrade, protect, and keep relevant the enterprise’s unique asset base”. The effectiveness of dynamic capabilities, however, in achieving organisational performance is nuanced, with some researchers finding an indirect relationship (based on studies) between dynamic capabilities and firm competitive advantage (Eisenhardt & Martin, 2000; Helfat, 1997; Li & Liu, 2014; Teece, Pisano & Shuen, 1997). In contrast, other researchers have found innovation and ambidexterity to be sources of competitive advantage (Jansen, George, Van den Bosch & Volberda, 2008; He & Wong, 2004). The concepts of learning (or innovation) and ambidexterity can themselves be dynamic capabilities if an organisation is able to build these routines to effect change within organisations. That said, these capabilities require managers to exercise a high degree of cognitive flexibility (which is the focus of this study) to take account of the environmental and organisational context and decide what the appropriate firm response may be.

Teece and Eisenhardt (the seminal authors on dynamic capabilities) offer different views on whether dynamic capabilities are applicable under conditions of rapid change, with Eisenhardt arguing that routines, by their nature, are less flexible and therefore ineffective under conditions of rapid change. Teece (2007), in contrast, argues that the microfoundations that underpin dynamic capabilities (discussed later) are consistent with highly entrepreneurial firms and that these capabilities allow firms to continually adapt to sustain advantage. The researcher in the current study subscribes to Teece’s

view on the applicability of dynamic capabilities; accordingly, this perspective underpins the interpretation of dynamic capabilities in this study.

The meta-analysis study conducted by Fainshmidt, Pezeshkan, Frazier, Nair and Markowski (2016) revealed that dynamic capabilities had a positive impact on performance. In a later study, Fainshmidt et al. (2019) explored firm performance in relation to the firm’s strategic orientation (cost versus differentiation) as well as whether the environment was characterised by resource scarcity and/or market dynamism. The findings revealed that dynamic capabilities are not necessarily beneficial under all circumstances (discussed later).

The structure of the literature review is set out in Table 1. Dynamic capabilities, ambidexterity, learning and innovation, as well as cognitive flexibility, are concepts referenced across multiple disciplines. However, for the purposes of this review, these constructs are predominantly reviewed within the strategy and organisational theory literature. The gaps in the literature are identified and discussed, and the under-explored areas from the literature review provide the basis for the hypotheses identified in Chapter Three.

Table 1: Roadmap of literature review

2.1. Introduction	2.2. Dynamic capabilities	2.3. Managerial cognitive flexibility
2.1.1 Description of sources	2.2.1. Definition and relevance	2.3.1. Managerial cognition as a dynamic capability
2.1.2 Primary authors	2.2.2. Dynamic managerial capabilities	2.3.2. Ambidexterity as a dynamic capability
		2.3.3 Role of market dynamism
2.4. Conclusion		

Source: Author’s compilation

2.1.1. Description of sources

The literature search for the current study was conducted using various top-rated journals (assessed through ABS rating). These journals (ISSN identifier denoted in parentheses) included the Academy of Management Journal (0001-4273), Academy of Management Review (0363-7425), Administrative Science Quarterly (0001-8392), Human Resource Management (0090-4848), Journal of Management (0149-2063), Journal of Management Studies (0022-2380), Journal of Operations Management (0272-6963), Journal of Product Innovation Management (0737-6782), Leadership Quarterly (1048-9843), Organization Science (1047-7039), and Strategic Management Journal (0143-2095).

The criterion was set to the period between 2016 and 2020, and focused on key word searches aimed at narrowing the scope of the literature review to the most pertinent areas related to this study. The key words used were “dynamic capabilities”, “dynamic managerial capabilities”, “agility”, “strategic leadership”, “ambidexterity” and “cognitive flexibility”. References from sourced articles were also used as an additional source of research material.

2.1.2. Primary authors

The articles that anchor the respective sections of the literature review are noted in Table 2 below, with the article citations, author citations and published journal noted for reference. The anchor article for each section of this literature review is shaded. The anchor articles reflect the seminal authors’ substantial contribution to the respective topics and therefore form the foundation of the literature review.

Teece et al. (1997) and Eisenhardt and Martin (2000) are seminal authors on dynamic capabilities and their articles reflect differing views on certain interpretations. March (1991) was instrumental in the conceptualisation of organisational ambidexterity, with seemingly contradictory mandates of “exploring” new potential opportunities, while “exploiting” existing opportunities at the same organisation. Adner and Helfat (2003) introduced the concept of managerial dynamic capabilities, while Helfat and Martin (2015) unpacked the progression of this literature and mapped key managerial capabilities back to Teece’s microfoundations of dynamic capabilities. Helfat and Peteraf (2015) focused on the theory of managerial cognitive capabilities, while Laureiro-Martinez and Brusoni (2018) tested cognitive flexibility and established a strong link between cognitive flexibility and performance.

Table 2: Primary authors

Primary authors	Article title	Author citations	Article citations	Journal
Teece, D. J., Pisano, G. & Shuen, A. (1997)	Dynamic capabilities and strategic management	163,681	38,190	Strategic Management Journal
Eisenhardt, K.M. & Martin, J.A. (2000)	Dynamic capabilities: What are they?	N/A	17,523	Strategic Management Journal
Peteraf, M., Stefano, G. & Verona, G. (2013)	The elephant in the room of dynamic capabilities: Bringing two diverging conversations together	38,437	537	Strategic Management Journal
Schilke, O., Hu, S. & Helfat, C. E. (2018)	Quo vadis, dynamic capabilities? A content-analytic review of the current state of knowledge and recommendations for future research	5,775	171	Academy of Management Annals
Fainshmidt, S., Wenger, L., Pezeshkan, A. & Mallon, M. R. (2019)	When do dynamic capabilities lead to competitive advantage? The importance of strategic fit	1,240	15	Journal of Management Studies
March, J. G. (1991)	Exploration and exploitation in organizational learning	N/A	24,949	Organization Science
Teece, D.J. (2007)	Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance	163,681	10,145	Strategic Management Journal
Luger, J., Raisch, S. & Schimmer, M. (2018)	Dynamic balancing of exploration and exploitation: The contingent benefits of ambidexterity	185	56	Organization Science
Pitelis, C.N. & Wagner, J.D. (2019)	Strategic shared leadership and organizational dynamic capabilities	7,870	19	The Leadership Quarterly
Adner, R. & Helfat, C. E. (2003)	Corporate effects and dynamic managerial capabilities	12,016	1,711	Strategic Management Journal
Helfat, C. E. & Martin, J. A. (2015)	Dynamic managerial capabilities: Review and assessment of managerial impact on strategic change	N/A	417	Journal of Management
Helfat, C. E. & Peteraf, M. A. (2015)	Managerial cognitive capabilities and the microfoundations of dynamic capabilities	N/A	895	Strategic Management Journal
Laureiro-Martínez, D. & Brusoni, S. (2018)	Cognitive flexibility and adaptive decision-making: Evidence from a laboratory study of expert decision-makers	N/A	45	Strategic Management Journal
Raffaelli, R., Glynn, M. A. & Tushman, M. (2019)	Frame flexibility: The role of cognitive and emotional framing in innovation adoption by incumbent firms	454	23	Strategic Management Journal

Eggers, J. P. & Kaplan, S. (2009)	Cognition and renewal: Comparing CEO and organizational effects on incumbent adaptation to technical change	1,633	483	Organization Science
Eggers, J. P. (2012)	All experience is not created equal: Learning, adapting, and focusing in product portfolio management	1,633	166	Strategic Management Journal

Source: Author's compilation. Citation figures per Google Scholar (June 2020)

2.2. Dynamic Capabilities

2.2.1. Definition and relevance

Barney's (1991) resource-based view (RBV) of the firm preceded dynamic capability (DC) theory and credits a firm's resource base and capabilities as being supportive of a firm's competitive advantage. The RBV uses four criteria for measuring a firm's resources and capabilities, namely: is it valuable, rare, imperfectly imitable and non-substitutable? It makes the argument that while these resources and capabilities are still differentiated from their competitors, they may be a source of competitive advantage (Barney, 1991).

The concept of a capability lifecycle is set out by Helfat and Peteraf (2003, p. 998) who provide a dynamic interpretation of resource-based theory as an "evolution over time of the resources and capabilities that form the basis of competitive advantage". Similarly, the dynamic capabilities (DCs) concept refers to capabilities that an organisation uses (processes and routines) to meet its evolving environment, with Teece et al. (1997, p. 516) defining DCs as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments". Eisenhardt and Martin (2000, p. 1107) describe dynamic capabilities as "the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die". Dynamic capabilities can also be considered to be learned patterns of modifying organisational capabilities (Zollo & Winter, 2002) and can also potentially be used by organisations to influence the external environment (Helfat & Winter, 2011). Helfat and Winter (2011, p. 1249) clarify that "capabilities that promote economically significant change are dynamic, even if the pace of change appears slow or undramatic".

While there is no single definition, there is substantial overlap between the various definitions. Therefore, DCs may be conceptualised as learned, organisational and

strategic routines aimed at redeveloping and reconfiguring a firm's most economically relevant competencies over time to adapt to or possibly influence its environment.

Capabilities in individuals and organisations develop through routines or practice, and these capabilities improve with experience (Eggers, 2012; Zollo & Winter, 2002). At the core of the dynamic capabilities theory is the assertion that operational business capabilities are necessary, but do not provide any competitive advantage – rather *both* operational and dynamic capabilities are necessary (Teece et al., 1997). Operational capabilities support the status quo, whereas dynamic capabilities enable an organisation to renew its competences in relation to the changing environment (Eisenhardt & Martin, 2000; Helfat & Winter, 2011). For example, new product development at a pharmaceutical firm may be a source of growth and therefore a dynamic capability. Its payroll function, in turn, is operationally necessary, but unless it can “promote economically significant change” for that firm, it is an ordinary capability (Helfat & Winter, 2011, p. 1249).

The seminal authors on dynamic capabilities (Eisenhardt & Martin, 2000; Teece et al., 1997) have some fundamentally different views on the applicability of dynamic capabilities. Peteraf et al. (2013) reconciled the different views of Teece et al. (1997) and Eisenhardt and Martin (2000) (hereafter referred to as “TPS” and “EM” – see detail below). The key differences relate to the applicability of the theory under conditions of rapid change and whether the routines that underpin the capabilities are best practice versus heterogeneous routines specific to the firm. The primary differences include: *(i) boundary conditions*: TPS framed DCs as applicable in rapidly changing environments, while EM considered DCs to be inapplicable in high-velocity markets; *(ii) sustainable advantage*: TPS considered advantage to be subject to how readily a capability can be replicated, while EM argued that DCs may be a source of competitive advantage (but not sustainable advantage), as DCs do not have to be imitated to achieve the same end-state; *(iii) competitive advantage*: Both agreed that in moderately dynamic markets, DCs can be a source of competitive advantage but EM depicted DCs as best practice, implying that competitive advantage is likely to be quite small. Teece (2007) later clarified the view that replicable best practice cannot by itself provide competitive advantage.

Peteraf et al. (2013, p. 1407) resolve the apparent conflicts between these seminal authors' perspectives by restating the applicability of dynamic capabilities as follows: “Regardless of the level of market dynamism or the nature of dynamic capabilities,

dynamic capabilities may enable firms to attain a sustainable competitive advantage in certain conditional cases.”

The researcher in the current study subscribes to the TPS view on the applicability of DCs rather than the EM view. The TPS interpretation of DCs provides the framework that underscores the importance of managerial cognitive capabilities (discussed later) as a dynamic managerial capability (DMC), where heterogeneous managerial cognitive capabilities and the unique capabilities of each firm create a situation in which the deviation in decision-making is potentially significant, which in turn impacts firms' performance.

Brown and Eisenhardt (1997), Eisenhardt and Martin (2000), Teece et al. (1997) and O'Reilly and Tushman (2008, p. 187) emphasise the role of leadership in “adapting, integrating and reconfiguring organizational skills and resources to match changing environments”. Teece (2007, p. 1319) further refined dynamic capabilities as “the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting and, when necessary, reconfiguring the business enterprise's intangible and tangible assets”. Zollo and Winter (2002) posit that firms also reconfigure capabilities, even when the competitive environment is not subject to any disruptive change.

Eggers' (2012) empirical study provided insights into the relationship between breadth of experience and performance in new niches. The study looked at firms in the asset management industry, which adapted the product development process for new niches. This comes at an initial cost, but as a firm gains experience, it becomes more proficient and quality also improves. Eggers' (2012) case study highlight the dilemma that managers face when broadening their experience and learning (into adjacencies) in the short term over current lines of business. In addition, the case is illustrative of learning and ambidexterity as dynamic capabilities within an organisation, facilitated by managers.

In the literature, DCs are largely conceived as an organisational (macro) construct, underpinned by organisational routines (Peteraf et al., 2013; Teece, 2007; Teece et al., 1997). The focus on routines positions the construct well in terms of adaptation, but less so under conditions of rapid change or significant uncertainty. Firms need both routines (for reliability) and individuals (to reconfigure the resources) to adapt to change (Helfat et al., 2007), with this relationship embedding an essential managerial

function in the DC framework. The extant literature exploring the individual (micro) level is largely conceptual, focusing predominantly on key individuals (top management team (TMT) members or entrepreneurial managers), and reveals limited empirical testing, particularly with respect to the role of individuals and collective impacts within the firm (Schilke et al., 2018).

Understanding DC capacity and how it operates continues to be a source of debate in the literature (Salvato & Vassolo, 2018; Schilke et al., 2018), with limited longitudinal research having been done to test the durability of advantages generated or the range of potential outcomes (Fainshmidt et al., 2016). In the DC literature, the review is focused on dynamic managerial capabilities (DMCs). This topic is examined from the perspective of DMCs (and in particular, cognitive managerial capabilities) offering a mechanism for managers within firms to understand when to renew the firm's capabilities and help bridge "changes in organizational context and strategic change, which in turn can affect firm performance" (Helfat & Peteraf, 2015, p. 845). For the purposes of this study, however, the unit of analysis is maintained at the managerial level.

2.2.2. Dynamic managerial capabilities

While managerial involvement is implicitly embedded in the DC framework, the concept of dynamic managerial capabilities (DMCs) was introduced by Adner and Helfat (2003) and later elaborated on by Helfat and Martin (2015). Adner and Helfat (2003, p. 1020) conceptualised and defined dynamic managerial capabilities (DMCs) as "the capabilities with which managers build, integrate, and reconfigure organizational resources and competencies". Helfat and Martin (2015) reviewed the subsequent literature and noted the expansion of the definition (similar to that of DC) to reflect the possibility that these dynamic managerial capabilities also affect the external environment. Teece (2007) identifies the microfoundations of DCs as the capacity to: (i) sense; (ii) seize; and (iii) reconfigure organisations. These concepts are reiterated by O'Reilly and Tushman (2008, p. 189) who note the capacity of "senior managers to ensure learning, integration, and, when required, reconfiguration and transformation – all aimed at sensing and seizing opportunities as markets evolve".

Helfat and Martin (2015) note that DMC is "distinct in its singular focus on the capacity of managers, individually and in teams, to effect strategic change". Individual managers have unique dynamic capabilities and each firm has its own set of resources and

capabilities, and it is this interplay that leads to different types of decision-making at various firms (Adner & Helfat, 2003). According to Sirmon and Hitt (2009), empirical evidence suggests that DMCs are an important contributor to divergence in a firm's performance under conditions of change. However, asset orchestration decisions need to be aligned for both the investment decisions and the deployment decisions to be effective. This view is also consistent with that expressed by Helfat and Peteraf (2015), which aligns, at a managerial level, the three underpinnings for DMC (sense, seize and reconfigure dynamic capabilities) with Teece's (2007) framework, which is set at the firm level. Adner and Helfat (2003) consider DMCs to be underpinned by three aspects – each with its own effects but also interacting with one another:

- (i) Managerial human capital: Applies to all levels of manager across an organisation and refers to the varied mix of skills and levels of ability; other than generic managerial skills, all other skills are uniquely shaped by different career paths and experiences, and therefore result in heterogeneous managerial human capital.
- (ii) Managerial social capital: Refers to the numerous levels of social ties, both internal and external to the business operation, including: (i) the transfer of information in related, and across different, work settings; (ii) managers with social ties to external resources necessary to operate or to external parties with information about practices at other firms; and
- (iii) Managerial cognition: Refers to as the “mental models and beliefs (also termed “knowledge structures”...), mental processes...and emotions” that inform managerial decision-making (Helfat & Martin, 2015, p. 1285). In the microfoundations of DMC, the concept of managerial cognitive capability (Helfat & Peteraf, 2015) is of particular interest and is discussed in the next section.

Helfat and Martin's (2015) review of the DMC literature made a number of important contributions based on an analysis of the empirical and theoretical studies. These insights are reflected against the three underpinnings for DMCs below. The latter also support the key functions of DMCs and the closely related microfoundations of sensing, seizing and reconfiguring (see Figure 1 in the next section).

- (i) Managerial human capital: The review of the research suggested that prior work experience does not harm strategic change;

- (ii) Managerial social capital: The studies support external social networks for strategic change, including acquisitions (due to knowledge, product or geographical factors) and performance under conditions of change (related to the sharing of information in the external network); and
- (iii) Managerial cognition: Managerial attention to the external environment is related to how initiatives gain focus for development purposes as well as the pace of the strategic response.

2.3. Managerial Cognitive Flexibility

Helfat and Peteraf (2015) introduced the concept of managerial cognitive capability and linked the major DC activities of sensing, seizing and reconfiguring to the respective managerial cognitive capabilities (see Figure 1). While it is beyond the scope of this review to delve into each of these cognitive capabilities, a brief outline is provided of how the capabilities highlighted by Helfat and Peteraf (2015) relate to sensing, seizing and reconfiguring activities.

2.3.1. Managerial cognition as a dynamic capability

Helfat and Peteraf (2015) introduced the concept of managerial cognitive capability, identifying and mapping types of cognitive capabilities to the dynamic managerial capabilities related to sensing, seizing and reconfiguring (see Figure 1). While a review of cognition literature is beyond the scope of the current study, the definition and interpretation set out by Helfat and Peteraf (2015, p. 835) below offer additional insights into the concept:

In order to make the link explicit between managerial capabilities and mental activities, we define the concept of “managerial cognitive capability” as follows: Managerial cognitive capability is the capacity of an individual manager to perform one or more of the mental activities that comprise cognition. This definition of cognitive capability directs attention to the activities or functions that cognition performs. The human brain performs many different mental activities, such as those involving attention, perception, and problem-solving. Although these mental activities interact with one another, they are separable; cognitive psychologists have documented that they perform different functions, and brain-imaging studies have shown that different mental activities are associated with different parts of the brain. (For a review, see Smith & Kosslyn, 2008.)

Research in psychology and related fields distinguishes between two modes of mental processing of information, denoted by a variety of terms (see Stanovich & West, 2000, p. 659 for a partial list). One is mostly automatic, termed System 1 mental processing by Stanovich and West (2000, p. 658) (see also Kahneman, 2011). Automatic mental activities enable quick responses to external stimuli and data (Schneider & Shiffrin, 1977). The other mode of processing is often referred to as “controlled” or “deliberative” mental processing or as an “executive function,” termed System 2 mental processing by Stanovich and West (2000, p. 658) (see also Kahneman, 2011). Mental activities of this type are slower and support a more deliberate response to circumstances (Schneider & Shiffrin, 1977).

For the purposes of this study, the interpretation of cognitive flexibility is based on Martin and Rubin’s (1995, p. 623) definition of a person’s “(a) awareness that in any given situation, there are options and alternatives available, (b) willingness to be flexible and adapt to the situation, and (c) self-efficacy in being flexible”. As is evident from Figure 1, the heterogeneity of managers’ cognitive capabilities is likely to result in the heterogeneity of managerial dynamic capabilities, which in turn may contribute to differentiation in organisational performance (due to the variation of strategic response), particularly under changing conditions.

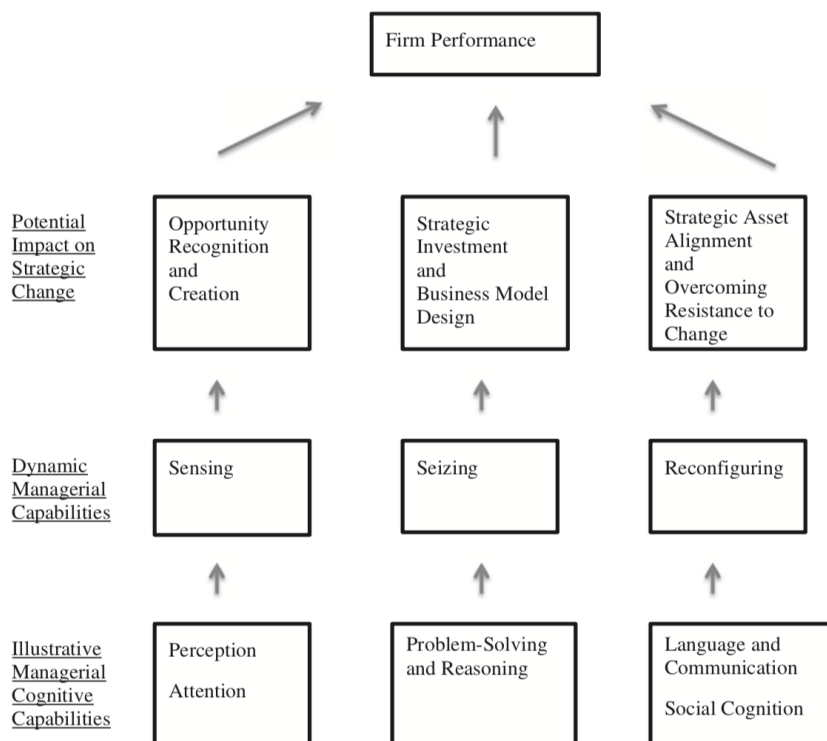


Figure 1: Managerial cognitive capabilities and strategic change

Source: Adapted from Helfat, C.E. & Peteraf, M.A. (2015). Managerial cognitive capacities and the microfoundations of dynamic capabilities. *Strategic Management Journal*, 36(6), p. 837

A discussion of the relevant managerial cognitive capabilities that underpin each of the microfoundations for dynamic capabilities appears below.

- (i) *Sensing (perception and attention capabilities)*: Environmental scanning is an important part of the sensing capability and, according to Helfat and Peteraf (2015), draws on the cognitive capabilities of perception and attention. Helfat and Peteraf (2015) indicate that perception is grounded in one's prior experiences and beliefs, which guide pattern recognition, whereas attention is "the act of focusing on particular information" (p. 839). The combination of perception (pattern recognition) and attention (focusing on relevant information, detecting signals for processing while in an alert state) allows for the recognition of opportunities or the creation thereof. Eggers and Kaplan's (2009) case study observes firms' strategic responses in the telecommunications industry by using firms' CEO attention to a new technology in relation to the adoption thereof at the respective firms. Kiss et al.'s (2020) empirical study also establishes a link between cognitively flexible CEOs who are more likely to be engaged in greater learning intensity.
- (ii) *Seizing (reasoning and problem-solving capabilities)*: By exercising superior reasoning and problem-solving, managers are able to arrive at better business models and make better investment decisions – both of which are difficult to alter or reverse once implemented (Helfat & Peteraf, 2015).
- (iii) *Reconfiguring of firms' resources and capabilities (language, communication and social cognition capabilities)*: The top management team's (TMT) effectiveness in reconfiguring resources and capabilities lies in strategic asset alignment and overcoming resistance to change.

Cognitive frame flexibility

Martin and Ruben (1995, p. 623) define cognitive flexibility as a person's "(a) awareness that in any given situation there are options and alternatives available, (b) willingness to be flexible and adapt to the situation, and c) self-efficacy in being flexible". Raffaelli et al. (2019, p. 1024) note that "[a cognitive] flexible frame allows for an interpretation of innovations under a cohesive intermediate level of classification that is neither too specific (i.e., fixed) nor too abstract (i.e., ambiguous)".

Raffaelli et al. (2019) set out their model for top management team (TMT) frame flexibility and innovation adoption, in which the TMT cognitive frame is determined from the lens through which the innovation challenging the existing strategy is viewed. The

resultant classification of this innovation as specific (fixed frame), intermediate (flexible frame) or abstract (ambiguous frame) is important. An expanded lens for a new innovation would be filtered against the existing cognitive frame, according to: (i) capability development (consistency vs. co-existence); (ii) organisational identity (less vs. more elastic); (iii) competitive boundaries (narrow vs. wide scanning). An expanded lens would look for the co-existence of capabilities and greater elasticity of organisational identity, and through wide, competitive boundary scanning.

Raffaelli et al. (2019) also overlay the outcome of the TMT cognitive assessment of innovation with how the TMT emotionally frames the innovation. According to the model, if the innovation emotionally resonates as a threat (fixed frame) or if the TMT is ambivalent (ambiguous frame), the innovation is unlikely to be adopted. However, should the innovation resonate as an opportunity (flexible frame), it is more likely to be adopted. While the testing of this model is outside the scope of the current study, the reference to the flexible cognitive frame is consistent with the findings of other scholars reviewed in the literature (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018).

The ability to identify change is an important component both in the ambidexterity literature for fostering innovation and change (Levinthal & March, 1993; Raisch, Hargrave & Van de Ven., 2018; Rerup & Feldman, 2011) and in the DC literature as a dynamic capability itself. In effect, this ability to identify change can result in the development and deployment of further dynamic capabilities (Aggarwal et al., 2017; Schilke, 2014; Verreyne, Hine, Coote & Parker, 2016; Zollo & Winter, 2002) and informs the strategic decisions necessary to break inertial tendencies within an organisation. This further reinforces the importance of a flexible cognitive frame for managers to be able to identify change and to also decide how best to respond.

There are a number of case studies that provide additional insights into managerial cognition (Helfat & Peteraf, 2015) and some of the major themes arising from these studies are noted in Table 3 below. These cases can be classified into the following broad themes: (i) alignment of business model to the new context (Rosenbloom, 2000; Taylor & Helfat, 2009); (ii) positioning of business for current context (Tripsas & Gavetti, 2000; Raffaelli, et al., 2019; Helfat et al., 2007; Danneels, 2011); (iii) adoption of new technology/innovation (Eggers & Kaplan, 2009) / relevance of pace of industry change (Nadkarni & Narayanan, 2007); and (iv) continual experimentation and adaptation (Salvato, 2009).

Table 3: Case studies investigating role of dynamic managerial capabilities

Case	Author(s)	Findings	Authors' assessment of relevance to DMC
NCR	Rosenbloom (2000)	Conception of business model had an adverse impact on the transition to new technology transition	Strategic alignment at odds with business model
IBM	Taylor and Helfat (2009)	Cognition of TMT and alignment of resources and incentives for successful technology transition	Cognitive frame flexibility
Polaroid	Tripsas and Gavetti (2000)	Executives' conception of existing business prevented adaptation	Lack of cognitive frame flexibility
Rubbermaid	Helfat et al. (2007)	Mindset of CEO to changing marketplace	Lack of cognitive frame flexibility
Smith-Corona	Danneels (2011)	Executives' conception of existing business prevented adaptation	Lack of cognitive frame flexibility
Fibre-optic market entry: Communication industry CEOs	Eggers and Kaplan (2009)	Managerial cognition an important factor (but also depends on direction of cognition and firm orientation)	Heterogeneity of firm responses based on managerial cognitive frames and firm strategy
Various industries – fast and slow-paced industries	Nadkarni and Narayanan (2007)	Strategic flexibility needs to be aligned with the pace of industry – high pace = complex schema promoting flexibility; slow pace = focused schema promoting stability	Level of cognitive complexity and structures aligned with industry pace of change
Allesi**	Salvato (2009)	Managers' adaptive innovations and continual localised experimentation	Flexible cognitive frame
Blockbuster**	Raffaelli et al. (2019)	Executives' conception of existing business prevented adaptation	Lack of cognitive frame flexibility

Source: Compiled from Helfat, C.E. and Martin, J.A. (2015). Dynamic managerial capabilities: Review and assessment of managerial impact on strategic change. *Journal of Management*, 41(5), pp. 1281–1312.

**Author's addition (not in original article)

As evident from these case studies, the heterogeneity of managers' cognitive capabilities can be a source of divergent firm outcomes. Within the context of cognition, the cognitive frame (or mental model or beliefs) can be a source of heterogeneity in cognitive capabilities. The flexibility of cognitive frames is important as it allows beliefs to adapt to the context. Moreover, this ability to alternate between automatic and more deliberate mental processes is an important feature of determining potential firm outcomes (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli et al., 2019). Learning and cognitive flexibility are likely to be reinforcing activities (Aggarwal et al., 2017; Eggers, 2012; Eggers & Kaplan, 2009), with an organisation's capacity for learning a source of competitive advantage (Kiss et al., 2020; Levinthal & March, 1993).

Managerial role performance

Laureiro-Martínez and Brusoni (2018) note that there is ample empirical evidence of the relationship between cognitive inertia and the inability to adapt, in addition to evidence that strategic flexibility drives firm performance. It is imperative that organisations demonstrate this adaptability and the role of decision-makers in this process is crucial (Giorgi, 2017; Havermans, Den Hartog, Keegan & Uhl-Bien, 2015; Helfat & Peteraf, 2015; Raffaelli et al., 2019). An impediment to recognising non-incremental innovation and achieving adoption is leadership adaptation; therefore, cognitive frame flexibility is a crucial dynamic managerial capability. As firms shift the focus of managerial performance measurement in favour of role performance versus job performance (Welbourne et al., 1998), greater emphasis is placed on dynamic managerial capabilities such as cognitive flexibility.

Role-based performance incorporates role theory and identity theory to develop a more generalisable measure of performance, and incorporates five different roles: job, career, innovator, team member and organisation citizen (Welbourne et al., 1998). This measure offers a broad-based performance measure as is aligned with the aims of this study.

Hypothesis 1 (H1): *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable) (Aggarwal et al., 2017; Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli et al., 2019; Welbourne et al., 1998).*

2.3.2. Ambidexterity as a dynamic capability

Organisational ambidexterity is defined as the organisation's ability to simultaneously pursue explorative (radical) and exploitative (incremental) innovation (O'Reilly & Tushman, 2011, 2013). The term organisational ambidexterity emerged to explain and support how an organisation should initiate and execute phases of growth. The paradoxical relationship between exploitation and exploration, and the challenge organisations face to balance these conflicting objectives simultaneously, has emerged in a research stream referred to as organisational ambidexterity (O'Reilly & Tushman, 2011, 2013). Organisational ambidexterity is an important attribute of an organisation (Foss & Saebi, 2017). However, mechanisms are required to manage it effectively (Papachroni et al., 2016), with the exploration mandate needed to sustain future

viability and the exploitation mandate delivering on the current results (Levinthal & March, 1993; March, 1991).

Over time, as a firm experiences different stages of growth (the typical S-curve), its strategy, structure, skills and culture evolve, as do its markets and technologies (Tushman & O'Reilly III, 1996). When assessing future market opportunities, managers may have to seek new ways to serve the market, thereby discontinuing the routines or behaviours that were factors contributing to the firm's current success (Tushman & O'Reilly III, 1996). O'Reilly and Tushman advocate that sustained organisational performance depends on a careful balancing act between change and continuity (O'Reilly & Tushman, 2008, 2011, 2013; Tushman & O'Reilly III, 1996). The implications are that managers must run the firm partly in a stable environment (which requires incremental innovation), but also engage to some extent in radical innovation. Therefore, the need to simultaneously manage these seemingly conflicting priorities has implications for the managerial style and the organisation as a whole (Pitelis & Wagner, 2019).

March (1991) explains exploration and exploitation as two distinct activities: exploration is associated with "search, variation, experimentation and innovation", while exploitation is associated with "refinement, efficiency, increased productivity, selection and implementation" (p. 71). Since March's pioneering article, the terms exploitation and exploration have become central features of organisational analysis in relation to technological innovation, competitive advantage adaptation, and thus organisational survival (Bromiley, Koumakhov, Rousseau & Starbuck, 2019; Levinthal & March, 1993; March, 1991). The extant literature argues that organisations engaged in both explorative and exploitative activities perform better than those that pursue only one of these activities (Birkinshaw, Zimmerman & Raisch, 2016; Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2008, 2011, 2013; Raisch, Birkinshaw, Probst & Tushman, 2009; Tushman & O'Reilly III, 1996).

Achieving ambidexterity through the internal or external sourcing of competencies can be done by externalising exploitation or exploration through alliances or outsourcing (Raisch et al., 2009). This approach poses similar challenges to structurally separating exploitation and exploration, with strategic integration being a particular challenge. Effectiveness, certainty and proximity influence activities driving exploitation, while the search for new ideas is a less certain activity and introduces greater divergence of outcomes in the case of exploration. Owing to these differences, mature organisations

operating during periods of relative stability tend to explicitly allocate resources to exploitation, at the expense of exploration (March, 1991). Lavie (2006) indicates that, although both exploration and exploitation are supportive of a firm's survival, firms tend to favour one over the other, due to resource constraints. Luger et al. (2018) advocate for the dynamic balancing of exploration and exploitation activities and demonstrated in their longitudinal study that, in addition to the context, firm performance also varies over time. Therefore, while ambidexterity may allow for a firm's competitive advantage, the utility is dependent on the context and there are periods when firms are better served by internal exploration or exploitation bias.

Managerial ambidexterity

The Papachroni et al. (2016) study highlighted how different levels of management interpreted and dealt with tensions arising from ambidexterity within an organisation as they sought to manage the interrelationship between efficiency and innovation. Senior management were balancing the strategic tensions relating to these demands, while lower levels of management were grappling with the operational tensions arising from these demands.

Gibson and Birkinshaw (2004) note that individuals' ambidextrous behaviour reflects the ability to host contradictions and to recognise opportunities outside their area of expertise while cooperating to achieve outcomes. Papachroni et al. (2016) and Mom, Van den Bosch and Volberda (2009) assert that ambidextrous managers are similar to Gibson and Birkinshaw's (2004) description of them as multi-taskers with the ability to refine and renew their knowledge, skills and expertise. The organisational context and the realities faced by business units in assessing their own response are important – yet having the cognitive flexibility across various business units and management levels potentially allows managers not only to recognise but also to operationalise change. Kiss et al.'s (2020) empirical study focused on CEOs in SMEs. The analysis revealed that CEO cognitive flexibility was linked to greater information search intensity, which in turn was associated with higher levels of ambidexterity.

There are strong linkages for learning routines across the dynamic capability, ambidexterity and innovation literature, with authors highlighting the role of innovation and ambidexterity as a source of competitive advantage (Jansen et al., 2008; He & Wong, 2004). Li, Maggitti, Smith, Tesluk and Katila (2013) identify search effort and search persistency as key aspects of leaders' intensity in knowledge-seeking activities. In the innovation literature, search selection refers to those aspects of the operating

environment that leaders direct attention to, whereas search intensity is the “cognitive effort and persistence CEOs apply in the search for information” (Kiss et al., 2020; Li et al., 2013). This information search intensity has been found to have a strong relationship with managerial ambidexterity, expressed through CEO ambidexterity at SME firms (Kiss et al., 2020).

Leaders of organisations make conscious decisions about which activities to support and how they will allocate resources – that is, in support of either an explorative strategy or an exploitative strategy. Therefore, when the organisation creates the context for ambidexterity, a leader prioritises innovation and exploration and encourages others in the organisation to add value to existing products and services, while remaining cognisant of changes in the environment. That said, the context for ambidexterity needs to be flexible and balanced in terms of what is appropriate for the firm within its business context. The activities associated with exploration or exploitation (or both), including the ability to integrate the necessary change, can in fact be a dynamic capability if it can “promote economically significant change” (Helfat & Winter, 2011, p. 1249).

The manner in which a firm adapts to its context is crucial. In this regard, Aggarwal et al. (2017) make an important contribution to the learning aspect of firms through their work on adaptive capacity and its impact on changing routines. Their model (Figure 2) classifies firms’ adaptive change challenge into one of the following categories: (i) status quo (low difficulty of adaptation, low inducement to adapt); (ii) incremental change (low difficulty of adaptation, high inducement to adapt); (iii) discontinuous change (high difficulty of adaptation, high inducement to adapt); and (iv) entrapping change (high difficulty of adaptation, low inducement to adapt).

		Difficulty of Adaptation	
		Low	High
Inducement to Adapt	Low	Status Quo	Entrapping Change
	High	Incremental Change	Discontinuous Change

Figure 2: Adaptation to change

Source: Adapted from Aggarwal, V.A., Posen, H.E. & Workiewicz, M. (2017). Adaptive capacity to technological change: A microfoundational approach. *Strategic Management Journal*, 38(6), p. 1216.

The high difficulty scenarios (discontinuous change and entrapping change) create challenges for firms' attempts to adjust their routines (Zollo & Winter, 2002) and, by implication, for dynamic capabilities renewal. The relevance of discontinuous change is recognised by the firm, due to the high inducement to change. In the case of entrapping change, the firm is already highly successful and potentially does not see the relevance of change; therefore, there is limited inducement to change. Aggarwal et al. (2017) argue that the firm's adaptive capacity for routines is heterogeneous, with adaptive capacity declining from incremental change to discontinuous change and finally to entrapping change. In addition, the path that an organisation takes to arrive at its current position informs individuals' strongly ingrained habits at the firm, which impacts adaptive capacity.

Therefore, improving adaptive capacity depends on individuals displaying cognitive flexibility and an exploratory policy (ambidexterity) which is a strategic priority for the firm (Aggarwal et al., 2017).

Hypothesis 2a (H2a): *Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance (Gibson & Birkinshaw, 2004; Kiss et al., 2020; Papachroni et al., 2016).*

2.3.3. Role of market dynamism

While the conceptual literature on dynamic capabilities supports the positive relationship with competitive advantage, the empirical evidence is more nuanced. Schilke (2014) explored the effectiveness of DCs in achieving competitive advantage under varied environmental dynamism conditions and found empirical evidence that DCs are most effective when environmental dynamism is moderate (exhibiting an inverse U-shaped curve over the environmental dynamism spectrum). This was also evidenced in studies by Fainshmidt et al. (2016) and Fainshmidt et al. (2019). Fainshmidt et al.'s (2016) meta-analysis study focused on: (i) whether dynamic capabilities contributed positively to performance; and (ii) if such impacts were stronger in environments of rapid technological change. The 2016 study results supported the notion of a positive relationship between dynamic capabilities and performance, but found that rapid technological change did not moderate the relationship.

The Fainshmidt et al. (2019) study explored firm performance in relation to the firm's strategic orientation and whether the environment was characterised by resource scarcity *and* market dynamism. The findings revealed that DCs are not necessarily beneficial under all circumstances: (i) where the environment is stable and resources scarce, there may be little benefit in developing DCs and few penalties for a lack thereof, which is consistent with Eisenhardt and Martin's (2000) view that DCs are in themselves insufficient for competitive advantage; and (ii) where the strategic orientation is differentiation, bountiful (munificent) environments are necessary to allow the recoupment of costs incurred to develop these dynamic capabilities.

Therefore, the key insight from the Fainshmidt et al. (2019, p. 782) study is that the "relationship between dynamic capabilities and competitive advantage is contingent upon the strategic fit between organizational and environmental factors, contributing to a more rigorous and configurational dynamic capabilities view". This supports the current study's focus on managerial dynamic capabilities – in particular, cognitive dynamic capabilities that are necessary for managers to understand the environmental context and decide on the appropriate firm response.

Hypothesis 2b (H2b): Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance (Fainshmidt et al., 2019).

2.4. Conclusion

There is ongoing debate about where dynamic capabilities are located in an organisation and how they operate. The macro (organisation-level) view references organisational routines (Teece, 2007; Zollo & Winter, 2002) or decision-making rules (Eisenhardt & Martin, 2000). While emphasising routines may be adequate for adaptation, it may restrict innovative change and also prioritise an internal focus (Pitelis & Wagner, 2019; Salvato & Vassolo, 2018). The extant literature views dynamic capabilities predominantly as an organisational construct.

In contrast, the micro (individual) view has largely been attributed to key leaders and entrepreneurial individuals (Adner & Helfat, 2003; Helfat & Peteraf, 2015; Teece, 2007). The criticism provided by Salvato and Vassolo (2018) is that while the actions of key individuals may be crucial, this ignores the collective activities within a firm, which may function independently of these key individuals. Salvato and Vassolo (2018) posit that interpersonal connections allow individual-level actions to aggregate into firm-level DC, while Pitelis and Wagner (2019) advocate for shared strategic leadership as the mechanism to foster firm dynamic capabilities. Developing an understanding of DC capacity and how it operates continues to be a source of debate in the literature (Salvato & Vassolo, 2018).

The research opportunity (see Appendix I) identified for this study is that the cognitive flexibility of managers is not well understood within an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018). This is important because studies suggest that high cognitive flexibility improves decision-making (Laureiro-Martínez & Brusoni, 2018). In addition, Kiss et al.'s (2020) empirical study on CEO cognitive flexibility in SMEs (small and medium-sized enterprises) highlighted a positive relationship between managerial cognitive flexibility and information search, which implicitly impacts how organisations engage in explore and exploit activities, thereby leading to divergent firm outcomes. This research study aims to address the question of whether managerial cognitive frame flexibility positively impacts managerial role performance.

3. RESEARCH QUESTION

3.1. Introduction

The research question that underpins this study is whether managers' cognitive frame flexibility improves managerial role performance. The researcher in this study subscribes to the Teece et al. (1997) interpretation of dynamic capabilities, which provides the framework that underscores the importance of managerial cognitive capabilities as a dynamic managerial capability (Helfat & Martin, 2015; Helfat & Peteraf, 2015). The current study is focused on dynamic managerial capabilities as the mechanism that allows a firm to understand when to renew its capabilities and break inertial tendencies, through the managerial impact on strategic change (Helfat & Martin, 2015). The research opportunity is that the cognitive flexibility of managers is not well understood in an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018) and this forms the context for the research question.

The primary objectives of this study are set out in postulated frameworks and hypotheses in this chapter. A conceptual framework helps to clarify the research design, measurable variables and hypothesised relationships between these variables, which are set out diagrammatically in Figure 3 and were subject to testing (Burns & Burns, 2008). A hypothesis is an educated assumption that is established and tested on the basis of the likely relationship between two or more variables (Bell, Bryman & Hartley, 2019). A consistency matrix mapping the hypotheses to components of the research instrument is set out in Appendix I, with the research instrument used for the study set out in Appendix II.

3.2. Research Hypotheses

The first objective of this study is to test whether managers' cognitive frame flexibility has an influence on their role performance.

Hypothesis 1 (H1):

H0: No relationship exists between managerial cognitive frame flexibility and managerial role performance.

H1: Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable).

The second objective is focused on testing the conditions or factors that affect the strength of the primary objective relationship. The roles of managerial ambidexterity and market dynamism are examined in relation to the first objective, with these relationships set out as separate hypotheses below.

Hypothesis 2a (H2a):

H0: Managerial ambidexterity does not moderate the relationship between managerial cognitive frame flexibility and managerial role performance.

H1: Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance.

Hypothesis 2b (H2b):

H0: Market dynamism does not moderate the relationship between managerial cognitive frame flexibility and managerial role performance.

H1: Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance.

The conceptual framework that underpins this research is set out in Figure 3. It reflects the applicable constructs, with the relationships investigated in the study denoted through the use of arrows.

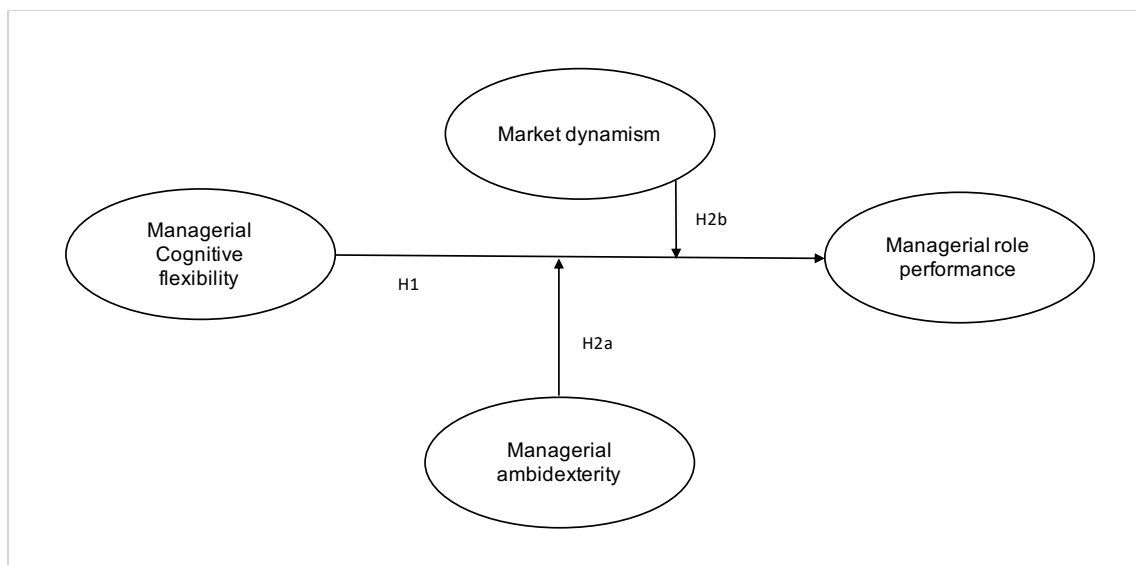


Figure 3: Managerial cognitive frame flexibility and role performance framework

Source: Author's analysis

4. RESEARCH METHODOLOGY

4.1. Introduction

The literature review highlighted the importance of managerial cognitive flexibility for improved decision-making. The review highlighted the need for empirical research, examining managerial cognitive flexibility in an organisational setting. This study's objectives are substantiated by the conceptual framework and hypotheses discussed in Chapter Three. This chapter outlines how the methodology and research design address the research question, which is whether managers' cognitive frame flexibility impacts managerial role performance.

Through the course of this chapter, the reader is provided with comprehensive insights into the methodological approach adopted, with a summary of such approach set out in Table 4. The researcher's epistemological position (worldview) is discussed, including why a deductive approach was considered appropriate for this study. Thereafter, the research design, sampling method and data collection approach (used for the collection of quantitative data) are set out, which are necessary to test the hypotheses in the study. The chapter also includes a section on the measurement tools used to obtain feedback from the respondents in the study. In addition, the basis for linking the measured constructs to the relevant items in the measurement instrument is set out, together with the data analysis techniques used to analyse the measured items.

Table 4: Summary of research methodology choices

Criteria	Approach adopted
Philosophy	Positivist
Approach to theory	Deductive
Methodological choice	Quantitative
Strategy	Survey
Time horizon	Cross-sectional
Techniques and procedures	Data collection and analysis

Source: Author's compilation

4.2. Epistemological View and Approach to Theory

The researcher's positivist worldview has been shaped by his formal academic studies in accounting and finance, his experience in investment markets and his personal preference for sense-making. Owing to the researcher's positivist bias, the

interpretation of the findings may have been geared towards confirming an outcome. Therefore, care had to be exercised to ensure that any editing, analysis and interpretation of data were as objective as possible and best suited to the circumstances. The research study was set predominantly within the context of the dynamic capabilities literature, which is intermediate to mature in terms of theory development (Laaksonen & Peltoniemi, 2018; Schilke et al., 2018). As a result, it was well suited to a positivist or pragmatist research philosophy (Creswell & Creswell, 2018). Positivists aim to make generalisations, seeking to establish relationships between cause and effect, and are reductionist in their approach (Creswell & Creswell, 2018).

A deductive approach was followed as the extant literature formed the basis of the research hypotheses (Creswell & Creswell, 2018). In addition, the quantitative nature of the study was aligned to the deductive nature of theory testing. Managerial cognitive frame flexibility was tested for a relationship with managerial role performance. The roles of managerial ambidexterity and market dynamism were also explored in relation to the research question. The literature review in Chapter Two proposed the existence of the relationships set out in the hypotheses below:

- **Hypothesis 1 (H1):** *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable).*
- **Hypothesis 2a (H2a):** *Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance.*
- **Hypothesis 2b (H2b):** *Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance.*

4.3. Research Design

The research plan or design informs the implementation of the research method as well as the subsequent data analysis (Creswell & Creswell, 2018). As the study involved empirically testing existing theory, primarily found in the dynamic capabilities literature, the process was deductive in nature and sought to validate the hypotheses set out in section 4.2. through a quantitative study (Crane, Henriques & Husted, 2018; Laaksonen & Peltoniemi, 2018).

The quantitative study applied a mono-method approach, as the hypotheses were tested through quantitative data only. Responses collected using Likert-type scale data were numerically coded and statistically analysed to test these hypotheses (Creswell, 2012). This process was followed in order to arrive at a systematic and standardised method for gauging variations with two or more variables, which were then examined to identify patterns of connection (Bell et al., 2019). In the context of this study, these were: (i) managerial cognitive frame flexibility; (ii) managerial role performance; (iii) managerial ambidexterity; and (v) market dynamism. The cross-sectional design involved collecting data over a time frame of six weeks (ending mid-November 2020). All data collection questions were combined into a single research instrument – the online survey questionnaire, as set out in Appendix II.

The quantitative research methodology is well suited to testing existing theory claims (Crane et al., 2018; Laaksonen & Peltoniemi, 2018) and is appropriate where the theory has matured (Edmondson & Mcmanus, 2007), which is the case with the dynamic capabilities literature (Laaksonen & Peltoniemi, 2018; Schilke et al., 2018). There have been a number of calls for quantitative studies to: (a) assess the managerial impact outside the top leadership structures on dynamic capabilities in firms (Gibson & Birkinshaw, 2004; Papachroni et al., 2016; Schilke et al., 2018); and (b) assess managerial cognitive capabilities (Aggarwal et al., 2017; Fainshmidt et al., 2019; Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli et al., 2019). These areas of focus formed the basis of this study.

The data collection strategy made use of a survey instrument. Cross-sectional studies examine more than one group of people at one time, whereas longitudinal studies examine one group of people over multiple periods (Salkind, 2012). Longitudinal surveys at a managerial level are problematic as gaining participation from the same set of participants may be unrealistic and hamper causal inference (Marini & Singer, 1988) and also create temporal erosion (Cook & Campbell, 1979). Alternatively, if a longitudinal study is conducted by asking questions about certain points in time, there is heavy reliance on the fact that individuals' cognition is stable over time or that they will be able to objectively provide input that aligns with their cognitive frame for those time periods.

The cross-sectional approach was well suited to the research question of whether managers' cognitive frame flexibility improves managerial role performance, thus allowing the researcher to test whether the condition was evident across various

groups of people. Owing to the shortcomings of longitudinal studies mentioned above and the fact that the cross-sectional approach met the study objectives, the additional benefits of speed, cost-effectiveness and the researcher's time constraints all bolstered the choice of a cross-sectional study design.

The quantitative data was collected through an online, self-administered survey. This is a widely accepted approach among business and management researchers, as it is both easy to understand and cost-effective (Saunders & Lewis, 2012). The online survey was aimed at managers in South African firms, with descriptive questions (relating, for example, to seniority, experience, age, gender, and sector and geographic exposures) designed to better understand the profile and diversity of respondents. Understanding the profile of the respondents is always important as the profile indicates whether the sample is representative of the target population and whether there are limitations as a result (Bell et al., 2019; Creswell & Creswell, 2018).

The online format of the survey, through Google Forms, allowed for improved data collection and testing because it ensured the timely electronic distribution and collection of survey responses, with the data automatically collated and stored anonymously on completion of the survey. The survey provided time-constrained managers with increased flexibility to participate, as it could be accessed through a web browser on a computer or a mobile device. It very likely produced a better response rate than would have been the case if distribution and collection had taken place via the postal service or manual processes (Bell et al., 2019).

The survey, which respondents could complete in a relatively short period of time at their convenience, proved to be a positive experience for the respondents, based on feedback from the pilot group. That said, data was sourced from individual respondents only, through self-reported assessments. The potential therefore existed for common method variance (CMV) to occur. CMV refers to the bias that is introduced as a result of the instrument design (Rindfleisch, Malter, Ganesan & Moorman, 2008). The participants' responses were the only data collection mechanism in this study, and while common method variance was a potential limitation, measures were taken to help mitigate this (see section 4.4.4).

The research topic involved the empirical testing of managerial cognitive flexibility as a dynamic managerial capability in relation to managers' own performance. Dynamic capabilities and dynamic managerial capabilities are firm-specific (Teece, 2007) and

therefore questions were posed in relation to managers' self-assessment and managers' own company setting (Eisenhardt, 1989; Laaksonen & Peltoniemi, 2018; Yin, 1981), and were considered appropriate.

4.4. Data Collection Design

4.4.1. Population

The target population for this study was managers in South African firms.

4.4.2. Unit of analysis

The unit of analysis is the level at which study participants are selected to participate in a study (Creswell, 2012). The unit of analysis throughout the theory development and empirical work of this study was set at the individual manager level. The individual manager unit of analysis remains under-explored in the extant literature (Papachroni et al., 2016; Salvato & Vassolo, 2018; Schilke et al., 2018), with the cognitive flexibility of managers not well understood in an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018).

4.4.3. Sampling method and size

A sample is a subset of a population selected for observation (Bell et al., 2019). Respondents were sourced using convenience sampling and were selected against the study criteria. The focus of the study was on incumbent firms' managers and this selection was facilitated through (i) targeting listed companies through their investor relations departments, (ii) user groups on professional networking platforms, and (iii) targeted distribution via a professional social networking platform to participants who met the selection criteria.

4.4.3.1. Sample method

A random sample in probability theory is a subset of the larger dataset (population) that is chosen entirely by chance, thus allowing for a non-biased representation of the total population (Bell et al., 2019; Creswell & Creswell, 2018). While a non-biased representative sample is preferable (Bell et al., 2019), the impracticalities of obtaining a representative sample across all South African firms' managers, given the time and budgetary constraints, favoured a non-probability sampling approach (Creswell & Creswell, 2018). Non-probability sampling occurs when subjects do not have an equal chance of selection for the study (Creswell & Creswell, 2018).

Random sampling was not possible in this study as a sampling frame for all managers does not exist. As such, the study made use of non-probability convenience sampling, with participants accessible to the researcher who represented, in full or in part, the identified population characteristics (Creswell, 2012). Snowball sampling was also employed as respondents were asked to extend the survey to others who met the criteria of the study population. Participant selection was based on convenience, utilising various social media platforms (LinkedIn, Facebook and WhatsApp) and readily accessible information on publicly listed companies to make contact via email. Data gathering was achieved through a self-administered questionnaire, using Google Forms. This data collection method allowed for ease of distribution and encouraged snowball sampling.

4.4.3.2. Sample size

A large potential population size was likely for individual managers in South Africa. As it was impractical to accurately size or include all cases within the entire population, a sample of the target population was studied, with the intention of generalising findings to the population (Creswell & Creswell, 2018; Wegner, 2016). There does not appear to be a reliable estimate of the number of South African managers, although the size of the population is assumed to be above one million people and therefore large enough to warrant the use of the maximum sample size of 384, using a sample size calculator (see below).

Bell et al. (2019) note that the absolute size (and not the relative size) is important when considering the size of a sample. When increasing the sample size, the accuracy of the sample also increases, which has the effect of reducing sampling error. Sampling error is an important consideration as it highlights the degree of error one is prepared to tolerate (Bell et al., 2019). Using the Qualtrics sample size calculator (www.qualtrics.com), the sample size necessary at a 95% confidence interval and a 0.05 margin of error was 384.

Suitability for statistical analysis

Sample size in a quantitative study is essential for sample accuracy and to infer credible conclusions from the findings. While there are varied views on the minimum sizes, Gorsuch (1983) and Kline (1994) posit a target threshold of at least 100 responses to conduct a meaningful statistical analysis. Knofczynski and Mundfrom (2008) propose accessing minimum acceptable sample sizes based on the number of

predictor variables, the sample squared multiple correlation coefficient and the level of prediction level. These sample size guidelines are for multiple regression models used for prediction and were applicable to this study.

This study targeted a good to excellent prediction level, using the squared multiple correlation coefficient and the number of independent variables to estimate a sample size. Using the more conservative estimate from H1 and H2a, H2b, the researcher calculated a low squared, multiple correlation coefficient for the hypotheses at 0.29 and the number of predictor variables as three (a more conservative level in H1 testing). This provided a sample size range of 101 (good prediction level) to 380 (excellent prediction level). An alternative basis for expressing the sample size calculation, according to Knofczynski and Mundfrom (2008), is as a multiple of the predictor variable. In this study, this would equate to 34x (good prediction level) to 127x (excellent predictor level) on three predictors, resulting in a sample size of 102 to 381 (the mid-point is 242).

Suitability for factor analysis

Results of research on the appropriate sample size for factor analysis vary, with Field (2013) suggesting an ideal sample size of 300, while the review of the relevant literature by Beavers, Lounsbury, Richards, Huck, Skolits and Esquivel (2013) revealed a number of considerations and insights related to: (a) minimum number of cases and subject-to-variable ratio; (b) strength of the factors and items and impact on minimum sample size; and (c) univariate versus multivariate methods. Beavers et al. (2013) posit that a minimum number of cases advocated in the literature varies within a range of 100 to 300 cases, as well as a case-to-item ratio of 10 times and a minimum subject-to-variable ratio of five times. In this study, the minimum case-to-item ratio (31 items used for variables tested) would require a sample of 310, with the minimum subject-to-variable ratio (11 variables used) implying a minimum sample of 55. The mid-point using this framework would be 183.

In summary, Beavers et al. (2013) support a sample size of at least 150 for a multivariate analysis, where the factor loadings are moderate (defined as 10 to 12 factors with loadings of 0.40 or more). Where there are four or more factors with loadings of 0.60 or higher, sample size is less relevant (Beavers et al., 2013). This study had a sample size above 150 and all the factors had loadings of at least 0.59, with most of the factors comfortably above 0.6 (Table 7) and therefore acceptable for factor analysis, regardless of the sample size. The sample adequacy was assessed

using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the overall dataset and the applicability of the dataset for factor analysis was assessed using Bartlett's test of sphericity (Hair, Black, Babin & Anderson, 2010). These tests are set out in section 4.6.3.

Adequacy of sample

There were 203 respondents who participated in the survey (two respondents declined to participate) and accessed the survey via a Google Forms link, primarily through LinkedIn, Facebook, WhatsApp and email. The absolute size of the sample achieved was above the minimum considered acceptable for meaningful statistical analysis and factor analysis. Similar global studies achieved a sample size of 202 (Kiss et al., 2020), 139 (Lubatkin, Simsek, Ling & Veiga, 2006) and 200 (Barrales-Molina, Benitez-Amado & Perez-Arostegui, 2010) and so the sample size of 203 compared favourably.

Notwithstanding attempts to obtain a larger sample size, the higher end of the target range was not possible within the study time frame. The 203 fully completed responses were achieved relative to the estimated targeted audience of 2,071 (discussed later) and equated to an estimated response rate of 9.8%. The sample size was assessed as adequate and the descriptive statistics in Chapter Five also confirm that the sample effectively targeted that population of interest.

4.4.3.3. Type of data collected

There are four data types for measurement scales: nominal, ordinal, interval and ratio, and the data type determines the most appropriate statistical method to use on the data to provide statistically valid results (Wegner, 2016). This study used three Likert rating scales. According to Wegner (2016), Likert rating scales reflect the attitudes or opinions of respondents to the statement or question posed and produce interval data. Interval data is similar to ordinal data as both have the numerical property of order, but interval data also includes a proportionate or interval distance between the data points – a feature that lends itself to a wide range of statistical analysis (Wegner, 2016). The data collected from the scales in the survey were quantitative, numeric and interval in nature. The interval data was coded to continuous data as a precursor to statistical analysis.

4.4.4. Measurement instrument

The measurement instrument used was an online survey (see Appendix III) which was self-administered via Google Forms. The inherent strengths of online survey research include: (i) the ability to measure a variety of unobservable data; (ii) remote data collection; (iii) anonymity and convenience for the respondent; (iv) consistency of responses; (v) cost and time advantages; and (vi) absence of interviewer effects (Bell et al., 2019; Creswell & Creswell, 2018). There are, however, several disadvantages of survey research, predominantly related to bias, including sampling bias, non-response bias, social desirability bias and recall bias. In particular, reliance on individuals' introspective ability and social desirability bias were the primary shortcomings in this study (Bell et al., 2019; Creswell & Creswell, 2018).

4.4.4.1. Survey design

The purpose of the survey was to obtain sufficient data to test the hypotheses and generalise the findings from a sample to a larger population (Creswell & Creswell, 2018). The survey first disclosed pertinent information about the survey, including the purpose and confidentiality and anonymity undertakings, before seeking informed consent to continue with the survey. The questionnaire was in English, although there was a possibility that questions may have been misinterpreted by some participants whose home language was not English. Nevertheless, as the survey was aimed at managers in South Africa, where English is the language spoken in business, this risk was minimal, in the researcher's assessment.

The survey consisted of five sections. Section 1 contained demographic questions for classification purposes as well as a single question calling for the assessment of the level of industry dynamism at the respondent's firm. These questions were provided as radio box options for respondents, for ease of completion (Bell et al., 2019). Respondents quantified observed subconstructs, which collectively measured the key constructs of managerial cognitive frame flexibility (section 2), managerial learning intensity (section 3), managerial ambidexterity (section 4), and managerial role performance (section 5). The questions in sections 2 to 5 were closed-ended and used a Likert-type scale for respondents to rate each sub-construct. The Likert-type format is both a popular and well-tested method of measurement, producing interval-type data due to the set order and the interval spacing between the coded responses (Creswell, 2012). The Likert-type scale used improved comparability, analysis and the response rates (Bell et al., 2019).

The researcher did not alter the Likert-type scales drawn from the extant literature for the respective scales. Section 2 of the survey comprised questions related to the individual's cognitive frame flexibility and was based on the widely used cognitive flexibility scale (Martin, Staggars & Anderson, 2011; Martin & Rubin, 1995), which applies a six-point Likert-type scale, with some questions asked in reverse order. Section 3 of the survey dealt with managers' learning intensity, used a five-point Likert-type scale, and was operationalised using search effort and persistency scales (Li et al., 2013). Section 4 dealt with managerial ambidexterity and was measured using a seven-point Likert-type organisational exploration and organisational exploitation scale (Jansen, Van den Bosch & Volberda, 2006). Section 5, the final part of the survey, dealt with managerial performance and was operationalised through a five-point Likert-type, role-based performance scale (Welbourne et al., 1998).

Common method variance (bias) and alternative explanations

Owing to the single-respondent survey structure for data collection of all constructs, data generated from such surveys may introduce common method variance (CMV) into the analysis. With reference to CMV, researchers are concerned that the study may not consider sufficient variables to identify alternative explanations for the findings (Podsakoff, MacKenzie, Jeong-Yeon Lee & Podsakoff, 2003). The scales used in this study were all self-reported measures and, while practical, they had the disadvantage of social desirability bias and were subject to the individuals' introspective abilities (Laureiro-Martínez & Brusoni, 2018).

To address this potential issue, some guidelines were introduced into the survey design and data collection stages, which included targeting a sufficiently large sample size (Rindfleisch et al., 2008), using reverse questions and varied Likert-point scales, and incorporating multiple scales for different constructs into the study's research instrument (Podsakoff et al., 2003; Laaksonen & Peltoniemi, 2018). In view of the limitation of the Harman one-factor test (Podsakoff et al., 2003) in terms of statistical control, it was used as a diagnostic tool to assess for CMV and was therefore considered appropriate in this study for assessing if further analysis was necessary. The Harman one-factor test using the Statistical Package for Social Sciences (SPSS) software tool (using principal axis factoring extraction on a single factor) revealed that a single factor accounted for a total variance of 22.53%, therefore providing evidence that CMV was not a significant concern in the study (Podsakoff et al., 2003).

4.4.5. Sample respondent pre-test

A pilot study was conducted using the pilot instrument to help clarify unclear questions and make any necessary amendments (Bell et al., 2019). The pilot study was conducted with 11 participants who were all managers and were not part of the study sample. The aim of the pilot was to obtain feedback from the managers across a range of industries on whether the questions were clear and contained no bias, and that respondents clearly understood the purpose of the survey and that the time guideline was appropriate (Saunders & Lewis, 2012). Based on the feedback, the informed consent section and the introductory comments in the various sections of the survey were amended to elaborate on the purpose of the study and to highlight that participants needed to carefully read the questions in Section 2 where four questions were asked in reverse order.

4.4.6. Data gathering process and collection method

The primary source of data was an online, self-administered survey, hosted through Google Forms and completed by managers who participated in the survey. The survey was accessed via a Google Forms link, with an introductory note and a request for participants to also send the link to other senior and middle managers. The distribution of the survey was in line with the data sampling methodology detailed in section 4.3.3.

The instrument design was limited to closed-ended questions and was calibrated to be completed within 15 minutes. To ensure the integrity of the data and to limit the number of incomplete questionnaires, each question first had to be completed before a respondent could continue with the questionnaire. In addition, a number of questions pertaining to the original scales were asked in reverse order, which also helped to reveal potentially invalid responses. As is typical with online surveys, the response rate was low and there was a follow-up process to encourage targeted participants to complete the survey.

Response rate

To try and ensure a good response rate, an email was sent ahead of the survey instrument to notify people that they had been invited to participate, outlining the background to and rationale for the study. For people who indicated a willingness to participate, a link to the questionnaire was sent out via LinkedIn. Where email was preferred, the survey was sent both via a LinkedIn message and a separate email. The original LinkedIn messages were followed up after two weeks to remind potential

respondents to complete the survey. The emails sent to listed companies were also followed up after two weeks. In addition, posts were introduced on selected groups in LinkedIn with a link to the survey.

It was difficult to determine the exact response rate. However, a rudimentary assessment based on the membership of the LinkedIn groups and on a 1% estimate of the potential number of people who may have viewed the post (1,338), an initial count of the LinkedIn professional network based in South Africa who met the criteria (493) and were targeted for participation through messaging, as well as a further 141 companies that were targeted to participate via email, put the potential targeted audience at 1,972. Respondents were also asked to forward the survey link. It is difficult to establish how broadly the survey may have been distributed. However, assuming an additional 20% on the professional network component, this would place the targeted audience size at 2,071. The survey generated 205 responses, of which two respondents declined to participate. Using the accepted responses, 203 fully completed responses were obtained relative to the targeted audience of 2,071, resulting in an estimated response rate of 9.8%.

In the Hermano and Martín-Cruz (2016) study on the influence of top management on project and firm performance, despite identifying a target population of 1,686, a response rate of 3.7% was achieved, equating to a sample of 62 cases. Such a low response rate is not uncommon as senior managers are “notoriously unwilling to subject themselves to scholarly poking and probing” (Hambrick, 2007, p. 337). As noted by Hermano and Martín-Cruz (2016), in terms of sample quality, diversity is more important than the response rate and in this case, the sample was suitably diverse (see descriptive statistics section in Chapter Five).

4.5. Data Analysis Approach

As the study was a quantitative one, the data used was both descriptive and inferential and the testing applied regression analysis. The data was analysed against the hypotheses to determine if the respective hypotheses could be rejected or failed to be rejected. The data was assessed using Microsoft Excel and the SPSS software tool, with multiple regression analysis and moderated regression analysis as the primary statistical methodologies applied (Hayes & Rockwood, 2017).

4.5.1. Editing

The design of the questionnaire included mandatory responses to all questions, resulting in no incomplete questionnaires. Once the data collection process had been completed, the data was reviewed to ensure appropriate classifications and to minimise any errors from the data received from respondents (Kumar, 2011). In particular, four questions were reverse-coded in the survey. This process is set out below.

4.5.2. Coding

To conduct statistical analysis on the final data, each response was “coded”, which means that a numerical value was assigned to each response (Kumar, 2011). The variables in the responses from the survey questionnaire were coded, with four questions – which were asked in reverse – recoded to provide the correct response code for the rest of the questions (Bell et al., 2019; Creswell & Creswell, 2018). Prior to any analysis on the data taking place, these reverse-coded questions were recoded to provided values consistent with the values that would have been evident, had these questions not been asked in reverse. The extreme values were also assessed relative to other responses in the section in each case. Where outliers were noted (such as a 1 or 2), these were recoded (such as 6 or 5) as it was likely that participants had not interpreted the reverse-coded questions correctly.

4.5.3. Analysis

The analysis provided information on the overall profile of participants, with additional descriptive data for all predictor and outcome variables, including means, standard deviation and the range of scores (Creswell & Creswell, 2018). The study used existing literature to test the constructs (applying existing scales from the relevant literature) and was supportive of a reflective measurement approach, from theory to the observed variable through the questionnaire (see sections 4.6. to 4.8., which are a precursor to the hypothesis testing).

The hypothesis testing entailed inferential analysis, with the relationships between predictor and outcome variables tested using statistical procedures, such as multiple regression and a moderated multiple regression analysis (Hayes & Rockwood, 2017) for the various hypotheses tested (see section 4.4.3.3.). Using SPSS software, different statistical analyses and tests were performed to determine the reliability and validity of the data.

4.5.3.1. Normality of data

When establishing content validity, the adequacy of measurement is an important consideration. Assessing the normality of data also provides an indication of which statistical tests may be used on the data. According to Creswell (2012), data should be tested for normality – normally distributed data is considered to represent symmetrical, bell-shaped curves, comprising the majority of data points in the centre, decreasing toward the outer limits (Gravetter & Wallnau, 2006).

According to Pallant (2011), skewness depicts the evenness of the data distribution across the bell-shaped curve, whereas kurtosis refers to the concentration of the data around the mean or ‘peakiness’. Hence, skewness would point to a disproportionate amount of the data distribution lying on either the negative or positive side of the mean; this is referred to as a negatively or positively skewed distribution. Kurtosis, in turn, would provide an indication of how flat or peaked the distribution is around its mean. The most commonly used cut-offs for critical skewness and kurtosis values are ± 1.96 and ± 7 , respectively, corresponding with a 0.01 significance level for data to be accepted as normally distributed (Hair et al., 2010). The skewness and kurtosis results in Table 5 fell well within the limits proposed by Hair et al. (2010) and were therefore not a concern when assessing the normality of the data.

Table 5: Descriptive results for data normality (skewness and kurtosis)

Variable, N=203	Skewness	Kurtosis
Awareness (Awareness of options, subconstruct of MCF)	-0.73	0.23
Willingness (Willingness to be flexible, subconstruct of MCF)	-1.14	3.27
Self_efficacy (Self-efficacy in flexibility, subconstruct of MCF)	-0.20	-0.47
Exploit (Exploitation, subconstruct of MA)	-0.99	1.44
Explore (Exploration, subconstruct of MA)	-0.41	-0.61
MarketDynamism (Market Dynamism)	-0.98	0.60
Job (Job, subconstruct of MRP)	-0.84	0.47
Career (Career, subconstruct of MRP)	-0.78	0.31
Innovate (Innovate, subconstruct of MRP)	-0.84	0.85
Team (Team, subconstruct of MRP)	-1.04	2.21
Firm (Firm, subconstruct of MRP)	-1.28	2.50

Source: SPSS, Author’s analysis

Normality of data was initially assessed using a Shapiro-Wilk test (Table 6) (Hair et al., 2010; Zikmund, Babin, Carr & Griffin, 2012). The tests revealed a significance score of $p < 0.05$ for all the constructs. Normality requires a p value of > 0.05 and therefore the test indicated that normality had not been met. That said, the Shapiro-Wilk test can be less reliable for larger sample sizes (above 50 cases). With this study comprising a sample size of 203, it may reflect a statistically significant result (non-normal for this test), even when the data is normal (Hair et al., 2010; Zikmund et al., 2012). As a result, greater reliance was placed on the visual review of the histograms and normal Q-Q plots and the comparison of means to trimmed means as an indication of normality. On this basis, the data appeared to be approximately normally distributed.

Table 6: Tests of normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Awareness	.920	203	.000
Willingness	.899	203	.000
Self_efficacy	.968	203	.000
Exploit	.940	203	.000
Explore	.960	203	.000
MarketDynamism	.762	203	.000
Job	.929	203	.000
Career	.929	203	.000
Innovate	.930	203	.000
Team	.905	203	.000
Firm	.854	203	.000

Source: SPSS, Author's analysis

In assessing the normality of the data collected for this study, the descriptive statistics such as skewness, kurtosis and comparison of the mean and 5% trimmed mean are set out in Table 5 and Table 16. The 5% trimmed mean removes the top and bottom 5% of the data points and calculates a new mean (Pallant, 2011). Normally distributed data varies little between the mean and the 5% trimmed mean (Pallant, 2011) and this was evident for the constructs outlined in Table 16. The histograms for each of the variables were inspected visually for normality. The histograms and normal Q-Q plots for the 1st order and 2nd order constructs were assessed and corroborated the results from skewness, kurtosis and the 5% trimmed mean analysis, reflecting approximately normal distribution of data. The data collected in this study can therefore be assumed to be normally distributed.

As part of the hypothesis testing, normality was also assessed by visually inspecting the normal P-P plots from the hypothesis tests for the relationships with the dependent variables and the data points followed the line of best fit, reflecting a normal distribution. In addition, the normality of residuals was assessed by reviewing the chart of standardised residual and standardised predicted outcomes, with the values falling within the range of -3 to +3, which is considered appropriate (Hu & Bentler, 1999).

4.5.3.2. Outliers

Data points that are significantly above or below most of the data points are considered outliers (Pallant, 2011). Using box plots, outliers are denoted as circles outside the “whiskers” (where most of the data points lie) in the box plot. Using the box plots on the variables in the study, there were very few outliers, with most of them within the range of 1.5 box lengths (minimum criterion for inclusion as an outlier) to 3.0 box lengths, above which they would be deemed extreme (Pallant, 2011).

Pallant (2011) notes that it is not uncommon to extract extreme outliers from the dataset should these outliers have a significant impact on the test results, and while there were a few outliers for each of the variables in the study data set, the overall test results were within the boundaries of normality. The outliers were therefore not considered to have a significant impact on the results of the data analysis. No data was removed from the dataset, as removing it would not significantly change the results.

There were minimal cases noted that were beyond 3 standard deviations for H1 as well as for H2a and H2b. For the cases highlighted as significant outliers, no discrepancies were noted with the data inputs for the reverse-coded questions. There was a higher number of permutations for the H2a and H2b. The frequency of outliers is disclosed in Table 38, Table 41, Table 44, Table 47 and Table 50. Despite the extreme nature of these cases, they were not deleted from the dataset as there were limited instances of such extreme cases and also there was no evidence of data-capturing errors.

No leverage or highly influential points of concern were identified through the hypothesis testing. There can be certain data points that are, in some way, classified as unusual from the perspective of fitting a multiple regression model. These data points are generally detrimental to the fit or generalisation (statistical inference) of the regression equation. The leverage value and Cook’s Distance (influential cases) were also assessed for each case, using the SPSS option within the linear regression

analysis. A separate variable was created as the leverage values for each case. The rule of thumb (Huber, 1981) to determine if any cases exhibit high leverage is that leverage values below 0.2 are safe, values between 0.2 and 0.5 are risky and values above 0.5 are dangerous. The highest value in the study dataset was 0.17, followed by 0.14, and therefore leverage was not a concern. The ordered values for Cook's Distance were used to determine if there were any influential cases. There were no Cook's Distance values above 1 (Cook & Weisberg, 1982) and hence no cases were found to be influential.

4.6. Quality of Data and Protocols

The data was collected directly from respondents and therefore constituted primary data. Participants' demographic profiles and work experience were assessed to provide greater insight into the representativeness of the sample. The level of data accuracy was high as the data was obtained directly from respondents. Responses were based on closed-ended questions and were coded and stored directly in a database.

Data was managed in accordance with Gordon Institute of Business Science (GIBS) requirements regarding data collection and storage. The data was collected anonymously at an individual level, with both anonymity and confidentiality maintained throughout the data collection and analysis processes. Data was stored without any unique identifiers and only aggregated information has been reported. Data collected using Google Forms was stored in a public cloud (Google Cloud). Once the data collection exercise had been completed, the link to the form was deactivated and the data collected was deleted from Google Cloud. The data from respondents was stored only on the researcher's personal computer and a backup copy made on a flash drive. The stored data will remain in an accessible format (Microsoft Excel file and SPSS data file) for the requisite period, which is currently 10 years, according to the GIBS data protocol.

With respect to the distribution of the survey, the researcher used publicly disclosed or accessible information as of 17 September 2020. There were 152 constituents of the Johannesburg Stock Exchange (JSE) All Share Index (Alsi). As a proxy for this constituent data, the researcher used public disclosure of the equivalent tracker fund holdings (www.satrix.co.za), which revealed 141 constituents. Using this constituent

list, the researcher reviewed company websites for contact details of investor relations personnel and included these contacts when distributing the survey via email.

The researcher has experience of, and a professional network in, investment markets and these contacts were, where possible, also targeted to raise awareness about the survey and to further encourage snowballing within organisations, over and above participants' own networks, to broaden access. In addition, a publicly accessible professional social network database (LinkedIn) was used to distribute the survey to the researcher's personal network in South Africa and to target a list of South African business groups across the three major metro areas with a view to broadening the reach and diversity of the targeted sample. The scales used to operationalise the constructs in this study all feature in published research, are well documented and are widely used, and therefore did not require consent.

4.6.1. Measures

The interrelationships between theory, the construct and the measurement variable were a precursor to the testing of the measurement instrument. The measures had to be valid and reliable before any hypothesis testing could be done (Zikmund et al., 2012). The research literature, the ontological stance of the researcher and the hypotheses themselves supported the use of reflective measures in the study.

Reflective measures (or indicators) are observed variables that reflect (or show the effect of) a construct and are interchangeable, whereas formative measures (or indicators) are additive, unrelated variables that, when combined, are causal in determining a construct (Diamantopoulos & Winklhofer, 2001). When assessing the causal priority between the indicator and the construct, a reflective approach shows a causal link from the construct (from existing theory) to the indicator (Diamantopoulos & Winklhofer, 2001). Fornell and Bookstein (1982) further clarify that if a construct is a trait that explains an indicator, then the approach is reflective. However, a combination of traits explaining a construct tends to be formative. In addition, reflective measures have systematic errors in the overall approach. Formative measures, in contrast, do not specifically have error terms but rather a disturbance term which impacts at the construct level and is unrelated to variables. Reflective indicators are typically referred to as scales, whereas formative indicators combined are typically referred to as an index (Diamantopoulos & Winklhofer, 2001).

The measurement model assessment for reflective measures is focused on convergent and discriminant validity as well as internal reliability or convergent reliability (Hair et al., 2010), and is discussed in section 4.6.2. The main constructs (or latent variables) for this study were managerial cognitive frame flexibility, managerial ambidexterity and managerial role performance, where managerial role performance was the dependent variable. Managerial ambidexterity and market dynamism were tested as moderators of the relationship between managerial cognitive frame flexibility and managerial role performance. Each construct (with the exception of market dynamism) was defined using multi-item scales to measure the subconstructs or observed variables and provide a robust measure of the respective constructs (Churchill, 1979; Sarstedt & Wilczynski, 2009). The three scales used in this study to operationalise the following constructs were all reflective in nature: (i) managerial cognitive frame flexibility; (ii) managerial ambidexterity; and (iii) managerial role performance. Market dynamism was measured through a single-item scale and is discussed below.

Market dynamism

Market dynamism was assessed through a single question in the research instrument. Single-item scales have been criticised because: (a) they do not sufficiently capture the construct; (b) they exhibit fewer points of discrimination (and therefore may need a larger sample size); and (c) they lack internal consistency due to the single-item measure (Sarstedt & Wilczynski, 2009). That said, there is support for the application of single-item scales where the construct is simple or one-dimensional (Pollack & Alexandrov, 2013; Sarstedt & Wilczynski, 2009). The manner in which this study scoped market dynamism resulted in the construct being considered one-dimensional and therefore the measurement was also appropriate. This construct did not form part of the validity, reliability and factor analysis sections and raw data from the single question was used for the analysis and interpretation of this construct in this study.

Managerial cognitive frame flexibility

Managerial cognitive frame flexibility operationalisation can be challenging in an empirical study and due to managerial time constraints and participation concerns, self-responded measures were favoured over more intense laboratory testing methods, such as those outlined in Laureiro-Martínez & Brusoni (2018). Managerial cognitive frame flexibility was assessed using a widely accepted and credible tool (the Cognitive Flexibility Scale), developed by Martin and Rubin (1995) and revalidated by Martin et al. (2011). The scale consists of 12 items and uses a seven-point Likert scale, with four

reverse-coded questions. The reverse-coding of the original scale was not changed in the survey but the data was recoded once the collection had been completed.

Managerial ambidexterity

Managerial ambidexterity was measured using the scales developed and validated by Jansen et al. (2006). This measure combines exploration and exploitation measures and has been widely used in the ambidexterity literature (Kiss et al., 2020). Both the exploration and exploitation measures developed by Jansen et al. (2006) have seven items each and employ a seven-point Likert scale. There are two dimensions to the scale: (i) exploration; and (ii) exploitation. For the purposes of this study, the researcher amended the original seven-item scales to four items each for both scales, using the items highlighted for each of the scales in Kiss et al. (2020).

Managerial role performance

Managerial role performance was measured using a role-based performance scale developed and validated by Welbourne et al. (1998). This measure is a broad-based performance measure that incorporates role theory and identity theory to develop a more generalisable measure of performance. It incorporates five different roles: job, career, innovator, team member and organisation citizen. Given its relevance to the aims of the study, this was considered a more holistic measure of performance. The 20-item scale is spread across five dimensions, comprising four items each, and uses a five-point Likert scale.

4.6.2. Validity and reliability

When considering the applicability of a research instrument, validity and reliability are crucial. Validity refers to how well the instrument measures the construct it is supposed to measure and if it matches the intended purpose. In contrast, reliability infers consistency of the instrument, free from random error, as it is used multiple times over different time periods (Creswell, 2012). These concepts are explained in greater detail in sections 4.6.2.1 and 4.6.2.2 which also set out some guidelines for acceptable levels when assessing the suitability of validity and reliability measures as reflective measures.

Validity was established by assessing bi-variate correlations and is presented as a correlation matrix in Appendix III, while factor analysis was used as a dimension-reduction technique (Hair et al., 2010). Reliability was tested for internal consistency by

assessing the Cronbach's alpha for each dimension. Convergent reliability was assessed by examining Cronbach's alpha scores for a reading above 0.50 as a minimum level; 0.60 is considered a questionable but acceptable level (George & Mallery, 2003).

4.6.2.1. Validity

Validity can be thought of as whether "an indicator or set of indicators that is devised to gauge a concept really measures that concept" (Bell et al., 2019). Each of the scales measuring a construct in the questionnaire was subject to validity tests to determine the effectiveness of the items used to measure the construct. This study used correlation analysis, which is an approach consistently adopted in other studies on dynamic capabilities to establish convergent and discriminant validity (Blaikie, 2003).

Construct validity comprises two aspects: convergent and discriminant validity. Both need to be established to prove construct validity (Dane, 2018). Convergent validity measures the extent to which observed variables correlate, as theoretically suggested, while divergent (or discriminant) validity measures the extent to which observed variables do not correlate (Dane, 2018). Discriminant validity has been interpreted by researchers as falling into two broad categories – the instrument either (i) measures the construct it is supposed to measure, but not any other construct, or (ii) indicates that the constructs are empirically distinguishable from each other (Rönkkö & Cho, 2020). This study employed Rönkkö and Cho's (2020, p. 6) generalisable definition of discriminant validity as follows: "...two measures intended to measure distinct constructs have discriminant validity if the absolute value of the correlation between the measures after correcting for measurement error is low enough for the measures to be regarded as measuring distinct constructs".

Convergent and discriminant validity are evident when assessing the correlation of items against the constructs they seek to measure (convergent) and not other constructs (discriminant) that the item should not be measuring, with correlations of at least 0.30 considered appropriate when assessing convergent validity (Beavers et al., 2013). In analysing Table 55 in Appendix III, it is apparent that the constructs display a high degree of convergent and discriminant validity, as the items show the highest correlations within their own subconstruct or construct relative to other constructs. Based on the correlation matrix in Table 55, the constructs all load as distinct constructs and load better against their own construct or subconstruct. The

relationships between the items in each subconstruct were also tested up to the total of the related items and the relationships were found to be significant with a p value < 0.05 and reflecting high intercorrelations (above 0.70), thus demonstrating convergent validity (Table 7).

On the basis of the testing, there was strong evidence of convergent and discriminant validity for all the constructs in the study. While there were a few items within MCF (managerial cognitive frame flexibility) that were below 0.70, the relationships were all significant and correlations were well above 0.50 and therefore did not compromise the assessment of convergent validity (Carlson & Herdman, 2012).

Table 7: Summary of significance and correlation within subconstructs

Construct	Subconstruct	P < 0.05	Correlation range	Outcome
MCF	Awareness	Yes	0.68 – 0.72	Valid
	Willingness	Yes	0.59 – 0.77	Valid
	Self efficacy	Yes	0.66 – 0.76	Valid
MRP	Job	Yes	0.75 – 0.83	Valid
	Career	Yes	0.75 – 0.84	Valid
	Innovate	Yes	0.83 – 0.89	Valid
	Team	Yes	0.81 – 0.84	Valid
	Firm	Yes	0.76 – 0.87	Valid
MA	Exploit	Yes	0.81 – 0.84	Valid
	Explore	Yes	0.78 – 0.84	Valid

Source: Author's analysis, SPSS. Note that market dynamism (MD) is a single question construct and therefore inter-construct is not relevant. Note, too, that the Awareness subconstruct now excludes MCF2 and the Career subconstruct excludes Career4.

4.6.2.2. Reliability

The reliability of a measure is evident when the measure is stable, demonstrating “consistency of a measure of a concept” (Bell et al., 2019). The reliability of the various scales used to operationalise the variables of the study were assessed for internal reliability (internal consistency of items that make up the scale).

One of the most widely accepted tests for internal consistency is the Cronbach's coefficient alpha test (Creswell & Creswell, 2018; DeVellis, 2003; Kline, 2005). The internal reliability of each construct is assessed against an acceptable Cronbach's alpha value, which is discussed below (including indicator loadings > 0.50). While a value of 0.70 is generally considered a sufficiently strong value (Hair et al., 2010), values as low as above 0.50 are considered acceptable in research, with George and Mallery (2003, p. 231) providing a tiered assessment as follows: “≥ .9 – Excellent, ≥ .8 – Good, ≥ .7 – Acceptable, ≥ .6 – Questionable, ≥ .5 – Poor, and ≤ .5 – Unacceptable”.

While Cronbach's alpha seeks to determine how well a set of questions are “grouped together”, it does not determine if items analysed consist of a single dimension or multiple dimensions. Therefore, Cronbach's alpha tests were conducted for each dimension where there were multiple dimensions to a scale.

Based on the testing, there was strong evidence of internal reliability of the constructs in the study. As outlined in Table 8, the Cronbach's alpha was considered acceptable for each of the dimensions of the scales used to measure the constructs in this study. Through the testing of the Cronbach's alpha for each of the dimensions, two items were eliminated that had a positive impact on the Cronbach's alpha. They were: (i) item MCF2 under the Awareness of options subconstruct, which had the effect of increasing the Cronbach's alpha from 0.632 to 0.636; and (ii) item Career4 under the Career subconstruct, which had the effect of increasing the Cronbach's alpha from 0.823 to 0.834.

Table 8: Summarised reliability statistics (Cronbach's alpha)

Scale	Sample size	Number of items prior to Cronbach's alpha test	Number of items post Cronbach's alpha test	Cronbach's alpha	Decision
MCF (managerial cognitive frame flexibility)	203	12	11		
Awareness of options	203	4	3	0.636	Proceed
Willingness to be flexible	203	4	4	0.594	Proceed
Self-efficacy in flexibility	203	4	4	0.647	Proceed
MA (managerial ambidexterity)	203	8	8		
Exploitation	203	4	4	0.841	Proceed
Exploration	203	4	4	0.834	Proceed
MRP (managerial role performance)	203	20	19		
Job	203	4	4	0.802	Proceed
Career	203	4	3	0.834	Proceed
Innovate	203	4	4	0.883	Proceed
Team	203	4	4	0.833	Proceed
Firm	203	4	4	0.851	Proceed

Source: Author's analysis.

Note: The Cronbach's alpha for search effort loaded higher with four out of five items.

4.6.3. Factor analysis

Factor analysis is used to identify smaller groups or factors from larger groups of continuous variables, accounting for most of the variance in the original set of observed variables (Blaikie, 2003; Hair et al., 2010). Factor analysis is sensitive to outliers (Pallant, 2011), and the explore function of SPSS was used to assess normality and determine if any significant outliers were present in the results before conducting factor

analysis. This is detailed in Chapter Four. No problematic outliers were identified when comparing the mean with the trimmed mean (Pallant, 2011) and the box plots also revealed limited instances of outliers. The sample size was considered adequate for factor analysis. This is discussed in greater detail in section 4.4.3.2.

The correlation matrix, Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were used to test whether the data was suitable for factor analysis (Pallant, 2011). A correlation matrix was used to identify which variables had very low or high correlation coefficients (Blaikie, 2003) and is shown in Table 55. The correlation data for each of the constructs revealed high intercorrelations, suggesting that the data was suitable for factor analysis (Beavers et al., 2013). A summary of the correlation ranges is shown in Table 7. The KMO test for sampling adequacy is a measure of shared variance in the items and a value of at least 0.50 was necessary to proceed, while Bartlett's test of sphericity was used to test significance for rejecting the null hypothesis, which confirms that linear relationships do exist (Beavers et al., 2013).

As the questionnaire was constructed from known scales from the literature, confirmatory factor analysis (CFA) was the preferred approach to assess convergent validity (Hair et al., 2010). That said, sample size is a material limitation of the CFA approach. In contrast, exploratory factor analysis (EFA) can provide robust outcomes (Beavers et al., 2013). To counter the shortcomings associated with the subjectivity of methodological choices and the iterative nature of refining solutions for EFA, Beavers et al. (2013) posit that the interpretation of results in light of the theory, conceptual foundation and sound justification for the methodological choices mitigates these shortcomings. The sample size in the study, the interpretation of the factor analysis in relation to the original scales, and the context of the study and theoretical basis made the EFA approach suitable for this study. The EFA explored the interrelationships within each of the constructs and made use of the principal component analysis (PCA) method (Blaikie, 2003), using the dimension-reduction procedure in SPSS.

Based on the acceptable values for the KMO measure and the significance level for the Bartlett's test, the results indicated that it was appropriate to use a factor-reduction technique on the data for all the study constructs. The KMO measure of sampling adequacy reflected scores of 0.59 and above (Table 9). A reading above 0.50 is considered acceptable (Hair et al., 2010; Kaiser, 1974), and therefore no remedial action was necessary in terms of the sample size.

Most of the KMO scores were between 0.70 and 0.80, with Hair et al. (2010) classifying a score between 0.70 and 0.80 as good and Kaiser (1974) considering similar values as middling. Only three values were between 0.59 and 0.65 and these would be considered miserable to mediocre (Kaiser, 1974) or mediocre (Hair et al., 2010). The Bartlett's test of sphericity revealed a significance level of less than 0.05, which made the dataset suitable for factor analysis (Hair et al., 2010).

Table 9: Summary of KMO and Bartlett's tests

	Awareness	Willingness	Self_efficacy	Exploit	Explore	Job	Career	Innovate	Team	Firm
KMO	.64	.59	.65	.79	.79	.75	.72	.80	.76	.78
Bartlett's test (sig. value)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Suitable for factor analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author's analysis, SPSS

Assessing components on the basis of Eigenvalues greater than 1 allows for the major components to be extracted and for multiple items to be reduced to a single factor or component. This exercise is outlined in Table 10 and maps out each of the item groups from the survey to the subconstruct or factor used to measure this grouping. The constructs (with the exception of Willingness) all loaded as having a single component that was suitable for factor analysis.

Table 10: Summary of principal component analysis

Construct	Awareness	Willingness**	Self_efficacy	Exploit	Explore	Job	Career	Innovate	Team	Firm
Cumulative variance explained %*	58.08	72.50	48.81	67.90	66.83	63.41	75.18	74.20	66.99	69.50
Components*	1	2	1	1	1	1	1	1	1	1
Eigenvalues >1	1.74	1.83 and	1.95	2.72	2.67	2.54	2.26	2.97	2.68	2.78

	1.07									
Suitable for factor analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author's analysis, SPSS

*Where Eigenvalue > 1

** Willingness has two distinct components, namely Willingness_choices (for MCF5 and MCF6) and Willingness_solutions (for MCF7 and MCF8). Although there is a distinction, both measures willingness to be flexible and has been retained as a single component.

It should be noted that there were two Eigenvalues greater than 1 for the questions MCF5 to MCF8. Furthermore, despite a nuance in the nature of the questions MCF5 and MCF6, which focused on willingness related to choices, and questions MCF7 and MCF8, which focused on willingness related to solutions, respectively, both related to the respondent's willingness to be flexible. Therefore, these four items were kept under the subconstruct Willingness as a single factor or component in the analysis (Table 11).

Table 11: Rotated component matrix (Willingness)

Rotated component matrix ^a	Component	
	1	2
MCF5	-.026	.882
MCF6	.283	.777
MCF7	.833	.120
MCF8	.850	.092

Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalisation

a. Rotation converged in three iterations

Source: Author's analysis, SPSS

The study tested direct and indirect relationships between the predictor and moderator variables and the dependent variable. The predictor construct, managerial cognitive frame flexibility (MCF), was separated into three distinct components (Awareness, Willingness and Self-efficacy) which were the independent variables for testing the hypotheses. Similarly, the moderator, managerial ambidexterity, was separated into two distinct components (exploit and explore) while the second moderator, market dynamism, was a single component in this study. These components were the variables that were tested in the hypotheses.

Managerial role performance (MRP) was the dependent variable and one item was removed so that the original scale of 20 measures was reduced to 19 items across five dimensions.

From an analysis of Table 12 below it is apparent that no single item had a material impact on the scale mean, scale variance or the Cronbach's alpha. The "Corrected item – total correlation" column refers to how the individual items correlated with the total score for the construct, MRP, with the items in this scale being in a narrow range of 0.61 to 0.66.

Table 12: Managerial role performance item - Total statistics

Item-total statistics

	Scale mean if item deleted	Scale variance if item deleted	Corrected item – total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
Job	16.47	5.02	.61	.40	.80
Career	16.74	4.41	.61	.41	.80
Innovate	16.56	4.53	.65	.43	.78
Team	16.32	4.96	.66	.52	.78
Firm	16.17	5.04	.61	.46	.80

Source: Author's analysis, SPSS

4.7. Hypotheses and Statistical Testing

The statistical tests for the hypotheses in this study were based on a number of assumptions, which are summarised in Table 13 and Table 14 for the respective hypothesis tests. The approach is set out per hypothesis, with the analytical technique assumptions discussed within each hypothesis. It concludes with an assessment of the suitability of the dataset for the statistical test intended to be conducted for each hypothesis. The comments relating to the normality assumptions and outliers have been included under the respective sections in Chapter Four.

Type I and type II errors in hypothesis testing

When testing a hypothesis, there is a risk that a researcher will reject a hypothesis that is actually true (type I error). This is also known as a false-positive, as the researcher rejects the true null hypothesis. Similarly, a researcher may fail to reject a hypothesis

that is actually false (type II error). This is also known as a false-negative, as the researcher fails to reject the false null hypothesis (Gavin, 2008).

Therefore, a type I error equals the significance level (alpha) set for the hypothesis test, which for the purposes of this study was set at 0.05 (or a 5% probability that the null hypothesis would be rejected). A type II error in the sample may be evidenced through an insignificant test result, while there is in fact the existence of the effect in the population. This risk is higher when the sample size is small or not sufficiently representative of the population and also increases as a type I error decreases. As noted in the discussion on sample size, as well as the descriptive statistics in Chapter Five, the sample size or the representation of the population does not appear to pose an elevated risk.

Hypothesis 1 (H1): Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable) (Aggarwal et al., 2017; Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Raffaelli et al., 2019; Welbourne et al., 1998). The hypothesis test entailed conducting a multiple regression analysis to predict an outcome from the predictor variable (Howell, 2008). Managerial cognitive frame flexibility had three subconstructs (Awareness, Willingness and Self-efficacy), which were tested as the independent or predictor variables, with managerial role performance as the dependent or outcome variable in the relationship tested. As the outcome variable had five dimensions, the researcher tested the relationship between the predictor variables and each of the dependent variable subconstructs (Job, Career, Innovate, Team and Firm). The results are set out in Chapter Five.

Assumption tests for multiple regression

Before one can rely on the findings from a multiple regression analysis, the data has to be tested to confirm that the assumptions underpinning the technique were not violated and therefore that the multiple regression produced a valid result.

Aside from the criteria for the variable data type, which have already been set out in Table 13, the following assumptions were tested: (a) there was independence of observations; (b) there was a linear relationship between the Awareness, Willingness and Self-efficacy (independent variables) and managerial role performance (dependent variable); (c) there was homoscedasticity of data for all the independent variables (Awareness, Willingness and Self-efficacy); (d) the data was free of multicollinearity;

(e) there were no significant outliers in the data; and (f) residuals (errors) were approximately normally distributed (Howell, 2008; Hair et al., 2010).

Table 13: Summary of hypothesis and analytical test

Hypothesis	Analytical technique	Rationale
H1: Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)	Multiple regression. This technique is used to test the relationship between two or more independent variables and an outcome variable.	<p>Type of data: Quantitative – continuous data variables (interval data).</p> <p>Number of sample groups: 8</p> <p>Purpose of test: To establish whether a relationship exists between two or more variables.</p>

Source: Author's compilation

Based on the tests for the assumptions underpinning multiple regression, the dataset was well suited to the multiple regression analysis used to test the hypothesis. The detailed outcomes of the tests are set out below:

- (a) There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.02. The Durbin-Watson statistic can range from 0 to 4, with a value of approximately 2 indicating that there is no correlation between observations (Hu & Bentler, 1999).

Linearity in a multiple regression was tested in two parts (Hair et al., 2010; Zikmund et al., 2012), namely: (i) if a linear relationship existed between the five subconstructs of MRP (Job, Career, Innovate, Team and Firm) and the predictor variables collectively (Awareness, Willingness and Self_efficacy), which was demonstrated in the scatterplot of the studentised residuals against the (unstandardised) predicted values; and (ii) if a linear relationship existed between each of the dimensions of MRP (Job, Career, Innovate, Team and Firm) and Awareness, Willingness and Self_efficacy individually, using partial regression plots between these variables. In assessing these charts, a similar “level of scatter” across values indicated that the data points were approximately the same distance from the line. This was evident for Awareness, Willingness and Self_efficacy and therefore demonstrated an approximate linear relationship.

- (b) The data did not show multicollinearity. Multicollinearity occurs when two or more predictor or moderator variables are highly correlated with each other. This may lead to difficulties in assessing which variables contribute to the variance explained in the outcome variable (Hair et al., 2010; Zikmund et al., 2012). Multicollinearity is assessed through correlation coefficients as well as through an assessment of the VIF value. Through inspection of the correlation coefficients, none of the independent variables had correlations with each other above 0.70 (Hair et al., 2010) and therefore did not display a high level of correlation with other independent variables. The intercorrelations between Awareness, Willingness and Self_efficacy were within a range of 0.368 and 0.404. In addition, a VIF value greater than 10 may indicate a collinearity problem, with a value < 3 considered acceptable (Hair et al., 2010). In this study, the VIF values were all less than 3 (Awareness: 1.30; Willingness: 1.28; Self_efficacy: 1.26) and therefore it was unlikely that there would be a problem with multicollinearity.
- (c) Homoscedasticity was assessed through the visual inspection of a plot of studentised residuals versus unstandardised predicted values. The assumption of homoscedasticity is that the residuals are equal for all values of the predicted dependent variable (i.e., the variances along the line of best fit remain similar as one moves along the line). This was the case for Awareness, Willingness and Self_efficacy and therefore a relatively even distribution of values around the best fit line was indicative of homoscedasticity.
- (d) There were no outliers, leverage or highly influential points of concern, which has been discussed earlier in this chapter.
- (e) The residuals are normally distributed as evidenced through inspection of the Normal P-P plot.

Hypothesis 2a (H2a): Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance (Gibson & Birkinshaw, 2004; Kiss et al., 2020; Papachroni et al., 2016).

Hypothesis 2b (H2b): Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance (Fainshmidt et al., 2019).

The hypotheses (H2a and H2b) were tested using moderated multiple regression analysis, which is a technique used to determine whether the relationship between two variables is moderated by a third variable (Howell, 2008). Prior to testing the interactions, the predictor and moderator variables were centred to mitigate multicollinearity issues (Hair et al., 2010; Zikmund et al., 2012). The centred variables were computed by subtracting a constant, which is the mean for the variable from the value. This process of centring the variables is important when assessing group or interaction effects and mitigating collinearity issues (Hair et al., 2010; Zikmund et al., 2012).

Moderating variables

A moderating variable affects the direction and/or the strength of a relationship between a predictor (or independent) and outcome (or dependent) variable. Ideally, a moderator variable should be uncorrelated with both the predictor (or independent) variable and the outcome (or dependent variable) (Baron & Kenny, 1986; Creswell & Creswell, 2018). Moderating variables are themselves predictor variables and can be insightful when identifying potential boundary conditions (Creswell & Creswell, 2018). In this study, the moderating variables were (i) managerial ambidexterity and (ii) market dynamism. Both of these were tested for a moderating effect on the relationship between managerial cognitive frame flexibility and managerial role performance (tested as H2a and H2b).

Assumption tests for moderated multiple regression

Before the findings from a moderated multiple regression analysis can be relied upon, the data has to be tested to confirm that the assumptions that underpinned the technique were not violated and therefore that the moderated multiple regression produced a valid result. Aside from the criteria for the variable data type, which were met in Table 14, the following assumptions were tested: (a) there was independence of observations; (b) there was a linear relationship between the dependent variable and the moderator variable; (c) there was homoscedasticity of data for all combinations of the independent and moderator variables; (d) data was free of multicollinearity; (e) there were no significant outliers in the data; and (f) residuals (errors) were approximately normally distributed (Howell, 2008; Hair et al., 2010).

Table 14: Summary of hypotheses and analytical test

Hypothesis	Analytical technique	Rationale
<p>H2a: Organisational ambidexterity is a moderating variable of the relationship between managerial cognitive frame flexibility and managerial role performance</p> <p>H2b: Market dynamism is a moderating variable of the relationship between managerial cognitive frame flexibility and managerial role performance</p>	<p>Moderated multiple regression. This technique is used to test the impact of a third variable on a relationship between a continuous outcome variable, when there is a continuous predictor variable, and either (a) a dichotomous moderator variable; (b) a polytomous moderator variable; or (c) a continuous moderator variable. In this case, the variables were all continuous.</p>	<p>Type of data: Quantitative – continuous data variables (interval data).</p> <p>Number of sample groups: 11</p> <p>Purpose of test: To establish whether a relationship between two variables is influenced by the value of a third variable.</p>

Source: Author's compilation

Based on the tests for the assumptions that underpinned the moderated multiple regression, the dataset was well suited to the statistical analysis technique used to test hypotheses H2a and H2b.

The detailed outcomes from the tests were as follows:

- (a) There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.07. The Durbin-Watson statistic can range from 0 to 4, with a value of approximately 2 indicating that there is no correlation between residuals. The hypothesis test value was very close to 2, and therefore independence of errors (residuals) was accepted.
- (b) There was a linear relationship between Awareness, Willingness, Self_efficacy, Exploit, Explore and MarketDynamism individually and collectively to the dimensions of MRP, namely Job, Career, Innovate, Team and Firm. Linearity in a multiple regression was tested in two parts (Hair et al., 2010; Zikmund et al., 2012), namely: (a) if a linear relationship existed between the outcome and predictor variables collectively, which was demonstrated in the scatterplot of the

studentised residuals against the (unstandardised) predicted values; and (b) if a linear relationship existed between the outcome variable and each of the predictor or moderator variables, using partial regression plots between these variables. A similar “level of scatter” across values indicated that the data points were approximately the same distance from the line. In addition, based on the scatter plot, the predictor and moderator variables demonstrated an approximate linear relationship.

The data did not display multicollinearity. Through inspection of the correlation coefficients, none of the independent variables had correlations with each other above 0.70 and therefore did not display a high level of correlation with other independent variables. In addition, a VIF value greater than 10 may indicate a collinearity problem, with a value < 3 considered acceptable (Hair et al., 2010). In this study, the VIF values were all less than 3 and therefore multicollinearity was not a concern.

- (c) Homoscedasticity was assessed through visual inspection of the plots, which displayed relatively similar variances along the line of best fit as one moved along the line. A relatively even distribution of values around a best fit line from a plot of studentised residuals versus unstandardised predicted values indicates homoscedasticity. This was the case for the predictor variables, Awareness, Willingness, Self_efficacy, Exploit, Explore and MarketDynamism.
- (d) As has been discussed earlier in the chapter, there were no outliers, leverage or highly influential points of concern.
- (e) The residuals were normally distributed, as evidenced through an inspection of the Normal P-P plot.

4.8. Replicability

Replicability is the extent to which a study can be repeated, with the researcher providing sufficient information to clearly define and describe the process that makes such replication possible (Bell et al., 2019). This study, while set in a South African context, was not unique to this setting and the procedures used were sufficiently detailed to allow for a replication study in other contexts.

4.9. Generalisability

In quantitative research, the researcher looked for results that can be generalised beyond the context in which the research was conducted (Bell et al., 2019). The population in this study was skewed towards senior managers of South African businesses, which were classified as medium to larger enterprises (Eisenhardt, 1989; Yin, 2013). The results can be generalised more broadly than a South African context for larger firms where markets display social and business parallels to the South African context.

That said, Laaksonen and Peltoniemi (2018) articulate the firm-specific nature of the dynamic capabilities construct. Therefore, the relevance of the theory and the need for empirical testing at a manager level within the context of their respective firms was an important contribution of this research (Eisenhardt & Graebner, 2007; Ridder, 2017; Yin, 2013). Dynamic capabilities are unique to each firm. Therefore, the research was instructive of the functioning of this theory in a real world scenario and can also be generalised back to conceptual theory (Colquitt & Zapata-Phelan, 2007). In addition, the study tested a number of boundary conditions of the relationship between managerial cognitive frame flexibility and managerial performance, with managerial ambidexterity and market dynamism as the moderators of this relationship (Colquitt & Zapata-Phelan, 2007).

4.10. Research Ethics

Ethical clearance was obtained prior to the start of any research instrument data-collection processes. A pilot study was conducted with a sample of the target population and minor amendments were made to the survey to improve clarity for users. No minors were part of the sample and participants had the opportunity to ignore the request. Those who wished to participate had to explicitly opt into the survey, after salient information was communicated to participants in acknowledgement of their informed consent (see Appendix III). The data collection form was standardised, with all participants accessing the same research instrument. Anonymity of information was maintained, with conclusions drawn from aggregated data within the datasets.

4.11. Research Limitations

The first limitation was the use of non-probability convenience sampling, which cannot result in a representative sample of the population. The sample in this study may

therefore have exhibited a random sampling error, skewing the test results (Zikmund et al., 2012). As such, the findings offered greater generalisation to theory, rather than statistical generalisation (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Ridder, 2017).

Secondly, the cross-sectional nature of the study limited the results to a specific point in time and did not consider changes over time, thereby inhibiting causal inference (Marini & Singer, 1988). Although respondents may have been asked to provide commentary or feedback on prior periods, one has to be bear in mind that this was a highly subjective exercise and managers' own cognition evolves over time.

Thirdly, common method variance (CMV) was assessed due to the single survey instrument used to collect all data. From the Harman one-factor test, CMV was found to not be a potential limitation of this study. Finally, one of the moderators (market dynamism) was assessed through a single question in the research instrument, which may have been a limitation in the measurement of the construct. Appropriately contextualising the firm's strategy in relation to its respective market conditions may have led to a better understanding of the boundary conditions for market dynamism as a moderator.

5. RESEARCH RESULTS

5.1. Introduction

The primary aim of this study was to determine whether a relationship existed between managerial cognitive frame flexibility (MCF) and managerial role performance (MRP) and thereafter to establish whether and to what extent the other constructs, managerial ambidexterity (MA) and market dynamism (MD), influenced the primary relationship. This chapter begins by setting out the sample size, suitability of the dataset and demographic data of the sample. Thereafter, to provide context, descriptive statistics are discussed and the inferential statistical analysis conducted to test the research hypotheses. The suitability of the dataset for the appropriate statistical analysis to test the hypotheses is assessed in Chapter Four.

5.2. Suitability of Sample Size

There were 203 respondents who participated in the survey. A detailed discussion on sample size is provided in Chapter Four. In summary, the absolute size of the sample achieved was above the minimum size considered acceptable for meaningful statistical analysis and factor analysis, and compared favourably with similar global studies (Barrales-Molina et al., 2010; Kiss et al., 2020; Lubatkin et al., 2006).

5.3. Survey Demographics and Descriptive Statistics

The sample had most respondents in the age groups: 41–50 (44.83%), 31–40 (32.51%) and thereafter 51–60 (16.26%). There was a much smaller proportion of the sample in the 60+ age group (1.97%) and the 20–30 age group (4.43%). Therefore, the overall mix of age groups in the sample was considered appropriate for the target population. The respondents were well experienced and represented a relatively senior component of the sample population, with 92.61% of the sample with at least 10 years of working experience who identified themselves as middle, senior or executive level management. The respondents also displayed a relatively even mix of tenure at the current employer.

The sample comprised 90.15% in full-time employment and a further 7.88% as consultants, with the remaining component being part-time, retired or unemployed. The sample comprised 67.98% male and 32.02% female respondents, and was thus skewed towards male respondents. This distribution was consistent with a 2018 Grant

Thornton survey on leadership, which showed 29% of senior management roles were occupied by females in South Africa (Grant Thornton, 2018).

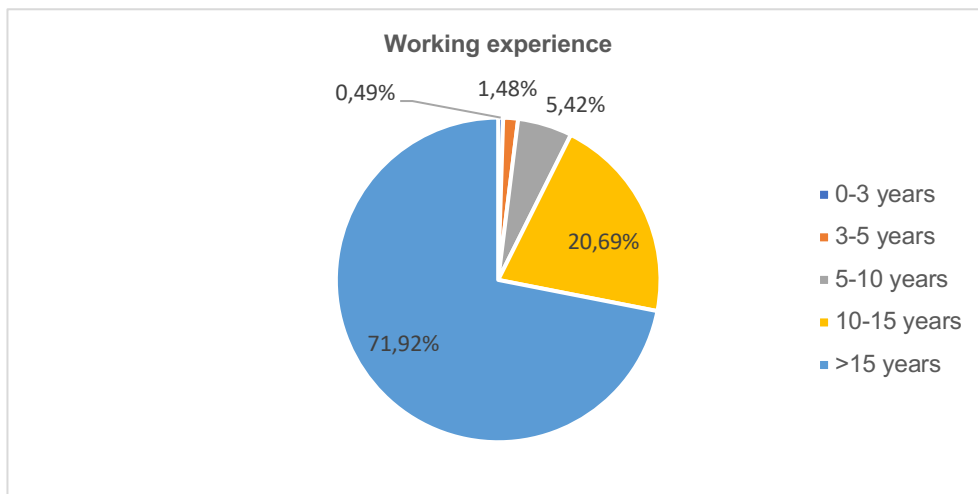


Figure 4: Working experience of respondents

Source: Author's analysis

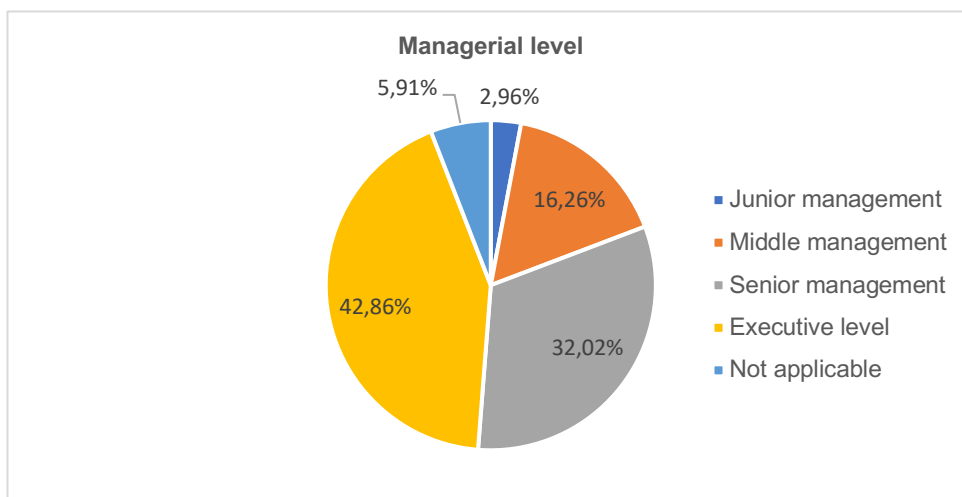


Figure 5: Managerial level of respondents

Source: Author's analysis

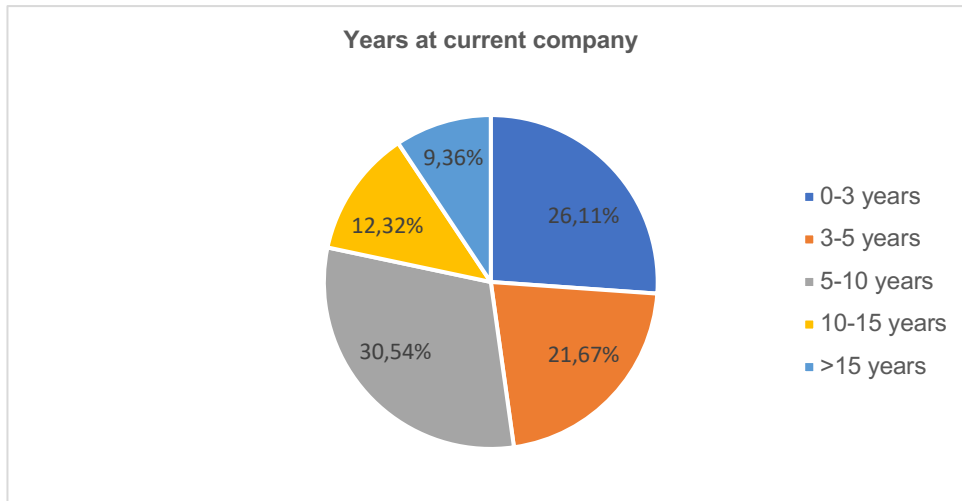


Figure 6: Tenure of respondents at current employer

Source: Author's analysis

The respondents were predominantly from firms that generated most of their revenues in South Africa (78.82%), with the vast majority of respondents (88.67%) also indicating that they believed their firms were in industries undergoing change, either rapid change (49.26%) or incremental change (39.41%). Respondents were also predominantly from larger firms, with 67.98% from firms with over 250 employees and a further 12.81% from firms with between 50 and 249 employees.

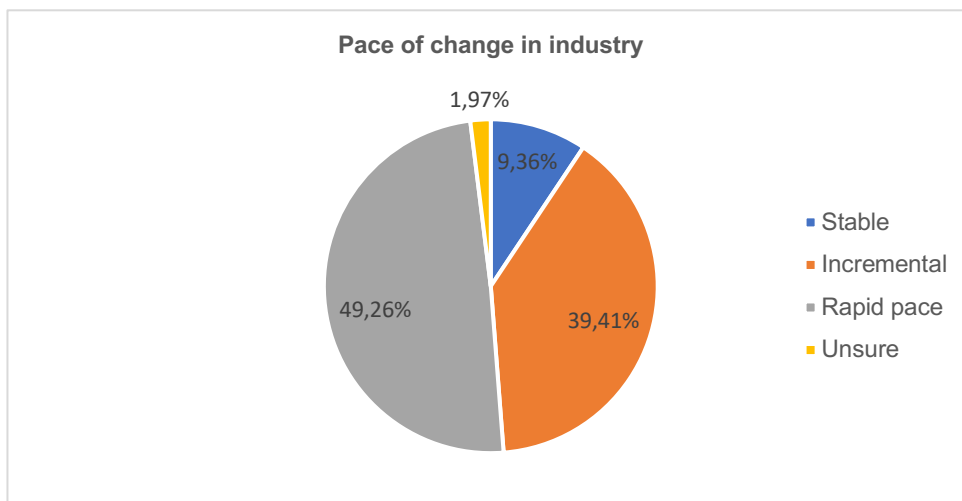


Figure 7: Level of industry dynamism of respondents' firms

Source: Author's analysis

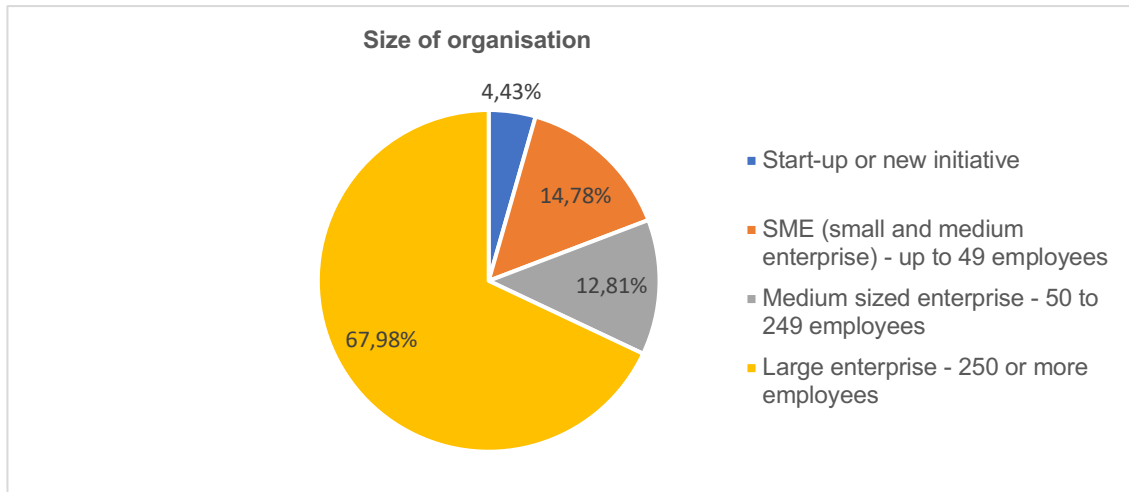


Figure 8: Size of respondents' firm

Source: Author's analysis

The industries represented by the sample were classified into 12 sub-categories, based on the participation from the following sectors: financials (64.53%), information technology (5.42%), communication services (2.96%), consumer discretionary (2.96%) and healthcare (2.46%). Using these industry participation rates as a proxy for the tertiary or services sector weighting of the sample, this exposure was assessed to be at least 78.33%. There was a further 8.37% of the sample not classified into one of the 12 sub-categories and a portion of this may also have been service related. While the sample was heavily weighted towards the financial sector, the tertiary sector participation spread across a number of industries was 78.33%. Therefore, the sample was relevant for generalisation to South Africa's services sectors.

The demographic of the sample population was also reflective of South African businesses by gender and firm size, although the manager profile was skewed towards more senior managers and therefore the analysis may have been more reflective of the views of senior leaders at larger firms, rather than all managers. The sample was skewed towards the services sector, which was therefore a consideration when assessing the generalisability of the findings.

Constructs and subconstructs

The constructs and subconstructs used in this study followed the notation set out in Table 15 below. Market dynamism was one of the moderators of the study and was the only construct assessed through a single question in the research instrument. All of the other constructs were assessed through multiple item scales.

Table 15: Abbreviations used for constructs and subconstructs

Description	Abbreviation	Nature of variable
Managerial cognitive frame flexibility	MCF	Predictor variable (primary factor or construct)
Awareness of options	Awareness	Subconstruct of MCF
Willingness to be flexible	Willingness	Subconstruct of MCF
Self-efficacy in flexibility	Self_efficacy	Subconstruct of MCF
Managerial role performance	MRP	Outcome variable (primary factor or construct)
Job	Job	Subconstruct of MRP
Career	Career	Subconstruct of MRP
Innovate	Innovate	Subconstruct of MRP
Team	Team	Subconstruct of MRP
Firm	Firm	Subconstruct of MRP
Managerial ambidexterity	MA	Moderator variable (primary factor or construct)
Exploit	Exploit	Subconstruct of MA
Explore	Explore	Subconstruct of MA
Market dynamism	MD	Moderator variable (primary factor or construct) – single question construct

Source: Author's analysis

The data preparation included an assessment of normality, outliers and whether the data was suitable for the intended statistical tests that underpinned the hypotheses. This analysis, as well as the testing of validity, reliability and factor analysis for each of the constructs used in this study, are also set out in Chapter Four. A brief description of all the constructs and how they map to the second order constructs is set out in Table 16.

Table 16: Descriptive statistic results (constructs)

Construct		N	Min	Max	Mean	Trimmed mean	Std. Dev.
1 st order	2 nd order						
Awareness	MCF	203	3.00	6.00	5.21	5.25	0.65
Willingness		203	2.75	6.00	5.39	5.42	0.48
Self_efficacy		203	3.25	6.00	5.02	5.04	0.58
Job	MRP	203	2.00	5.00	4.09	4.13	0.64
Career		203	1.00	5.00	3.82	3.87	0.82
Innovate		203	1.25	5.00	4.01	4.06	0.75
Team		203	1.25	5.00	4.25	4.29	0.62
Firm		203	1.25	5.00	4.40	4.45	0.63
Exploit	MA	203	1.00	7.00	5.13	5.20	1.14
Explore		203	1.75	7.00	4.95	4.99	1.33
MarketDyna mism	MD	203	0.00	3.00	2.36	2.42	0.73

Source: SPSS, Author's analysis. Multiple dimensions within constructs denoted as 1st order constructs. MD assessed through four options for market dynamism: 0 = not sure; 1 = stable; 2 = incremental change and 3 = rapid change.

5.4. Hypothesis Testing

The following section considers the research hypotheses, statistically analysing the study results of the constructs and the relationships hypothesised. Key assumptions for

the statistical tests were tested as a precursor to each of the statistical tests that was relevant for the hypotheses tested.

The first objective of this study was to confirm the existence of a linear relationship between managerial cognitive frame flexibility and managerial role performance (Hypothesis 1).

- **Hypothesis 1 (H1):** *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)*

The second objective was focused on the understanding of the conditions or factors that would affect the strength of the primary objective relationship. The role of managerial ambidexterity and market dynamism was examined in relation to the first objective and these relationships are set out as separate hypotheses below.

- **Hypothesis 2a (H2a):** *Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance*
- **Hypothesis 2b (H2b):** *Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance*

5.4.1. Hypothesis 1

Hypothesis 1 (H1): *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)*

A multiple regression was run to understand the effect of managerial cognitive frame flexibility (tested through the three subconstructs as separate predictors) on managerial role performance (tested through five subconstructs as separate outcomes). The coefficient of determination (more commonly referred to as R^2) is a measure of the proportion of variance in the dependent variable that is explained by the independent variable (Hair et al., 2010; Zikmund et al., 2012). In other words, it is the proportion of variance in the dependent variable that is explained by the independent variables over and above the mean model (Hair et al., 2010; Zikmund et al., 2012).

The models for each of the five dimensions of managerial role performance were significant. Adjusted R^2 for each of the five dimensions revealed a moderate to

substantial effect, according to Cohen (1988). Cohen (1988) suggested that R^2 values for endogenous latent variables are assessed as follows: 0.26 (substantial), 0.13 (moderate), 0.02 (weak). An R^2 as low as 10% is acceptable for studies in the fields of arts, humanities and social sciences because human behaviour cannot be accurately predicted (Cohen, 1988). Therefore, a low R^2 is often not a problem in studies in the arts, humanities and social science fields, whereas the statistical significance is crucial.

The multiple regression established that managerial cognitive frame flexibility could statistically predict managerial role performance with significance (Table 17 and Table 19). The multiple regression models statistically significantly predicted each of the subconstructs of the managerial role performance (Job, Career, Innovate, Team and Firm). Awareness and Self-efficacy are the major contributors to the variation in the subconstructs of managerial role performance (Job, Career, Innovate, Team and Firm) and according to Cohen (1988) account for a moderate to substantial effect. Willingness was neither significant nor a major contributor to the variation in the subconstructs of managerial role performance, with the exception of Team. The factors that accounted for most of the variation in the dependent variable are set out in Table 18 under the “Correlations part.” heading and reflect the unique impact of these independent variables on the dependent variable.

The summary of the multiple regression model for each subconstruct is set out under discussions for each subconstruct of managerial role performance as well as the ANOVA which confirms that the model was a good fit for the data. The ANOVA assesses whether the regression model results in a statistically better prediction of the dependent variable than if one applied the mean of the dependent variable.

The findings from the multiple regressions were valid as the models were a good fit for the data and the assumptions underpinning the statistical technique were not violated. **Based on the tests conducted, the researcher failed to reject Hypothesis 1.**

Table 17: Reporting of multiple regression models

Model	Description	Reporting	VIF range
1	Job	F(3, 199) = 8.13, p < .001, adj. R ² = .10	1.26 – 1.30
2	Career	F(3,199) = 18.62, p < .001, adj. R ² = .21	1.26 – 1.30
3	Innovate	F(3,199) = 21.54, p < .001, adj. R ² = .23	1.26 – 1.30
4	Team	F(3,199) = 16.39, p < .001, adj. R ² = .19	1.26 – 1.30
5	Firm	F(3,199) = 15.48, p < .001, adj. R ² = .19	1.26 – 1.30

Source: SPSS, Author's analysis

Table 18: Summary of multiple regression models for subconstructs of MRP

DV	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Correlations part.			Durbin-Watson
					Awareness	Willingness	Self_efficacy	
Job	.10	.61	8.13	.000	.19*	.01	.16*	2.06
Career	.21	.73	18.62	.000	.27*	.03	.21*	2.07
Innovate	.23	.66	21.54	.000	.25*	.00	.28*	1.97
Team	.19	.56	16.39	.000	.16*	.16*	.19*	1.97
Firm	.19	.57	15.48	.000	.20*	.06	.22*	1.99

*p value < 0.05

Source: SPSS, Author's analysis

In summary, linearity was visually assessed by reviewing partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by a Durbin-Watson statistic range between 1.97 and 2.07. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values. There was also no evidence of multicollinearity, which was assessed as VIF values lower than 3 (the values ranged between 1.26 and 1.30). Outliers were assessed and there were no studentised deleted residuals greater than ± 3 standard deviations, no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for each of the dependent variables.

The regression equation predicting managerial role performance is set out below:

$$\begin{aligned} \text{Job} &= b_0 + (b_1 \times \text{Awareness}) + (b_2 \times \text{Willingness}) + (b_3 \times \text{Self_efficacy}), \\ \text{Career} &= b_0 + (b_1 \times \text{Awareness}) + (b_2 \times \text{Willingness}) + (b_3 \times \text{Self_efficacy}), \\ \text{Innovate} &= b_0 + (b_1 \times \text{Awareness}) + (b_2 \times \text{Willingness}) + (b_3 \times \text{Self_efficacy}), \\ \text{Team} &= b_0 + (b_1 \times \text{Awareness}) + (b_2 \times \text{Willingness}) + (b_3 \times \text{Self_efficacy}), \text{ and} \\ \text{Firm} &= b_0 + (b_1 \times \text{Awareness}) + (b_2 \times \text{Willingness}) + (b_3 \times \text{Self_efficacy}), \end{aligned}$$

where b_0 is the intercept (or constant) and b_1 through b_3 is the slope coefficient for each independent variable. By substituting the values for b_0 through b_3 , within a valid range, one is able to predict the impact on each dimension or subconstruct of MRP, given any value one enters for Awareness, Willingness or Self-efficacy.

Dependent variable – subconstruct Job

$$\text{Job} = 1.95 + (0.21 * \text{Awareness}) + (0.01 * \text{Willingness}) + (0.20 * \text{Self_efficacy})$$

The beta coefficient for Awareness was 0.21, with the slope coefficient representing the change in the dependent variable (Job) for a 1.0 unit change in the independent variable (Awareness). Similarly, the beta coefficient for Willingness was 0.01 and for Self_efficacy was 0.20. There was a predicted increase in Job of 0.21, 0.01 and 0.20 for every unit increase in Awareness, Willingness and Self_efficacy, respectively, and applied to all values within the range of values measured in the survey.

It was also possible to define a range of “plausible” values for the slope coefficient. The 95% confidence intervals are reported in the “Lower Bound” and “Upper Bound” columns within the “95% Confidence Interval for B” column. In the case of Job, at the 95% confidence interval (CI) level, the lower and upper bounds for Awareness were 0.06 and 0.36, respectively; the lower and upper bounds for Willingness were -0.19 and 0.21, respectively; and the lower and upper bounds for Self_efficacy were 0.04 and 0.36, respectively. The slope coefficient was statistically significant for Awareness and Self_efficacy, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05.

Table 19: Multiple regression model summary (Job)

Model Summary ^b						
Model	R	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Durbin-Watson
1	.33 ^a	.10	.61	8.13	.000	2.06

a. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

b. Dependent variable: Mean_Job

Source: SPSS, Author's analysis

Table 20: ANOVA table (Job)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.05	3	3.02	8.13	.000 ^b
	Residual	73.81	199	.37		
	Total	82.86	202			

a. Dependent variable: Mean_Job

b. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

Source: SPSS, Author's analysis

From the analysis of the standardised beta coefficients in Table 21, a comparison of the independent variables reveals that Awareness (0.21) and Self-efficacy (0.20) were the strongest drivers of the relationship between managerial cognitive frame flexibility and job performance, with both variables significant, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05. In contrast, Willingness (0.01) made a much lower contribution and was also not significant, evidenced through a p value of 0.92.

The “Correlations part.” column indicates that the largest unique combination and the findings from the standardised beta coefficients were corroborated for both Awareness (.19) and Self_efficacy (.16). As such, Willingness (.01) does not appear to be a material driver of the subconstruct of Job.

Table 21: Coefficients and multicollinearity assessment (Job)

		Coefficients ^a								
		Unstandardised Coefficients		Standardised Coefficients		95.0% Confidence Interval for B		Correlations	Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Part.	VIF
1	(Constant)	1.95	.53		3.65	.000	.90	3.01		
	Mean_Awareness	.21	.08	.21	2.76	.01	.06	.36	.19	1.30
	Mean_Willingness	.01	.10	.01	.10	.92	-.19	.21	.01	1.28
	Mean_Self_efficacy	.20	.08	.18	2.41	.02	.04	.36	.16	1.26

a. Dependent variable: Mean_Job

Source: SPSS, Author's analysis

Dependent variable – subconstruct Career

Career = -0.183 + (0.39 * Awareness) + (0.06 * Willingness) + (0.33 * Self_efficacy)

The beta coefficient for Awareness was 0.39, with the slope coefficient representing the change in the dependent variable (Career) for a 1.0 unit change in the independent variable (Awareness). Similarly, the beta coefficient for Willingness was 0.06 and for Self_efficacy it was 0.33. There was a predicted increase in Career of 0.39, 0.06 and 0.33 for every unit increase in Awareness, Willingness and Self_efficacy, respectively. This applied to all values within the range of values measured in the survey.

It was also possible to define a range of “plausible” values for the slope coefficient. The 95% confidence intervals are reported in the “Lower Bound” and “Upper Bound” columns within the “95% Confidence Interval for B” column. In the case of Career, at the 95% confidence interval (CI) level, the lower and upper bounds for Awareness were 0.21 and 0.57, respectively; the lower and upper bounds for Willingness were -0.18 and 0.30, respectively; and the lower and upper bounds for Self_efficacy were 0.14 and 0.53, respectively. The slope coefficient was statistically significant for Awareness and Self_efficacy, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05 (Table 24).

Table 22: Multiple regression model summary (Career)

Model Summary ^b						
Model	R	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Durbin-Watson
1	.47 ^a	.21	.73	18.62	.000	2.07

a. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

b. Dependent variable: Mean_Career

Source: SPSS, Author's analysis

Table 23: ANOVA table (Career)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.02	3	10.01	18.62	.000 ^b
	Residual	106.94	199	.54		
	Total	136.96	202			

a. Dependent variable: Mean_Career

b. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

Source: SPSS, Author's analysis

From the analysis of the unstandardised beta coefficients in Table 24, a comparison of the independent variables reveals that Awareness (0.39) and Self-efficacy (0.33) were the strongest drivers of the relationship between managerial cognitive frame flexibility and career performance, with both variables significant, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05. In contrast, Willingness (0.06) made a much lower contribution and was also not significant, evidenced through a p value of 0.63. The “Correlations part.” column indicates that the largest unique combination and the findings from the standardised beta coefficients were corroborated for both Awareness (.27) and Self_efficacy (.21). As such, Willingness (.03) does not appear to be a material driver of the subconstruct of Career.

Table 24: Coefficients and multicollinearity assessment (Career)

Model		Coefficients ^a								
		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations	Collinearity Statistics
		B	Std. Error	Beta			Lower Bound	Upper Bound	Part.	VIF
1	(Constant)	-.18	.64		-.28	.78	-1.45	1.09		
	Mean_Awareness	.39	.09	.30	4.26	.00	.21	.57	.27	1.30
	Mean_Willingness	.06	.12	.04	.49	.63	-.18	.30	.03	1.28
	Mean_Self_efficacy	.33	.10	.24	3.35	.00	.14	.53	.21	1.26

a. Dependent variable: Mean_Career

Source: SPSS, Author's analysis

Dependent variable – subconstruct Innovate

Innovate = 0.27 + (0.33 * Awareness) + (0.00 * Willingness) + (0.40 * Self_efficacy)

The beta coefficient for Awareness was 0.33, with the slope coefficient representing the change in the dependent variable (Innovate) for a 1.0 unit change in the independent variable (Awareness). Similarly, the beta coefficient for Willingness was 0.00 and for Self_efficacy it was 0.40. There was a predicted increase in Innovate of 0.33, 0.00 and 0.40 for every unit increase in Awareness, Willingness and Self_efficacy, respectively. This applied to all values within the range of values measured in the survey.

It is also possible to define a range of “plausible” values for the slope coefficient. The 95% confidence intervals are reported in the “Lower Bound” and “Upper Bound” columns within the “95% Confidence Interval for B” column. In the case of H1, at the 95% confidence interval (CI) level, the lower and upper bounds for Awareness were 0.17 and 0.49, respectively, while the lower and upper bounds for Self_efficacy were 0.23 and 0.58, respectively. The slope coefficient was statistically significant for Awareness and Self_efficacy, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05.

Table 25: Multiple regression model summary (Innovate)

Model Summary ^b						
Model	R	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Durbin-Watson
1	.50 ^a	.23	.66	21.54	.000	1.97

a. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

b. Dependent variable: Mean_Innovate

Source: SPSS, Author's analysis

Table 26: ANOVA table (Innovate)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.89	3	9.30	21.54	.000 ^b
	Residual	85.91	199	.43		
	Total	113.81	202			

a. Dependent variable: Mean_Innovate

b. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

Source: SPSS, Author's analysis

From the analysis of the unstandardised beta coefficients in Table 27, a comparison of the independent variables reveals that Awareness (0.33) and Self-efficacy (0.40) were the strongest drivers of the relationship between managerial cognitive frame flexibility and Innovate, with both variables significant, evidenced by interpreting the value in the "Sig." column as a p value < 0.05. In contrast, Willingness (0.00) made a much lower contribution and was also not significant, evidenced through a p value of 0.97.

The "Correlations part." column indicates the largest unique combination and the findings from the standardised beta coefficients were corroborated for both Awareness (0.25) and Self_efficacy (0.28). As such, Willingness (0.00) does not appear to be a material driver of the relationship with the Innovate construct.

Table 27: Coefficients and multicollinearity assessment (Innovate)

Model		Coefficients ^a								
		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations	Collinearity Statistics
		B	Std. Error	Beta			Lower Bound	Upper Bound	Part.	VIF
1	(Constant)	.27	.58		.46	.64	-.87	1.40		
	Mean_Awareness	.33	.08	.28	4.00	.00	.17	.49	.25	1.30
	Mean_Willingness	.00	.11	.00	.03	.97	-.21	.22	.00	1.28
	Mean_Self_efficacy	.40	.09	.31	4.51	.00	.23	.58	.28	1.26

a. Dependent variable: Mean_Innovate

Source: SPSS, Author's analysis

Dependent variable – subconstruct Team

$$\text{Team} = 0.94 + (0.18 * \text{Awareness}) + (0.23 * \text{Willingness}) + (0.23 * \text{Self_efficacy})$$

The beta coefficient for Awareness was 0.18, with the slope coefficient representing the change in the dependent variable (Team) for a 1.0 unit change in the independent variable (Awareness). Similarly, the beta coefficient for Willingness was 0.23 and for Self_efficacy was 0.23. There was a predicted increase in Team of 0.18, 0.23 and 0.23 for every unit increase in Awareness, Willingness and Self_efficacy, respectively. This applied to all values within the range of values measured in the survey.

It is also possible to define a range of “plausible” values for the slope coefficient. The 95% confidence intervals are reported in the “Lower Bound” and “Upper Bound” columns within the “95% Confidence Interval for B” column. In the case of H1, at the 95% confidence interval (CI) level, the lower and upper bounds for Awareness were 0.04 and 0.31, respectively; the lower and upper bounds for Willingness were 0.05 and 0.41, respectively; and the lower and upper bounds for Self_efficacy were 0.08 and 0.38, respectively. The slope coefficient was statistically significant for Awareness, Willingness and Self_efficacy, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05.

Table 28: Multiple regression model summary (Team)

Model Summary ^b						
Model	R	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Durbin-Watson
1	.45 ^a	.19	.56	16.39	.000	1.97

a. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

b. Dependent variable: Mean_Team

Source: SPSS, Author's analysis

Table 29: ANOVA table (Team)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.37	3	5.12	16.39	.000 ^b
	Residual	62.19	199	.31		
	Total	77.56	202			

a. Dependent variable: Mean_Team

b. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

Source: SPSS, Author's analysis

From the analysis of the unstandardised beta coefficients in Table 30, a comparison of the independent variables reveals that Willingness (0.23), Self-efficacy (0.23) and Awareness (0.18) had an impact on team performance, with all variables significant, evidenced by interpreting the value in the "Sig." column as a p value < 0.05. The "Correlations part." column indicates the largest unique combination and the findings from the standardised beta coefficients were corroborated for all variables, with Awareness (0.16), Willingness (0.16) and Self_efficacy (0.19) all explaining meaningfully unique contributions.

Table 30: Coefficients and multicollinearity assessment (Team)

		Coefficients ^a								
		Unstandardised Coefficients		Standardised Coefficients		95.0% Confidence Interval for B		Correlations	Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Part.	VIF
1	(Constant)	.94	.49		1.92	.06	-0.03	1.91		
	Mean_Awareness	.18	.07	.18	2.52	.01	0.04	0.31	.16	1.30
	Mean_Willingness	.23	.09	.18	2.49	.01	0.05	0.41	.16	1.28
	Mean_Self_efficacy	.23	.08	.22	3.05	.00	0.08	0.38	.19	1.26

a. Dependent variable: Mean_Team

Source: SPSS, Author's analysis

Dependent variable – subconstruct Firm

$$\text{Firm} = 1.38 + (0.22 * \text{Awareness}) + (0.09 * \text{Willingness}) + (0.27 * \text{Self_efficacy})$$

The beta coefficient for Awareness was 0.22, with the slope coefficient representing the change in the dependent variable (Firm) for a 1.0 unit change in the independent variable (Awareness). Similarly, the beta coefficient for Willingness was 0.09 and for Self_efficacy it was 0.27. There was a predicted increase in Firm of 0.22, 0.09 and 0.27 for every unit increase in Awareness, Willingness and Self_efficacy, respectively. This applied to all values within the range of values measured in the survey.

It was also possible to define a range of “plausible” values for the slope coefficient. The 95% confidence intervals are reported in the “Lower Bound” and “Upper Bound” columns within the “95% Confidence Interval for B” column. In the case of H1, at the 95% confidence interval (CI) level, the lower and upper bounds for Awareness were 0.08 and 0.36, respectively, while the lower and upper bounds for Self_efficacy were 0.12 and 0.42, respectively. The slope coefficient was statistically significant for Awareness and Self_efficacy, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05, whereas Willingness did not reflect significance.

Table 31: Multiple regression model summary (Firm)

Model Summary ^b						
Model	R	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Durbin-Watson
1	.44 ^a	.18	.57	15.48	.000	1.99

a. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

b. Dependent variable: Mean_Firm

Source: SPSS, Author's analysis

Table 32: ANOVA table (Firm)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.22	3	5.07	15.48	.000 ^b
	Residual	65.24	199	.33		
	Total	80.46	202			

a. Dependent variable: Mean_Firm

b. Predictors: (Constant), Mean_Self_efficacy, Mean_Willingness, Mean_Awareness

Source: SPSS, Author's analysis

From the analysis of the unstandardised beta coefficients in Table 33, a comparison of the independent variables reveals that Awareness (0.22) and Self-efficacy (0.27) were the strongest drivers of the relationship between managerial cognitive frame flexibility and Firm performance, with both variables significant, evidenced by interpreting the value in the “Sig.” column as a p value < 0.05. In contrast, Willingness (0.09) made a much lower contribution and was also not significant, evidenced through a p value of 0.33. The “Correlations part.” column indicates the largest unique combination and the findings from the standardised beta coefficients were corroborated for both Awareness (0.20) and Self_efficacy (0.22). As such, Willingness does not appear to be a material driver in terms of the relationship with the Firm construct.

Table 33: Coefficients and multicollinearity assessment (Firm)

Model		Coefficients ^a								
		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations	Collinearity Statistics
		B	Std. Error	Beta			Lower Bound	Upper Bound	Part.	VIF
1	(Constant)	1.38	.50		2.75	.01	0.39	2.37		
	Mean_Awareness	.22	.07	.23	3.16	.00	0.08	0.36	.20	1.30
	Mean_Willingness	-.09	.09	.07	.98	.33	-0.09	0.28	.06	1.28
	Mean_Self_efficacy	.27	.08	.25	3.46	.00	0.12	0.42	.22	1.26

a. Dependent variable: Mean_Firm

Source: SPSS, Author's analysis

5.4.2. Hypothesis 2a and Hypothesis 2b

Hypothesis 2a (H2a): *Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance*

Hypothesis 2b (H2b): *Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance*

The moderated multiple regression models statistically significantly predicted managerial role performance, as noted in Table 35. The “Sig. F change” has been interpreted as a p value in the tables below. The findings from the multiple regression were valid and the models were a good fit for the data as the assumptions underpinning the statistical technique have not been violated.

Based on the tests conducted, the researcher failed to reject H2a and H2b for the models set out in and which are summarised below:

- Job is moderated by Exploit and Explore through its effect on Awareness, Willingness and Self_efficacy.
- Career is moderated by Explore through its effect on Willingness.
- Team is moderated by Exploit, Explore and MarketDynamism through its effect on Self_efficacy.
- Firm is moderated by MarketDynamism through its effect on Self_efficacy.

A moderated multiple regression was run to predict managerial role performance from the three subconstructs of managerial cognitive frame flexibility (Awareness, Willingness and Self_efficacy), with managerial ambidexterity (Exploit, Explore) and market dynamism (MarketDynamism) moderating this relationship. The dependent variable, managerial role performance, was assessed through five dimensions (Job, Career, Innovate, Team and Firm) of the dependent variable.

Table 34: Reporting of multiple regression models

Model	Description	Reporting	VIF Range
1	Job	F(3, 199) = 8.13, p < .001, adj. R ² = .10	1.00 – 1.13
2	Career	F(3,199) = 18.62, p < .001, adj. R ² = .21	1.00 – 1.16
3	Innovate	F(3,199) = 21.54, p < .001, adj. R ² = .23	1.00 – 1.16
4	Team	F(3,199) = 16.39, p < .001, adj. R ² = .19	1.00 – 1.16
5	Firm	F(3,199) = 15.48, p < .001, adj. R ² = .19	1.00 – 1.16

Source: SPSS, Author's analysis

Table 35: Summary of significant moderation effects

Model	Description	Base case		Moderated		Dependent variable	Durbin-Watson
		Adj. R ²	Δ p-value	Adj. R ²	Δ p-value		
1_4	Awareness_C_Exploit_C	.08	<.001	.10	.01	Job	2.05
1_5	Awareness_C_Explore_C	.08	<.001	.13	<.001	Job	2.03
1_7	Willingness_C_Exploit_C	.02	.02	.05	<.05	Job	1.94
1_8	Willingness_C_Explore_C	.02	.02	.10	<.001	Job	1.94
1_10	Self_efficacy_C_Exploit_C	.07	<.001	.09	<.05	Job	1.99
1_11	Self_efficacy_C_Explore_C	.07	<.001	.14	<.001	Job	1.98
2_8	Willingness_C_Explore_C	.06	<.001	.05	<.05	Career	1.89
4_10	Self_efficacy_C_Exploit_C	.12	<.001	.15	<.05	Team	1.97
4_11	Self_efficacy_C_Explore_C	.12	<.001	.14	<.05	Team	2.02
4_12	Self_efficacy_C_MarketDynamism_C	.12	<.001	.17	<.05	Team	2.06
5_12	Self_efficacy_C_MarketDynamism_C	.13	<.001	.19	<.001	Firm	1.93

Source: SPSS, Author's analysis

There was linearity, as assessed by partial regression plots and a plot of studentised residuals against the predicted values (Awareness, Willingness, Self_efficacy, Exploit, Explore and MarketDynamism). There was independence of residuals, as assessed by a Durbin-Watson statistic range of 1.89 to 2.09 for all the moderated models (Table 35). Homoscedasticity was confirmed by visual inspection of a plot of studentised

residuals versus unstandardised predicted values. There was also no evidence of multicollinearity, assessed by VIF values that were in the range 1.00 to 1.16 for the moderated models tested. There were limited instances ranging from 0 to 3 for the studentised deleted residuals greater than ± 3 standard deviations, no leverage values greater than 0.2 and no Cook's distance values above 1. Therefore, outliers were not a concern. The assumption of normality was met, as assessed through Q-Q plots and discussed in greater detail in Chapter Four.

The summary of the multiple regression models is set out in Table 36, with the ANOVA for each model confirming the models were a good fit for the data. It should be noted that in the analysis set out below, all the predictor and moderator variables have been centred and these centred variables have been used for the testing. The variance explained by the models and the relative contribution of each of the predictors to the total variance explained are important contributions for the hypotheses.

Dependent variable – subconstruct Job

A moderated multiple regression established that managerial cognitive frame flexibility (through Awareness, Self_efficacy and Willingness) statistically predicted Job performance, with:

1. Awareness: $F(1, 201) = 17.65, p < .001, \text{adj. } R^2 = .08$. Awareness accounted for 8% of the explained variability in Job – a weak to moderate effect, according to Cohen (1988).
2. Willingness: $F(1, 201) = 5.24, p < .05, \text{adj. } R^2 = .02$. Willingness accounted for 2% of the explained variability in Job – a weak effect, according to Cohen (1988).
3. Self-efficacy: $F(1, 201) = 15.30, p < .001, \text{adj. } R^2 = .07$. Self_efficacy accounted for 7% of the explained variability in Job – a weak to moderate effect, according to Cohen (1988).

The interaction effects were tested and are shown in Table 37 and Table 38. As is evident from the ANOVA tables, all the models were significant, with Exploit and Explore moderating the relationship between managerial cognitive frame flexibility (Awareness, Willingness and Self-efficacy) and Job. The moderator, MD (MarketDynamism), was not significant for the moderation of Job and did not change the adjusted R^2 . Awareness, Willingness and Self-efficacy were moderated by Exploit and Explore, as set out in Table 36 and Table 37, with all the models reflecting

significance and the adjusted R^2 increasing for the following models: 1_4, 1_5, 1_7, 1_8, 1_10, and 1_11 in Table 38. The exception was the moderation effect of MarketDynamism on any of the predictors, which was not found to be significant (sig. F change > 0.05) and did not contribute to greater variance on Job.

In summary, for H2a and H2b, all the assumptions underpinning the statistical tests were not violated and therefore the results from the analysis were valid. Linearity was visually assessed by partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by a Durbin-Watson statistic of 1.92 and 2.05. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values and there was no evidence of multicollinearity, which was through all VIF values lower than 3 (Table 38). Outliers were assessed and there were between 1 and 4 studentised deleted residuals greater than ± 3 standard deviations (Table 38), no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for Job.

Table 36: Reporting of multiple regression models (Job)

Model	Description	Reporting	Durbin-Watson	VIF
1	Job			
1_1	Awareness	F(1,201) = 17.65, p < .001, adj. R^2 = .08		
1_2	Willingness	F(1,201) = 5.24, p < .05, adj. R^2 = .02		
1_3	Self_efficacy	F(1,201) = 15.30, p < .001, adj. R^2 = .07		
1_4	Awareness_C_Exploit_C	F(2,200) = 12.50, p < .05, adj. R^2 = .10	2.05	1.04
1_5	Awareness_C_Explore_C	F(2,200) = 16.20, p < .001, adj. R^2 = .13	2.03	1.09
1_6	Awareness_C_MarketDynamism_C	F(2,200) = 9.00, p = .57, adj. R^2 = .07	2.04	1.03
1_7	Willingness_C_Exploit_C	F(2,200) = 6.63, p < .05, adj. R^2 = .05	1.94	1.07
1_8	Willingness_C_Explore_C	F(2,200) = 11.97, p < .001, adj. R^2 = .10	1.94	1.05
1_9	Willingness_C_MarketDynamism_C	F(2,200) = 2.74, p = .61, adj. R^2 = .02	1.92	1.13
1_10	Self_efficacy_C_Exploit_C	F(2,200) = 7.20, p < .05, adj. R^2 = .09	1.99	1.04
1_11	Self_efficacy_C_Explore_C	F(2,200) = 16.89, p < .001, adj. R^2 = .14	1.98	1.03
1_12	Self_efficacy_C_MarketDynamism_C	F(2,200) = 8.29, p = .26, adj. R^2 = .07	1.96	1.00

Source: SPSS, Author's analysis

Table 37: Moderated multiple regression (Job)

	Note	Base		Exploit_C		Explore_C		MarketDynamism_C	
		Adj R ²	p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value
Awareness_C	1,2,3	.08	<.001	.10	.01	.13	<.001	.07	.57
Willingness_C	4,5,6	.02	.02	.05	<.05	.10	<.001	.02	.61
Self_efficacy_C	7,8,9	.07	<0.001	.09	<.05	.14	<.001	.07	.26

1. The moderating effect of Exploit on Awareness was significant and resulted in a higher adjusted R² than the relationship between Awareness and the dependent variable, Job. The Durbin-Watson statistic was 2.05.
2. The moderating effect of Explore on Awareness was significant and resulted in a higher adjusted R² than the relationship between Awareness and the dependent variable, Job. The Durbin-Watson statistic was 2.03.
3. The moderating effect of MarketDynamism on Awareness was not significant and an adjusted R² was slightly lower compared to the relationship between Awareness and the dependent variable, Job. The Durbin-Watson statistic was 2.04.
4. The moderating effect of Exploit on Willingness was significant and resulted in a higher adjusted R² than the relationship between Willingness and the dependent variable, Job. The Durbin-Watson statistic was 1.94.
5. The moderating effect of Explore on Willingness was significant and resulted in a higher adjusted R² than the relationship between Willingness and the dependent variable, Job. The Durbin-Watson statistic was 1.94.
6. The moderating effect of MarketDynamism on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Job. The Durbin-Watson statistic was 1.92.
7. The moderating effect of Exploit on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Job. The Durbin-Watson statistic was 1.99.
8. The moderating effect of Explore on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Job. The Durbin-Watson statistic was 1.98.
9. The moderating effect of MarketDynamism on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Job. The Durbin-Watson statistic was 1.96.

Source: SPSS, Author's analysis

Table 38: Model summary and chart assessments of moderated multiple regression (Job)

Model Summary ^b									
Model ^a	R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	VIF	No. of outlier cases ^c	Normal P-P plot fit to line ^d	No. of outliers on scatterplot ^e
1_1	.28	.08	.08	.62					
1_2	.16	.03	.02	.63					
1_3	.27	.07	.07	.62					
1_4	.33	.10	.10	.61	2.05	1.04	3	Yes	1
1_5	.37	.14	.13	.60	2.03	1.09	3	Yes	0
1_6	.29	.08	.07	.62	2.04	1.03	2	Yes	2

1_7	.25	.06	.05	.62	1.94	1.07	2	Yes	1
1_8	.33	.11	.10	.61	1.94	1.05	2	Yes	0
1_9	.16	.03	.02	.64	1.92	1.13	2	Yes	1
1_10	.32	.10	.09	.61	1.99	1.04	2	Yes	0
1_11	.38	.15	.14	.60	1.98	1.03	2	Yes	0
1_12	.28	.08	.07	.62	1.96	1.00	2	Yes	0

a. Model 1_1=Awareness; Model 1_2=Willingness; Model 1_3=Self_efficacy; Model 1_4=Awareness_Exploit; Model 1_5=Awareness_Explore; Model 1_6=Awareness_MarketDynamism; Model 1_7=Willingness_Exploit; Model 1_8=Willingness_Explore; Model 1_9=Willingness_MarketDynamism; Model 1_10=Self_efficacy_Exploit; Model 1_11=Self_efficacy_Explore; Model 1_12=Self_efficacy_MarketDynamism

b. Dependent Variable: Job

c. Outlier cases assessed using Casewise Diagnostics function in SPSS at 3 standard deviations

d. Normal P-P plot of Observed cumulative probability to Expected cumulative probability for dependent variable, Job

e. Scatterplot of regression between standardised residual and standardised predicted value assessed between a band of -3 and +3

Source: SPSS, Author's analysis

Dependent variable – subconstruct Career

A moderated multiple regression established that managerial cognitive frame flexibility (through Awareness, Willingness and Self_efficacy) statistically predicted Career performance, with:

1. Awareness: $F(1,201) = 40.50, p < .001, \text{adj. } R^2 = .16$. Awareness accounted for 16% of the explained variability in Career – a moderate to significant effect, according to Cohen (1988).
2. Willingness: $F(1,201) = 12.73, p < .001, \text{adj. } R^2 = .06$. Willingness accounted for 6% of the explained variability in Career – a weak to moderate effect, according to Cohen (1988).
3. Self-efficacy: $F(1,201) = 31.21, p < .001, \text{adj. } R^2 = .13$. Self_efficacy accounted for 13% of the explained variability in Career – a moderate effect, according to Cohen (1988).

The interaction effects were tested and are shown in Table 40 and Table 41. As evident from the ANOVA tables, all the models were significant, with only Explore moderating the relationship between Willingness and Career. The moderators, MarketDynamism, Exploit and Explore, were not significant for the moderation of Career through Awareness and Self_efficacy, although there were modest changes to

the adjusted R^2 but not a significant effect. The interaction effects are set out in Table 40.

In summary, for H2a and H2b, all the assumptions underpinning the statistical tests were not violated and therefore the results from the analysis were valid. Linearity was visually assessed by partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by Durbin-Watson statistics of 1.89 and 2.09. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values and there was no evidence of multicollinearity, which was through all VIF values lower than 3 (Table 41). Outliers were assessed and there were between 0 and 3 studentised deleted residuals greater than ± 3 standard deviations (Table 41), no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for Career.

Table 39: Reporting of multiple regression models (Career)

Model	Description	Reporting	Durbin-Watson	VIF
2	Career			
2_1	Awareness	F(1,201) = 40.50, p < .001, adj. R^2 = .16		
2_2	Willingness	F(1,201) = 12.73, p < .001, adj. R^2 = .06		
2_3	Self_efficacy	F(1,201) = 31.21, p < .001, adj. R^2 = .13		
2_4	Awareness_C_Exploit_C	F(2,200) = 22.38, p = .06, adj. R^2 = .18	2.07	1.02
2_5	Awareness_C_Explore_C	F(2,200) = 21.06, p = .22, adj. R^2 = .17	2.08	1.02
2_6	Awareness_C_MarketDynamism_C	F(2,200) = .19, p = .67, adj. R^2 = .16	2.09	1.01
2_7	Willingness_C_Exploit_C	F(2,200) = 6.42, p = .69, adj. R^2 = .05	1.89	1.04
2_8	Willingness_C_Explore_C	F(2,200) = 6.45, p < .05, adj. R^2 = .05	1.89	1.01
2_9	Willingness_C_MarketDynamism_C	F(2,200) = 6.37, p = .79, adj. R^2 = .05	1.89	1.16
2_10	Self_efficacy_C_Exploit_C	F(2,200) = 3.64, p = .06, adj. R^2 = .14	1.96	1.03
2_11	Self_efficacy_C_Explore_C	F(2,200) = 16.41, p = .22, adj. R^2 = .13	1.98	1.06
2_12	Self_efficacy_C_MarketDynamism_C	F(2,200) = 16.58, p = .18, adj. R^2 = .13	1.97	1.00

Source: SPSS, Author's analysis

Table 40: Moderated multiple regression (Career)

	Note	Base		Exploit_C		Explore_C		MarketDynamism_C	
		Adj R ²	p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value
Awareness_C	1,2,3	.16	<.001	.18	.06	.17	.22	.16	.67
Willingness_C	4,5,6	.06	<.001	.05	.69	.05	<.05	.05	.79
Self_efficacy_C	7,8,9	.13	<0.001	.14	.06	.13	.22	.13	.18

1. The moderating effect of Exploit on Awareness was not significant and resulted in a higher adjusted R² than the relationship between Awareness and the dependent variable, Career. The Durbin-Watson statistic was 2.07.
2. The moderating effect of Explore on Awareness was not significant and resulted in a higher adjusted R² than the relationship between Awareness and the dependent variable, Career. The Durbin-Watson statistic was 2.08.
3. The moderating effect of MarketDynamism on Awareness was not significant and the adjusted R² was unchanged compared to the relationship between Awareness and the dependent variable, Career. The Durbin-Watson statistic was 2.09.
4. The moderating effect of Exploit on Willingness was not significant and resulted in a lower adjusted R² than the relationship between Willingness and the dependent variable, Career. The Durbin-Watson statistic was 1.89.
5. The moderating effect of Explore on Willingness was significant and resulted in a slightly lower adjusted R² than the relationship between Willingness and the dependent variable, Career. The Durbin-Watson statistic was 1.89.
6. The moderating effect of MarketDynamism on Willingness was not significant and resulted in a slightly lower adjusted R² compared to the relationship between Willingness and the dependent variable, Career. The Durbin-Watson statistic was 1.89.
7. The moderating effect of Exploit on Self_efficacy was not significant and resulted in a slightly higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Career. The Durbin-Watson statistic was 1.96.
8. The moderating effect of Explore on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Career. The Durbin-Watson statistic was 1.98.
9. The moderating effect of MarketDynamism on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Career. The Durbin-Watson statistic was 1.97.

Source: SPSS, Author's analysis

Table 41: Model summary and chart assessments of moderated multiple regression (Career)

Model Summary ^b									
Model ^a	R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	VIF	No. of outlier cases ^c	Normal P-P plot fit to line ^d	No. of outliers on scatterplot ^e
2_1	.41	.17	.16	.75					
2_2	.24	.06	.06	.80					
2_3	.37	.13	.13	.77					
2_4	.43	.18	.18	.75	2.07	1.02	3	Yes	3
2_5	.42	.17	.17	.75	2.08	1.02	3	Yes	1
2_6	.41	.17	.16	.75	2.09	1.01	2	Yes	2

2_7	.24	.06	.06	.80	1.89	1.04	1	Yes	1
2_8	.25	.06	.05	.80	1.89	1.01	1	Yes	1
2_9	.25	.06	.05	.80	1.89	1.16	1	Yes	2
2_10	.39	.15	.14	.76	1.96	1.03	2	Yes	1
2_11	.38	.14	.13	.77	1.98	1.06	2	Yes	0
2_12	.38	.14	.13	.77	1.97	1.00	2	Yes	1

a. Model 2_1=Awareness; Model 2_2=Willingness; Model 2_3=Self_efficacy; Model 2_4=Awareness_Exploit; Model 2_5=Awareness_Explore; Model 2_6=Awareness_MarketDynamism; Model 2_7=Willingness_Exploit; Model 2_8=Willingness_Explore; Model 2_9=Willingness_MarketDynamism; Model 2_10=Self_efficacy_Exploit; Model 2_11=Self_efficacy_Explore; Model 2_12=Self_efficacy_MarketDynamism

b. Dependent variable: Career

c. Outlier cases assessed using Casewise Diagnostics function in SPSS at 3 standard deviations

d. Normal P-P plot of Observed cumulative probability to Expected cumulative probability for dependent variable, Career

e. Scatterplot of regression between standardised residual and standardised predicted value assessed between a band of -3 and +3

Source: SPSS, Author's analysis

Dependent variable – subconstruct Innovate

A moderated multiple regression established that managerial cognitive frame flexibility (through Awareness, Self_efficacy and Willingness) statistically predicted Innovate performance, with:

1. Awareness: $F(1,201) = 39.02, p < .001, \text{adj. } R^2 = .16$. Awareness accounted for 16% of the explained variability in Innovate – a moderate effect, according to Cohen (1988).
2. Willingness: $F(1,201) = 11.28, p < .05, \text{adj. } R^2 = .05$. Willingness accounted for 5% of the explained variability in Innovate – a weak to moderate effect, according to Cohen (1988).
3. Self-efficacy: $F(1,201) = 43.47, p < .001, \text{adj. } R^2 = .17$. Self_efficacy accounted for 17% of the explained variability in Innovate – a moderate to significant effect, according to Cohen (1988).

The interaction effects were tested and are shown in Table 43 and Table 44. As evident from the ANOVA tables, all the models were significant, with none of the moderators (Exploit, Explore or MarketDynamism) moderating the relationship between

managerial cognitive frame flexibility (Awareness, Willingness and Self-efficacy) and Innovate.

In summary, for H2a and H2b, all the assumptions underpinning the statistical tests were not violated and therefore the results from the analysis were valid. Linearity was visually assessed by partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by a Durbin-Watson statistic range of 1.97 to 2.03. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values and there was no evidence of multicollinearity, which was through all VIF values lower than 3 (see Table 44). Outliers were assessed and there were between 0 and 2 studentised deleted residuals greater than ± 3 standard deviations (Table 44), no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for Innovate.

Table 42: Reporting of multiple regression models (Innovate)

Model	Description	Reporting	Durbin-Watson	VIF
3	Innovate			
3_1	Awareness	F(1,201) = 39.02, p < .001, adj. R ² = .16		
3_2	Willingness	F(1,201) = 11.28, p < .05, adj. R ² = .05		
3_3	Self_efficacy	F(1,201) = 43.47, p < .001, adj. R ² = .17		
3_4	Awareness_C_Exploit_C	F(2,200) = 19.65, p = .53, adj. R ² = .16	2.02	1.02
3_5	Awareness_C_Explore_C	F(2,200) = 19.74, p = .46, adj. R ² = .16	2.02	1.02
3_6	Awareness_C_MarketDynamism_C	F(2,200) = 19.43, p = .86, adj. R ² = .15	2.02	1.01
3_7	Willingness_C_Exploit_C	F(2,200) = 6.36, p = .24, adj. R ² = .05	2.03	1.04
3_8	Willingness_C_Explore_C	F(2,200) = 6.09, p = .34, adj. R ² = .05	2.03	1.01
3_9	Willingness_C_MarketDynamism_C	F(2,200) = 6.41, p = .22, adj. R ² = .05	2.02	1.16
3_10	Self_efficacy_C_Exploit_C	F(2,200) = 22.44, p = .25, adj. R ² = .18	1.97	1.03
3_11	Self_efficacy_C_Explore_C	F(2,200) = 21.63, p = .91, adj. R ² = .17	1.98	1.06
3_12	Self_efficacy_C_MarketDynamism_C	F(2,200) = 22.21, p = .33, adj. R ² = .17	1.98	1.00

Source: SPSS, Author's analysis

Table 43: Moderated multiple regression (Innovate)

	Note	Base		Exploit_C		Explore_C		MarketDynamism_C	
		Adj R ²	p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value
Awareness_C	1,2,3	.16	<.001	.16	.53	.16	.46	.15	.86
Willingness_C	4,5,6	.05	<.05	.05	.24	.05	.34	.05	.22
Self_efficacy_C	7,8,9	.17	<0.001	.18	.25	.17	.91	.17	.33

1. The moderating effect of Exploit on Awareness was not significant and resulted in an unchanged R² compared to the relationship between Awareness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.02.
2. The moderating effect of Explore on Awareness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Awareness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.02.
3. The moderating effect of MarketDynamism on Awareness was not significant and the adjusted R² was slightly lower compared to the relationship between Awareness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.02.
4. The moderating effect of Exploit on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.03.
5. The moderating effect of Explore on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.03.
6. The moderating effect of MarketDynamism on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Innovate. The Durbin-Watson statistic was 2.02.
7. The moderating effect of Exploit on Self_efficacy was not significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Innovate. The Durbin-Watson statistic was 1.97.
8. The moderating effect of Explore on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Innovate. The Durbin-Watson statistic was 1.98.
9. The moderating effect of MarketDynamism on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Innovate. The Durbin-Watson statistic was 1.98.

Source: SPSS, Author's analysis

Table 44: Model summary and chart assessments of moderated multiple regression (Innovate)

Model Summary ^b									
Model ^a	R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	VIF	No. of outlier cases ^c	Normal P-P plot fit to line ^d	No. of outliers on scatterplot ^e
3_1	.40	.16	.16	.69					
3_2	.23	.05	.05	.73					
3_3	.42	.18	.18	.68					
3_4	.41	.16	.16	.69	2.02	1.02	1	Yes	2
3_5	.41	.17	.16	.69	2.02	1.02	1	Yes	2

3_6	.40	.16	.15	.69	2.02	1.01	1	Yes	2
3_7	.24	.06	.05	.73	2.03	1.04	1	Yes	2
3_8	.24	.06	.05	.73	2.03	1.01	1	Yes	2
3_9	.25	.06	.05	.73	2.02	1.16	1	Yes	1
3_10	.43	.18	.18	.68	1.97	1.03	2	Yes	1
3_11	.42	.18	.17	.68	1.98	1.06	2	Yes	1
3_12	.43	.18	.17	.68	1.98	1.00	2	Yes	0

a. Model 3_1=Awareness; Model 3_2=Willingness; Model 3_3=Self_efficacy; Model 3_4=Awareness_Exploit; Model 3_5=Awareness_Explore; Model 3_6=Awareness_MarketDynamism; Model 3_7=Willingness_Exploit; Model 3_8=Willingness_Explore; Model 3_9=Willingness_MarketDynamism; Model 3_10=Self_efficacy_Exploit; Model 3_11=Self_efficacy_Explore; Model 3_12=Self_efficacy_MarketDynamism

b. Dependent variable: Innovate

c. Outlier cases assessed using Casewise Diagnostics function in SPSS at 3 standard deviations

d. Normal P-P plot of Observed cumulative probability to Expected cumulative probability for dependent variable, Innovate

e. Scatterplot of regression between standardised residual and standardised predicted value assessed between a band of -3 and +3

Source: SPSS, Author's analysis

Dependent variable – subconstruct Team

A moderated multiple regression established that managerial cognitive frame flexibility (through Awareness, Self_efficacy and Willingness) statistically predicted Team performance, with:

1. Awareness: $F(1,201) = 26.13, p < .001, \text{adj. } R^2 = .11$. Awareness accounted for 11% of the explained variability in Team – a weak to moderate effect, according to Cohen (1988).
2. Willingness: $F(1,201) = 24.96, p < .001, \text{adj. } R^2 = .11$. Willingness accounted for 11% of the explained variability in Team – a weak to moderate effect, according to Cohen (1988).
3. Self-efficacy: $F(1,201) = 18.10, p < .05, \text{adj. } R^2 = .15$. Self_efficacy accounted for 15% of the explained variability in Team – a moderate effect, according to Cohen (1988).

The interaction effects were tested and are shown in Table 46 and Table 47. As evident from the ANOVA tables, all the models were significant, with Exploit, Explore and MarketDynamism moderating the relationship between the Self-efficacy subconstruct of managerial cognitive frame flexibility and Team (Table 46). The

subconstructs of Awareness and Willingness were not moderated by Exploit, Explore or MarketDynamism.

In summary, for H2a and H2b, all the assumptions underpinning the statistical tests were not violated and therefore the results from the analysis were valid. Linearity was visually assessed by partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by a Durbin-Watson statistic range of 1.96 to 2.06. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values and there was no evidence of multicollinearity, which was through all VIF values lower than 3 (Table 45). Outliers were assessed and there were between 0 and 3 studentised deleted residuals greater than ± 3 standard deviations (Table 47), no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for Team.

Table 45: Reporting of multiple regression models (Team)

Model	Description	Reporting	Durbin-Watson	VIF
4	Team			
4_1	Awareness	F(1,201) = 26.13, p < .001, adj. R ² = .11		
4_2	Willingness	F(1,201) = 24.96, p < .001, adj. R ² = .11		
4_3	Self_efficacy	F(1,201) = 18.10, p < .05, adj. R ² = .15		
4_4	Awareness_C_Exploit_C	F(2,200) = 13.22, p = .54, adj. R ² = .11	1.96	1.02
4_5	Awareness_C_Explore_C	F(2,200) = 13.60, p = .31, adj. R ² = .11	1.97	1.02
4_6	Awareness_C_MarketDynamism_C	F(2,200) = 3.56, p = .06, adj. R ² = .12	2.00	1.01
4_7	Willingness_C_Exploit_C	F(2,200) = .315, p < .58, adj. R ² = .10	2.02	1.04
4_8	Willingness_C_Explore_C	F(2,200) = 12.47, p = .76, adj. R ² = .10	2.01	1.01
4_9	Willingness_C_MarketDynamism_C	F(2,200) = 12.46, p = .79, adj. R ² = .10	2.01	1.16
4_10	Self_efficacy_C_Exploit_C	F(2,200) = 18.10, p < .05, adj. R ² = .15	1.97	1.03
4_11	Self_efficacy_C_Explore_C	F(2,200) = 16.81, p < .05, adj. R ² = .14	2.02	1.06
4_12	Self_efficacy_C_MarketDynamism_C	F(2,200) = 20.98, p < .05, adj. R ² = .17	2.06	1.00

Source: SPSS, Author's analysis

Table 46: Moderated multiple regression (Team)

	Note	Base		Exploit_C		Explore_C		MarketDynamism_C	
		Adj R ²	p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value
Awareness_C	1,2,3	.11	<.001	.11	.54	.11	.31	.12	.06
Willingness_C	4,5,6	.11	<.001	.10	.58	.10	.76	.10	.79
Self_efficacy_C	7,8,9	.12	<0.001	.15	<.05	.14	<.05	.17	<.05

1. The moderating effect of Exploit on Awareness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Awareness and the dependent variable, Team. The Durbin-Watson statistic was 1.96.
2. The moderating effect of Explore on Awareness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Awareness and the dependent variable, Team. The Durbin-Watson statistic was 1.97.
3. The moderating effect of MarketDynamism on Awareness was not significant and the adjusted R² was slightly higher than the relationship between Awareness and the dependent variable, Team. The Durbin-Watson statistic was 2.00.
4. The moderating effect of Exploit on Willingness was not significant and resulted in a slightly lower adjusted R² than the relationship between Willingness and the dependent variable, Team. The Durbin-Watson statistic was 2.02.
5. The moderating effect of Explore on Willingness was not significant and resulted in a slightly lower adjusted R² than the relationship between Willingness and the dependent variable, Team. The Durbin-Watson statistic was 2.01.
6. The moderating effect of MarketDynamism on Willingness was not significant and resulted in a slightly lower adjusted R² than the relationship between Willingness and the dependent variable, Team. The Durbin-Watson statistic was 2.01.
7. The moderating effect of Exploit on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Team. The Durbin-Watson statistic was 1.97.
8. The moderating effect of Explore on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Team. The Durbin-Watson statistic was 2.02.
9. The moderating effect of MarketDynamism on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Team. The Durbin-Watson statistic was 2.06.

Source: SPSS, Author's analysis

Table 47: Model summary and chart assessments of moderated multiple regression (Team)

Model Summary ^b									
Model ^a	R	R ²	Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	VIF	No. of outlier cases ^c	Normal P-P plot fit to line ^d	No. of outliers on scatterplot ^e
4_1	.34	.12	.11	.58					
4_2	.33	.11	.11	.59					
4_3	.39	.15	.15	.57					
4_4	.34	.12	.11	.59	1.96	1.02	3	Yes	2
4_5	.35	.12	.11	.58	1.97	1.02	2	Yes	1
4_6	.36	.13	.12	.58	2.00	1.01	3	Yes	1

4_7	.33	.10	.10	.59	2.02	1.04	3	Yes	1
4_8	.33	.11	.10	.59	2.01	1.01	3	Yes	1
4_9	.33	.11	.10	.59	2.01	1.16	3	Yes	1
4_10	.39	.15	.15	.57	1.97	1.03	2	Yes	2
4_11	.38	.14	.14	.58	2.02	1.06	2	Yes	0
4_12	.42	.17	.17	.57	2.06	1.00	2	Yes	3

- a. Model 4_1=Awareness; Model 4_2=Willingness; Model 4_3=Self_efficacy; Model 4_4=Awareness_Exploit; Model 4_5=Awareness_Explore; Model 4_6=Awareness_MarketDynamism; Model 4_7=Willingness_Exploit; Model 4_8=Willingness_Explore; Model 4_9=Willingness_MarketDynamism; Model 4_10=Self_efficacy_Exploit; Model 4_11=Self_efficacy_Explore; Model 4_12=Self_efficacy_MarketDynamism
- b. Dependent variable: Team
- c. Outlier cases assessed using Casewise Diagnostics function in SPSS at 3 standard deviations
- d. Normal P-P plot of Observed cumulative probability to Expected cumulative probability for dependent variable, Team
- e. Scatterplot of regression between standardised residual and standardised predicted value assessed between a band of -3 and +3

Source: SPSS, Author's analysis

Dependent variable – subconstruct Firm

A moderated multiple regression established that managerial cognitive frame flexibility (through Awareness, Self_efficacy and Willingness) statistically predicted Job performance, with:

1. Awareness: $F(1,201) = 28.93, p < .001, \text{adj. } R^2 = .12$. Awareness accounted for 12% of the explained variability in Firm – a weak to moderate effect, according to Cohen (1988).
2. Willingness: $F(1,201) = 13.91, p < .001, \text{adj. } R^2 = .06$. Willingness accounted for 6% of the explained variability in Firm – a weak to moderate effect, according to Cohen (1988).
3. Self-efficacy: $F(1,201) = 30.47, p < .001, \text{adj. } R^2 = .13$. Self_efficacy accounted for 13% of the explained variability in Firm – a moderate effect, according to Cohen (1988).

The interaction effects were tested and are shown in Table 49 and Table 50. As evidenced from the ANOVA tables, all the models were significant, with MarketDynamism moderating the relationship between the Self_efficacy subconstruct of managerial cognitive frame flexibility and Firm. The moderators, Exploit and Explore, were not significant for the moderation of Awareness, Willingness or Self_efficacy (as

the subconstructs of managerial cognitive frame flexibility) on Firm (see Table 49). The moderation effect of MarketDynamism on Self_efficacy was found to be both significant (sig. F change < 0.001) and contributed to a greater variance on Firm.

In summary, for H2a and H2b, all the assumptions underpinning the statistical tests were not violated and therefore the results from the analysis were valid. Linearity was visually assessed by partial regression plots and a plot of studentised residuals against the predicted values. There was independence of residuals, evidenced by a Durbin-Watson statistic of 1.92 and 2.08. There was homoscedasticity, assessed by visual inspection of a plot of studentised residuals versus unstandardised predicted values and there was no evidence of multicollinearity, which was through all VIF values lower than 3 (see Table 50). Outliers were assessed and there were between 0 and 3 studentised deleted residuals greater than ± 3 standard deviations (Table 50), no leverage values greater than 0.2 and no Cook's distance values above 1. The assumption of normality was also met through visual inspection of the Q-Q plot for the variables and normal P-P plot for Firm.

Table 48: Reporting of multiple regression models (Firm)

Model	Description	Reporting	Durbin-Watson	VIF
5	Firm			
5_1	Awareness	F(1,201) = 28.93, p < .001, adj. R ² = .12		
5_2	Willingness	F(1,201) = 13.91, p < .001, adj. R ² = .06		
5_3	Self_efficacy	F(1,201) = 30.47, p < .001, adj. R ² = .13		
5_4	Awareness_C_Exploit_C	F(2,200) = 14.83, p = .39, adj. R ² = .12	2.08	1.02
5_5	Awareness_C_Explore_C	F(2,200) = 14.40, p = .92, adj. R ² = .12	2.08	1.02
5_6	Awareness_C_MarketDynamism_C	F(2,200) = 15.64, p = .14, adj. R ² = .13	2.07	1.01
5_7	Willingness_C_Exploit_C	F(2,200) = 7.08, p = .58, adj. R ² = .06	1.98	1.04
5_8	Willingness_C_Explore_C	F(2,200) = 7.04, p = .64, adj. R ² = .06	1.97	1.01
5_9	Willingness_C_MarketDynamism_C	F(2,200) = 7.33, p = .38, adj. R ² = .06	1.99	1.16
5_10	Self_efficacy_C_Exploit_C	F(2,200) = 15.16, p = .92, adj. R ² = .12	1.93	1.03
5_11	Self_efficacy_C_Explore_C	F(2,200) = 15.82, p = .29, adj. R ² = .13	1.92	1.06
5_12	Self_efficacy_C_MarketDynamism_C	F(2,200) = 24.80, p < 0.001, adj. R ² = .19	1.93	1.00

Source: SPSS, Author's analysis

Table 49: Moderated multiple regression (Firm)

	Note	Base		Exploit_C		Explore_C		MarketDynamism_C	
		Adj R ²	p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value	Adj R ²	Δ p-value
Awareness_C	1,2,3	.12	<.001	.12	.76	.12	.92	.13	.14
Willingness_C	4,5,6	.06	<.001	.06	.58	.06	.64	.06	.38
Self_efficacy_C	7,8,9	.13	<0.001	.12	.92	.13	.29	.19	<0.001

1. The moderating effect of Exploit on Awareness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Awareness and the dependent variable, Firm. The Durbin-Watson statistic was 2.08.
2. The moderating effect of Explore on Awareness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Awareness and the dependent variable, Firm. The Durbin-Watson statistic was 2.08.
3. The moderating effect of MarketDynamism on Awareness was not significant and the adjusted R² was slightly higher than the relationship between Awareness and the dependent variable, Firm. The Durbin-Watson statistic was 2.07.
4. The moderating effect of Exploit on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Firm. The Durbin-Watson statistic was 1.98.
5. The moderating effect of Explore on Willingness was not significant and resulted in an unchanged adjusted R² compared to the relationship between Willingness and the dependent variable, Firm. The Durbin-Watson statistic was 1.97.
6. The moderating effect of MarketDynamism on Willingness was not significant and resulted in a higher adjusted R² than the relationship between Willingness and the dependent variable, Firm. The Durbin-Watson statistic was 1.99.
7. The moderating effect of Exploit on Self_efficacy was not significant and resulted in a lower adjusted R² than the relationship between Self_efficacy and the dependent variable, Firm. The Durbin-Watson statistic was 1.93.
8. The moderating effect of Explore on Self_efficacy was not significant and resulted in an unchanged adjusted R² compared to the relationship between Self_efficacy and the dependent variable, Firm. The Durbin-Watson statistic was 1.92.
9. The moderating effect of MarketDynamism on Self_efficacy was significant and resulted in a higher adjusted R² than the relationship between Self_efficacy and the dependent variable, Firm. The Durbin-Watson statistic was 1.93.

Source: SPSS, Author's analysis

Table 50: Model summary and chart assessments of moderated multiple regression (Firm)

Model ^a	R	R ²	Model Summary ^b						
			Adjusted R ²	Std. Error of the Estimate	Durbin-Watson	VIF	No. of outlier cases ^c	Normal P-P plot fit to line ^d	No. of outliers on scatterplot ^e
5_1	.36	.13	.12	.59					
5_2	.25	.07	.06	.61					
5_3	.36	.13	.12	.59					
5_4	.36	.13	.12	.59	2.08	1.02	1	Yes	2
5_5	.36	.13	.12	.59	2.08	1.02	1	Yes	1
5_6	.37	.14	.13	.59	2.07	1.01	1	Yes	1
5_7	.26	.07	.06	.61	1.98	1.04	2	Yes	1

5_8	.26	.07	.06	.61	1.97	1.01	2	Yes	2
5_9	.26	.07	.06	.61	1.99	1.16	2	Yes	1
5_10	.36	.13	.12	.59	1.93	1.03	1	Yes	1
5_11	.37	.14	.13	.59	1.92	1.06	1	Yes	0
5_12	.45	.20	.19	.57	1.93	1.00	2	Yes	3

a. Model 5_1=Awareness; Model 5_2=Willingness; Model 5_3=Self_efficacy; Model 5_4=Awareness_Exploit; Model 5_5=Awareness_Explore; Model 5_6=Awareness_MarketDynamism; Model 5_7=Willingness_Exploit; Model 5_8=Willingness_Explore; Model 5_9=Willingness_MarketDynamism; Model 5_10=Self_efficacy_Exploit; Model 5_11=Self_efficacy_Explore; Model 5_12=Self_efficacy_MarketDynamism

b. Dependent variable: Firm

c. Outlier cases assessed using Casewise Diagnostics function in SPSS at 3 standard deviations

d. Normal P-P plot of Observed cumulative probability to Expected cumulative probability for dependent variable, Firm

e. Scatterplot of regression between standardised residual and standardised predicted value assessed between a band of -3 and +3

Source: SPSS, Author's analysis.

6. RESEARCH DISCUSSION

6.1. Introduction

The primary objective of the study was to test whether managers' cognitive frame flexibility has an influence on managers' role performance. Managerial cognitive frame flexibility was found to have a positive relationship on managerial role performance, based on the statistical analysis performed in Chapter Five. The multiple regression findings for Hypothesis 1 are valid (Table 52), as the models were a good fit for the data and the assumptions underpinning the statistical technique were not violated. Based on the tests conducted, the researcher failed to reject Hypothesis 1.

The secondary objective of the study was to test the conditions or factors that affect the strength of the primary objective relationship. The roles of managerial ambidexterity and market dynamism were examined to test their effect on moderating the primary objective relationship. The moderation effect was found to have most impact on the aspects of Job and Team within managerial role performance, with managerial ambidexterity (Exploit and Explore moderators) most impactful. Based on the tests conducted, the researcher failed to reject H2a and H2b for the models, as set out in Table 52. The primary findings were that: Job is moderated by Exploit and Explore through its effect on Awareness, Willingness and Self_efficacy; Career is moderated by Explore through its effect on Willingness; Team is moderated by Exploit, Explore and MarketDynamism through its effect on Self_efficacy; and Firm is moderated by MarketDynamism through its effect on Self_efficacy.

6.2. Sample Overview

While the full demographic of the sample is detailed in Chapter Five, a typical respondent for this study was a male between the ages of 30 and 50, with at least 10 years of work experience and currently occupying a senior managerial position at a large organisation, which was either undergoing incremental or rapid change. While the sample was well represented across managerial levels, it did have a bias towards senior managers. There was also a relatively even mix of tenure at the current employer for the respondents, with just over half the sample being at their present employer for more than five years. The tenure at a firm would likely provide one with a better understanding of a firm's capabilities and a greater likelihood of one experiencing a change event at the firm.

6.3. Variables Overview

The variables used in the study loaded well to the constructs measured. The mean of the variables was skewed towards the positive end of the measurement scales. The variables related to the constructs are discussed below.

6.3.1. Managerial cognitive frame flexibility

Managerial cognitive frame flexibility was measured using the cognitive flexibility scale developed by Martin and Rubin (1995) measuring three subconstructs: awareness of options (Awareness), willingness to be flexible (Willingness) and self-efficacy (Self_efficacy) in flexibility.

An exploratory factor analysis (EFA) was used to validate the cognitive flexibility scale proposed by Martin and Rubin (1995). The strong loadings and relevant groupings for each component revealed awareness of options, willingness to be flexible and self-efficacy in flexibility as supporting cognitive flexibility as a construct. The internal consistency of the scales was also tested using Cronbach's alpha and was found to be above the minimum acceptable level of 0.50 and therefore supportive of the scale's reliability (George & Mallery, 2003).

The box plot for managerial cognitive frame flexibility (based on a six-point Likert scale) indicated that respondents' views varied from somewhat agree (4) to strongly agree (6), with a median value of approximately 5.20. The 2nd and 3rd quartile groups began and ended at approximately 4.10 and 6.00, respectively, highlighting the fact that respondents' views on cognitive frame flexibility were concentrated towards the more positive end of the scale. These findings were consistent across each of the box plots for the underlying subconstructs and individual questions alike, although there was a wider dispersion of responses to the following questions: (i) I have many possible ways of behaving in any given situation; (ii) I can communicate an idea in many different ways; and (iii) I can find workable solutions to seemingly unsolvable problems. This would have impacted the subconstructs related to awareness of options and self-efficacy in flexibility which had a lower score than the overall construct.

6.3.2. Managerial role performance

Managerial role performance as a construct was measured through a role-based performance scale developed and validated by Welbourne et al. (1998). The 20-item scale was spread across five dimensions comprising four items each and used a five-

point Likert scale. The five dimensions for the managerial performance scale related to: (i) Job; (ii) Career; (iii) Innovate; (iv) Team; and (v) Firm.

An EFA was used to validate the role-based performance scale proposed by Welbourne et al. (1998). The strong loadings and relevant groupings for each component supported managerial role performance as a construct. It was noted that all five dimensions, namely Job, Career, Innovate, Team and Firm loaded as separate constructs within managerial role performance. The internal consistency of the scales was also tested using Cronbach's alpha and found to be above the minimum acceptable level of 0.5, and therefore supportive of the scale's reliability (George & Mallery, 2003).

The box plot for managerial role performance indicated that respondents' views ranged across excellent (5) and satisfactory (3), with a median value of approximately 4.10 and the 2nd and 3rd quartile groups at approximately 3.75 to 4.50, indicating that respondents' views on role performance were more similar towards the more positive end of the scale. These findings were consistent across each of the box plots for the underlying subconstructs and individual questions, although there was a wider range of responses for the following questions: (i) Obtaining personal career goals; (ii) Developing skills needed for his/her future career; (iii) Making progress in his/her career; (iv) Seeking out career opportunities; (v) Creating better processes and routines. In relation to the role performance construct, the Career subconstruct was scored lower, the lower bound of the Innovate subconstruct was below the other dimensions, and the median for the Team and Firm subconstructs was higher than the meta-construct, managerial role performance. The variables that reflected relatively lower mean values were Career and Innovate, and there may be an opportunity for additional research to understand the nuances of Career and Innovate within this context.

6.3.3. Managerial ambidexterity

Managerial ambidexterity as a construct was measured using the scales developed and validated by Jansen et al. (2006). This measure combined exploration and exploitation measures developed by Jansen et al. (2006), which has seven items each and uses a seven-point Likert scale. There were two dimensions to the scale: (i) exploitation, and (ii) exploration, and in this study, the researcher amended the original seven-item scales to four items each for both of the scales, using the items highlighted

for each of the scales in Kiss et al. (2020). This was done to keep the total number of questions in the survey to an acceptable level.

An EFA was used to validate the ambidexterity scale proposed by Jansen et al. (2006). The loadings differentiated between the exploitation and exploration subconstructs sufficiently, based on the sample data, and they were therefore treated as two separate constructs in this study. The internal consistency of the scales was also tested using Cronbach's alpha and found to be above the minimum acceptable level of 0.50, and therefore supportive of the scale's reliability (George & Mallery, 2003).

The box plot for managerial ambidexterity indicated that respondents' views ranged from disagree (2) to strongly agree (7), with a median value of approximately 5.20 and the range for the 2nd and 3rd quartile from approximately 4.40 to 5.90, indicating that respondents' views on managerial ambidexterity were more nuanced. There was a greater spread of respondents scoring between neither agree nor disagree (4) to agree (6), and while still biased towards the positive end of the scale, the bottom two quartiles emphasised a more neutral stance. The scores for the questions related to Exploit1, Exploit3, Explore1, Explore2, Explore3, Explore4 ranged between 1 and 7, with the lowest quartile ranging from 1 (strongly disagree) to 4 (neither agree nor disagree).

The questions relating to the exploration all scored poorly as well as Exploit1 (We frequently refine the supply of existing products and services) and Exploit3 (We introduce improved, but existing products and services for our local market), which appeared to indicate that for the bottom quartile, exploration initiatives were not prioritised, while exploitation initiatives related to the refinement of the existing offering were also modest. Given that most of the sample group were in industries experiencing either an incremental or rapid pace of change, the ability of the firms to exploit existing capabilities as well as explore new opportunities may have been compromised. There did, however, appear to be some aspects of strength within exploitation across the sample, with Exploit2 (We regularly implement small adaptations to the existing products and services) and Exploit 4 (We expand the services for existing clients) scoring between 4 and 7 (strongly agree), with the lowest quartile ranging from 4 to 5 (somewhat agree).

6.3.4. Market dynamism

In this study, market dynamism was addressed through a single question, with the mean score of 2.36 (on a scale of 0 to 3) reflecting a sample that was largely experiencing incremental or rapid industry change.

6.4. Hypotheses Discussion

Dynamic capabilities provide a mechanism for firms to adapt to change (Teece et al., 1997; Zollo & Winter, 2002) while leadership plays a crucial role in developing and enabling a firm's dynamic capabilities (Helfat & Martin, 2015; Helfat & Peteraf, 2015; Teece, 2007; Teece et al., 1997; Uhl-Bien & Arena, 2018). The hypotheses in this study had two objectives: firstly, to test the relationship between managerial cognitive frame flexibility and managerial role performance; and secondly, to test the conditions or factors that affect the strength of the primary objective relationship. The role of managerial ambidexterity and market dynamism were examined in relation to the first objective, with these relationships set out as separate hypotheses.

6.4.1. Hypothesis 1

Hypothesis 1 (H1): *Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)*

The findings from the multiple regressions were valid as the models were a good fit for the data as the assumptions underpinning the statistical technique were not violated.

Based on the tests conducted, the researcher failed to reject Hypothesis 1.

Heterogeneity of managers' cognitive capabilities is likely to result in heterogeneity of managerial dynamic capabilities, which in turn, may contribute to differentiation in organisational performance (due to the variation of strategic response), particularly under changing conditions (Helfat & Peteraf, 2015). Firms need both routines (for reliability) and individuals (to reconfigure the resources) to adapt to the change (Helfat, et al., 2007; Sirmon & Hitt, 2009; Helfat & Peteraf, 2015), thereby embedding an essential managerial function in the DC framework. The extant literature exploring the individual (micro) level is largely conceptual, predominantly focused on key individuals (top management team (TMT) members or entrepreneurial managers). It has produced limited empirical testing to date, with the role of individuals and collective impacts within the firm largely under-explored (Schilke et al., 2018). That said, there has been strong evidence to support the relationships between CEO cognitive flexibility and

learning in an SME context (Kiss et al., 2020) and the findings from this study support the linkage between managers' cognitive flexibility and managerial ambidexterity.

Laureiro-Martínez and Brusoni (2018) note that there is ample empirical evidence on the relationship between cognitive inertia and the inability to adapt, in addition to evidence that strategic flexibility drives firm performance. It is imperative that organisations can demonstrate this adaptability and the role of decision-makers in this process is crucial (Giorgi, 2017; Havermans et al., 2015; Helfat & Peteraf, 2015; Raffaelli et al., 2019).

The results suggest that managerial cognitive frame flexibility plays an important role in managerial role performance and this corroborates the theory (Helfat et al., 2007; Sirmon & Hitt, 2009; Helfat & Peteraf, 2015) as well as other empirical studies (Eggers, 2012; Kiss et al., 2020; Laureiro-Martinez & Brusoni, 2018). As noted in Table 51, the adjusted R^2 was moderate to significant for Career, Innovate, Team and Firm, with Job reflecting a weak to moderate effect (Cohen, 1998). The unique contribution of the subconstructs, Awareness, Willingness and Self_efficacy, are noted under the heading "Correlations part.". Specifically, the roles of Awareness and Self-efficacy were found to be strong contributors to all dimensions (or subconstructs) of managerial role performance (Job, Career, Innovate, Team and Firm). This contrasts with Willingness which was only found to be a strong contributor to the Team dimension of managerial role performance.

The positive relationship between managers' cognitive frame flexibility and role performance suggests that greater levels of cognitive flexibility of managers allow for improved performance. This finding corroborates the dynamic capabilities theory but also builds on the empirical evidence at an individual level (Eggers, 2012; Kiss et al., 2020; Laureiro-Martinez & Brusoni, 2018) in support of the linkage between cognitive frame flexibility and role performance.

Table 51: Summary of multiple regression models for subconstructs of MRP

DV	Adjusted R Square	Std. Error of the Estimate	F change	Sig. F change	Correlations part.			Durbin-Watson
					Awareness	Willingness	Self_efficacy	
Job	.10	.61	8.13	.000	.19*	.01	.16*	2.06
Career	.21	.73	18.62	.000	.27*	.03	.21*	2.07
Innovate	.23	.66	21.54	.000	.25*	.00	.28*	1.97
Team	.19	.56	16.39	.000	.16*	.16*	.19*	1.97
Firm	.19	.57	15.48	.000	.20*	.06	.22*	1.99

*p value < 0.05

Source: SPSS, Author's analysis

6.4.2. Hypothesis 2

Hypothesis 2a (H2a): *Managerial ambidexterity is a moderator of the relationship between managerial cognitive frame flexibility and managerial role performance*

Hypothesis 2b (H2b): *Market dynamism is a moderator of the relationship between managerial cognitive frame flexibility and managerial role performance*

Based on the tests conducted, the researcher failed to reject H2a and H2b for the models, as set out in Table 52. The moderated multiple regression models statistically significantly predicted the five dimensions of managerial role performance, as noted in Table 34, with the moderated regression models for each dimension of managerial role performance set out in Table 36 (Job), Table 39 (Career), Table 42 (Innovate), Table 45 (Team) and Table 48 (Firm). The findings from the multiple regression tests for H2a and H2b were valid as the models were a good fit for the data and the assumptions underpinning the statistical technique used were not violated. The models were all statistically significant, evident through the ANOVA tables for the regressions, with only the significant moderation relationships set out in Table 52.

Job was moderated by Exploit and Explore through its effect on Awareness, Willingness and Self_efficacy. Career was moderated by Explore through its effect on Willingness. Team was moderated by Exploit, Explore and MarketDynamism through its effect on Self_efficacy. Firm was moderated by MarketDynamism through its effect on Self_efficacy. Innovate did not have a valid moderated effect.

The Innovate dimension of managerial role performance did not reflect a moderation effect for any of the moderators tested. This may be due to the sample bias towards more senior managers, larger organisations or the market structure in South Africa, which may not prioritise ambidexterity of managers or high levels of market dynamism. Another possible reason may be the greater industry concentration in the market and these factors may be an avenue for future research.

Table 52: Summary of significant moderation effects

Model	Description	Base case		Moderated		Dependent variable	Durbin-Watson
		Adj. R ²	Δ p-value	Adj. R ²	Δ p-value		
1_4	Awareness_C_Exploit_C	.08	<.001	.10	.01	Job	2.05
1_5	Awareness_C_Explore_C	.08	<.001	.13	<.001	Job	2.03
1_7	Willingness_C_Exploit_C	.02	.02	.05	<.05	Job	1.94
1_8	Willingness_C_Explore_C	.02	.02	.10	<.001	Job	1.94
1_10	Self_efficacy_C_Exploit_C	.07	<.001	.09	<.05	Job	1.99
1_11	Self_efficacy_C_Explore_C	.07	<.001	.14	<.001	Job	1.98
2_8	Willingness_C_Explore_C	.06	<.001	.05	<.05	Career	1.89
4_10	Self_efficacy_C_Exploit_C	.12	<.001	.15	<.05	Team	1.97
4_11	Self_efficacy_C_Explore_C	.12	<.001	.14	<.05	Team	2.02
4_12	Self_efficacy_C_MarketDynamism_C	.12	<.001	.17	<.05	Team	2.06
5_12	Self_efficacy_C_MarketDynamism_C	.13	<.001	.19	<.001	Firm	1.93

Source: SPSS, Author's analysis

Hypothesis 2a

One of the findings from this study was that managerial ambidexterity was a prominent moderator of the Job subconstruct of managerial role performance across all aspects of managerial cognitive frame flexibility. For the Job dimension of managerial role performance, all aspects of managerial cognitive frame flexibility (Awareness, Willingness and Self_efficacy) were moderated by Exploit and Explore. Within the Career dimension of managerial role performance, it was only Explore that moderated the Willingness subconstruct of managerial cognitive frame flexibility. Within the Team dimension of managerial role performance, Self_efficacy was found to be moderated by Exploit, Explore and MarketDynamism (this component is discussed under H2b).

As discussed previously, there was no moderation impact on the Innovate subconstruct of managerial role performance. There has been strong evidence to support the relationships between CEO cognitive flexibility and learning in an SME context (Kiss et

al., 2020) and the findings from this study support the linkage between managers' cognitive frame flexibility and managerial ambidexterity. Therefore, the importance of improving adaptive capacity depends on individuals displaying cognitive flexibility as well as exploratory policy (ambidexterity), which should be a strategic priority for the firm (Aggarwal et al., 2017).

Hypothesis 2b

The market dynamism impact was predominantly reflected through the Team and Firm aspects of managerial role performance. Within the Team and Firm dimensions of managerial role performance, only Self_efficacy was found to be moderated by MarketDynamism. There was no moderation impact on Job, Career or Innovate from MarketDynamism through any of the subconstructs of managerial cognitive frame flexibility (Awareness, Willingness and Self_efficacy).

Despite most of the sample group self-identifying to be in industries experiencing either incremental or rapid change, it appears that there were firms in the grouping that scored very poorly in developing significant aspects of both exploitation and exploration. This may be indicative of businesses that are at higher risk of displacement in an environment of change. That said, the context of the firm is an important consideration and as this was not adequately explored in this study, it would be an opportunity for further research.

The relevance of firm context was supported by Fainshmidt et al.'s (2019) findings that the development of dynamic capabilities may not be beneficial under all circumstances. In particular, where (a) the environment is stable and resources are scarce, there may be little benefit in developing DCs and little penalty for not doing so; and (b) where the firm's strategic orientation is differentiation and the environment allows for the recouping of costs incurred, then DCs are more likely to be developed. Another consideration is that mature organisations, operating in periods of relative stability, may explicitly allocate resources to exploitation, at the expense of exploration (March, 1991; Adner, 2002; Adner & Kapoor, 2016; Adner & Zemsky, 2006; Christensen & Bower, 1996). It is possible that some of the firms in the sample group had experienced long periods of relative stability as well as dominant market positions, which may have encouraged a greater focus on exploitation.

The context in which firms find themselves is a major consideration. One of the nuances in the literature (Fainshmidt et al., 2019) is the market context that allows for the development of DCs – that is, does the firm have a differentiation strategy and do the market conditions allow for the recoupment of costs to develop these DCs? Appropriately contextualising the firm’s strategy in relation to market conditions facing such firms would allow for an improved understanding. The lack of this information was one of the limitations of this study and would be an avenue for future research.

6.5. Conclusion

The results, supported by literature, conclude that a positive linear relationship exists between cognitive frame flexibility and managerial role performance. The study highlighted the importance of Awareness and Self_efficacy within managerial cognitive frame flexibility for driving managerial role performance and leaders in organisations should emphasise this to their management teams. The results also found a significant moderator effect of managerial ambidexterity on the Job subconstruct of managerial role performance across all aspects of managerial cognitive frame flexibility.

Conceptual model

The conceptual model comprises the hypotheses that were not rejected through the course of statistical testing in Chapter Five. The following hypotheses were found to be both valid and reliable and therefore not rejected: H1, H2a and H2b (moderation effect as noted in Table 52). For the relationships not highlighted in Table 52, the moderation effects for H2a and H2b were rejected.

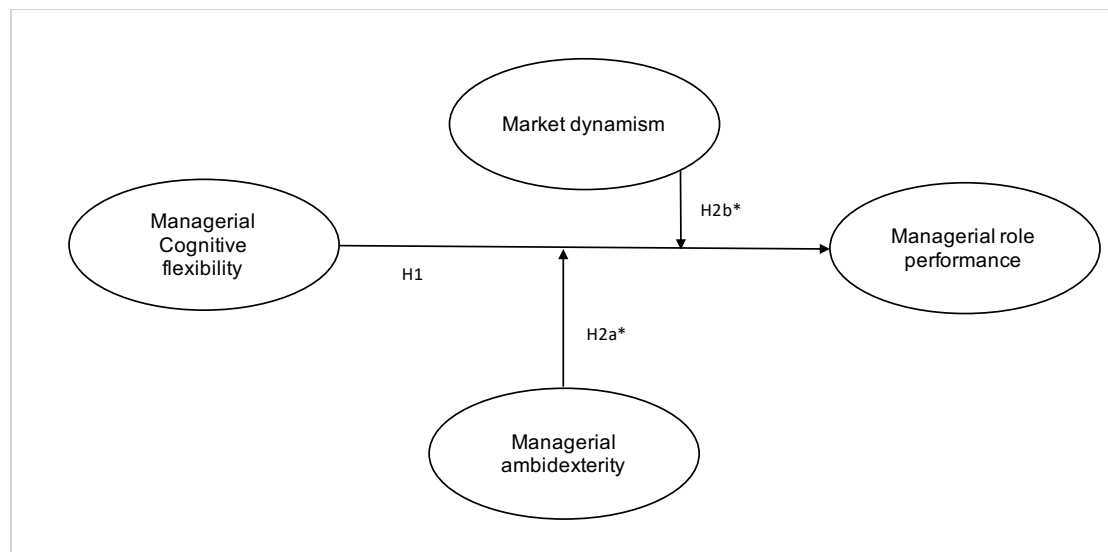


Figure 4: Managerial cognitive frame flexibility and role performance model

Source: Author’s analysis.

* See Table 52 for validated moderated effects

Based on the testing of the conceptual model, it is apparent that business leaders should seek and develop cognitive flexibility in their management teams to improve management effectiveness. By developing and supporting greater levels of managerial ambidexterity, including the firm environment, this may lead to improved Job outcomes. The improvement in adaptive capacity is dependent on individuals' cognitive flexibility and exploratory policy, which should be a strategic priority for firms' leaders (Aggarwal et al., 2017). In addition, market dynamism had a moderating impact on both Team and Firm aspects of role performance through Self_efficacy. The benefit of empowered managers, with the flexibility to appropriately deal with changing market conditions, is likely to support improved managerial role performance.

The importance of appropriately contextualising the firm's strategy in relation to its respective market conditions may provide a better understanding of the boundary conditions for market dynamism. The lack of such information was one of the limitations of this study and may be an avenue for future research. The results of the study pertaining to responses on Exploit and Explore may have been impacted by some of the firms in the sample group having experienced long periods of relative stability in a South African context, with the larger size and dominant market positions of the sample group possibly having encouraged a greater focus on exploitation.

The Innovate dimension of managerial role performance did not reflect a moderation effect for any of the moderators tested. This may be due to the sample bias towards more senior managers, larger organisations or the market structure in South Africa which may not prioritise ambidexterity of managers or high levels of market dynamism. Another possible reason may be the greater industry concentration in the market, and these factors may be worth further investigation. It is imperative that organisations can demonstrate this adaptability and the role of decision-makers in this process is crucial (Giorgi, 2017; Havermans et al., 2015; Helfat & Peteraf, 2015; Raffaelli et al., 2019). The variables that reflected relatively lower mean values were Career and Innovate, and there may be an opportunity for additional research to further understand the nuances of Career and Innovate within managerial role performance.

The main findings, implications for business, limitations of the research and recommendations for future research are discussed in the next chapter.

7. RESEARCH CONCLUSION

7.1. Introduction

This chapter contextualises the findings of this study in light of the research problem presented and the contribution that this study may make to business and theory. The purpose of this study was to establish whether there is a relationship between cognitive frame flexibility and managers' role performance. This was supplemented by testing the roles that managerial ambidexterity and market dynamism play in the primary relationship between managerial cognitive frame flexibility and managerial role performance. This chapter concludes this study and presents the main findings, implications for business, research limitations and recommendations for future research.

The study focused on the dynamic managerial capabilities literature and acknowledges the crucial role that managers' cognitive flexibility plays in identifying changes and determining an appropriate firm response. It is imperative that organisations can demonstrate this adaptability and the role of decision-makers in this process is crucial (Giorgi, 2017; Havermans et al., 2015; Helfat & Peteraf, 2015; Raffaelli et al., 2019). This has been determined at the managerial level through a multi-dimensional measure of managerial role performance (across Job, Career, Innovate, Team and Firm). The research opportunity was that the cognitive flexibility of managers is not well understood within an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018). This is important because studies suggest high cognitive flexibility improves decision-making (Laureiro-Martínez & Brusoni, 2018) – hence, the need for this research study.

7.2. Research Conclusions

From the results, supported by the literature, one can conclude that a positive linear relationship exists between cognitive frame flexibility and managers' role performance. The study highlighted the importance of Awareness and Self_efficacy within managerial cognitive frame flexibility in order to drive managerial role performance and this is an aspect that leaders in organisations should emphasise within their management teams. The results also revealed a significant moderator effect of managerial ambidexterity on the Job subconstruct of managerial role performance across all aspects of managerial cognitive frame flexibility. The following hypotheses were found to be both valid and reliable and therefore were not rejected: H1, H2a and

H2b (moderation effects as noted in Table 52). For the relationships not highlighted in Table 52, the moderation effects of H2a and H2b were rejected.

7.3. Research Contribution

The primary finding was that managers' cognitive frame flexibility is positively related to managers' role performance. The effect of managerial ambidexterity and market dynamism on managerial role performance was also assessed and found to be significant under certain circumstances. The scales used for the research instrument were found to be relevant in the particular study context.

The research opportunity was to better understand the impact of cognitive flexibility of managers within an organisational context (Helfat & Peteraf, 2015; Laureiro-Martínez & Brusoni, 2018; Schilke et al., 2018), and this literature was accordingly bolstered. The study makes a research contribution through empirical testing in a South African context and at an individual manager level by probing the role of managerial cognitive frame flexibility in relation to role performance. The theory was validated within the context of role performance, where high cognitive flexibility supports improved decision-making (Laureiro-Martínez & Brusoni, 2018) and also results in improved managerial role performance. The theory related to the moderation effects of managerial ambidexterity and market dynamism was also tested, with the findings contributing to the dynamic managerial capability literature.

7.4. Implications for Business

Based on the testing of the conceptual model, it was apparent that business leaders should seek and develop cognitive flexibility within their management teams to improve management effectiveness. By developing and supporting higher levels of managerial ambidexterity, including the firm environment, this may lead to improved Job outcomes. The improvement in adaptive capacity is dependent on individuals' cognitive flexibility and exploratory policy, which should be a strategic priority for firms' leaders (Aggarwal et al., 2017). In addition, market dynamism had a moderating impact on both Team and Firm aspects of role performance through Self_efficacy. The benefit of empowered managers, with the flexibility to appropriately deal with changing market conditions, is therefore likely to support improved manager role performance.

7.5. Limitations of the Research

The first limitation was the use of non-probability convenience sampling, which cannot result in a representative sample of the population. The sample therefore may have exhibited random sampling error, skewing the test results (Zikmund et al., 2012). As such, the findings offer greater potential for generalisation to theory than statistical generalisation (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Ridder, 2017).

Secondly, the cross-sectional nature of the study limited the results to a specific point in time and therefore did not consider changes over time, which inhibits causal inference (Marini & Singer, 1988). Although respondents may have been asked to provide commentary or feedback on prior periods, one has to be mindful that this was a highly subjective exercise and managers' own cognition evolves over time. Thirdly, as common method variance (CMV) was assessed through the single survey instrument used to collect all data and through the Harman one-factor test, CMV was found not to be a potential limitation of this study.

Finally, one of the moderators (market dynamism) was assessed through a single question in the research instrument and this may have been a limitation in terms of the measurement of the construct. Appropriately contextualising the firm's strategy in relation to its respective market conditions may provide a better understanding of the boundary conditions for market dynamism as a moderator.

7.6. Opportunities for Further Research

This study has created a better understanding of the components of managerial cognitive frame flexibility that have a material effect on managerial role performance, particularly Awareness and Self_efficacy related to Job performance. The results also revealed a significant moderator effect of managerial ambidexterity on the Job subconstruct of managerial role performance across all aspects of managerial cognitive frame flexibility. These findings enhance understanding of dynamic managerial capabilities, further building on the existing theory on this topic in relation to managerial role performance.

Based on the testing of the managerial cognitive frame flexibility and role performance model, it was apparent that business leaders should seek and develop cognitive flexibility in their management teams in order to improve management effectiveness. By developing and supporting greater levels of managerial ambidexterity, including the

firm environment, this may lead to improved Job outcomes. The improvement in adaptive capacity is dependent on individuals' cognitive flexibility and exploratory policy, which should be a strategic priority for firms' leaders (Aggarwal et al., 2017). In addition, market dynamism had a moderating impact on both Team and Firm aspects of role performance through Self_efficacy. The benefit of empowered managers, with the flexibility to appropriately deal with changing market conditions, is likely to support improved manager role performance.

One of the insights gained from the study was the importance of appropriately contextualising the firm's strategy in relation to its respective market conditions, which may give rise to a better understanding of the boundary conditions for market dynamism. The lack of such information was one of the limitations of this study and therefore an opportunity for future research.

The responses on Exploit and Explore may have been impacted by some of the firms in the sample group having experienced long periods of relative stability in a South African context, while the larger size and dominant market positions of the sample group may have encouraged a greater focus on exploitation. A further research opportunity would be to consider a different sample set, with more focus on smaller or younger firms, to determine if the current study's findings are similar to those of the new study with a different sample set.

7.7. Conclusion

Managerial cognitive flexibility and ambidexterity were found to be valuable in determining managerial role outcomes, particularly in relation to the Job subconstruct. In addition, market dynamism was most impactful on managerial role performance when managers felt empowered. Therefore, business leaders (and by implication, firms) would benefit from improved managerial role performance by seeking and developing cognitive flexibility among their managers and creating an appropriate environment, and encouraging managerial ambidexterity. In addition, empowered managers were more likely to be able to navigate dynamic markets and therefore the leadership's management style would also be a crucial factor in achieving these outcomes.

Appendix I: Research opportunity and consistency matrix

Table 53: Research opportunity

Title	Journal	Author(s) and year	Research gap
Managerial cognitive capabilities and micro foundations of dynamic capabilities	Strategic Management Journal	Helfat & Peteraf (2015)	<p>“... managerial cognitive capabilities may function as mediators of the relationship between changes in organizational context and strategic change, which in turn can affect firm performance” (p. 845).</p> <p>“Analyzing the cognitive capabilities of managers below the top executive level would further enrich our understanding of strategic change” (p. 846).</p> <p>“Investigation of managerial cognitive capabilities and their impact within and across different levels of the organization, as well as investigation of the limits that organizational context may place on the impact of managerial cognitive capabilities, may lead to a richer and deeper understanding of dynamic capabilities and strategic change” (p. 846).</p>
Cognitive flexibility and adaptive decision-making: Evidence from a laboratory study of expert decision-makers	Strategic Management Journal	Laureiro-Martínez & Brusoni (2018)	<p>“... a number of questions present themselves in relation to the evolution and development of cognitive flexibility as a managerial capability. Can managers manipulate the work environment to increase cognitive flexibility (Vuori & Huy, 2016)? Can we develop interventions aimed at increasing cognitive flexibility? Research so far has focused mostly on specific populations, in particular, children (Diamond & Lee, 2011) or video gamers (Colzato et al., 2010). Yet, these questions are of great managerial relevance as in real organizations ... the discussion about cognitive flexibility, and how it is affected by organizational processes and structures, will become even more important.” (p. 1051).</p>
Frame flexibility: The role of cognitive and emotional framing in innovation adoption by incumbent firms	Strategic Management Journal	Raffaelli et al. (2019)	<p>“...frame flexibility opens up several new avenues to extend research on senior team decision-making (Finkelstein, Hambrick & Cannella, 2009; Hambrick & Mason, 1984). We foresee empirical work that tackles how senior team heterogeneity (Hambrick, Cho & Chen, 1996), team knowledge diversity (Fichman & Kemerer, 1997), participative decision-making cultures (Hurley & Hult, 1998), and prior experience with strategic contradiction (Smith, 2014), interact with TMT framing. Similarly, exploring relationships among TMT composition, tenure, and frame flexibility would be especially worthy of investigation (e.g., Pfeffer, 1981).” (p. 1031)</p>
When do dynamic capabilities lead to competitive advantage? The importance of strategic fit.	Journal of Management Studies	Fainshmidt et al. (2019)	<p>“...affecting the value of dynamic capabilities, but important enablers of dynamic capabilities might also support or weaken fit. For example, as internal contingencies, organizational structure, culture, and managerial cognition might play an important role because they shape how organizational actors interact with each other in effectuating change...” (p. 781).</p>
Adaptive capacity to technological change: A microfoundational approach	Strategic Management Journal	Aggarwal et al. (2017)	<p>“...In the empirical domain, our notion of adaptive capacity as a property of routines and capabilities suggests that it may be fruitful for future empirical work to verify the existence, and examine the causes and consequences, of this property.” (p. 1228)</p>

Source: Author's compilation

Table 54: Consistency matrix

HYPOTHESIS	CONSTRUCTS	DATA COLLECTION TOOL (Questionnaire)
<p>Hypothesis 1 (H1): Managerial cognitive frame flexibility (predictor variable) is related to managerial role performance (outcome variable)</p>	<ol style="list-style-type: none"> 1. Managerial cognitive frame flexibility 2. Managerial role performance 	<p>Section 2 and Section 5</p>
<p>Hypothesis 2a (H2a): Managerial ambidexterity moderates the relationship between managerial cognitive frame flexibility and managerial role performance</p>	<ol style="list-style-type: none"> 1. Managerial ambidexterity 2. Managerial cognitive frame flexibility 3. Managerial role performance 	<p>Section 4</p>
<p>Hypothesis 2b (H2b): Market dynamism moderates the relationship between managerial cognitive frame flexibility and managerial role performance</p>	<ol style="list-style-type: none"> 1. Market dynamism 2. Managerial cognitive frame flexibility 3. Managerial role performance 	<p>Section 1 (questions 1.6. and 1.7.)</p>

Source: Author's analysis

Appendix II: Survey instrument

The following information was disclosed on the opening screen of the electronic survey:

Informed consent:

1. This survey forms part of an academic study at the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Philosophy (Corporate Strategy). The study deals with the role of managers' cognitive flexibility in their performance outcomes. The primary focus is on middle and senior decision-makers or influencers within firms of at least 50 employees. The study also assesses the role of learning intensity as well as organisational and industry context for the managerial performance outcomes.
2. Participants will be asked for some demographic information, questions related to the manager's assessment of their organisation in certain situations as well as the participant's own response under various circumstances. Some of the questions in Section 2 are asked in reverse order, so please read each question carefully.
3. The time commitment to complete the survey is less than 15 minutes.
4. Participation in the survey is voluntary and participants may withdraw from the survey at any time without penalty.
5. All the data collected will remain confidential and anonymous.
6. The researcher is Mervin Naidoo (19405937@mygibs.co.za) and the co-supervisors are Dr Morris Mthombeni (mthombenim@gibs.co.za) and Dr Manoj Chiba (chibam@gibs.co.za).
7. Kindly note that participation in the survey signals agreement with the above terms.

Survey questions:

1. Demographic data

- 1.1. Age (radio box)
- 1.2. Gender (radio box)
- 1.3. Years at current company (radio box)
- 1.4. Employment status (radio box)
- 1.5. Experience level (radio box)
- 1.6. Managerial level (radio box)
- 1.7. Pace of change in industry (radio box)
- 1.8. Industry classification (radio box)
- 1.9. Dominant geographic revenue base (radio box)
- 1.10. Size of organisation (radio box)

2. Cognitive flexibility

Point score: strongly disagree = 1 up to strongly agree = 6 (6-point Likert-type scale)

- 2.1. In any given situation, I am able to act appropriately
- 2.2. I have many possible ways of behaving in any given situation
- 2.3. My behaviour is a result of conscious decisions that I make
- 2.4. I have the self-confidence necessary to try different ways of behaving
- 2.5. I seldom have choices when deciding how to behave {reverse}
- 2.6. I feel like I never get to make decisions {reverse}
- 2.7. I am willing to listen and consider alternatives for handling a problem
- 2.8. I am willing to work at creative solutions to problems
- 2.9. I avoid new and unusual situations {reverse}
- 2.10. I can communicate an idea in many different ways
- 2.11. I have difficulty using my knowledge on a given topic in real life situations
{reverse}
- 2.12. I can find workable solutions to seemingly unsolvable problems

3. Learning intensity

Point score: strongly disagree = 1 up to strongly agree = 5 (5-point Likert-type scale)

- 3.1. I would invest a great deal of personal effort in gathering potentially valuable information

- 3.2. I would devote a large percentage of my time to searching for information
- 3.3. When searching for information, I would make looking for new information a top priority for how I would spend my time
- 3.4. I would go out of my way to find information sources that may have relevant information
- 3.5. When searching for information, I would continue searching until I was satisfied that I had identified all relevant information
- 3.6. When searching for information, I would persist until I found all the information pertaining to this problem
- 3.7. When searching for information, I would take as much time as needed to identify all available information
- 3.8. When searching for information, I would exhaustively search and study every possibility
- 3.9. When searching for information, I would concentrate on information outside my own organisation

4. Ambidexterity

Point score: strongly disagree = 1 up to strongly agree = 7 (7-point Likert-type scale)

- 4.1. We frequently refine the supply of existing products and services
- 4.2. We regularly implement small adaptations to the existing products and services
- 4.3. We introduce improved, but existing, products and services for our local market
- 4.4. We expand the services for existing clients
- 4.5. Our organisation accepts demands that go beyond the existing products and services
- 4.6. We invent new products and services
- 4.7. We regularly seek and approach new clients in new markets
- 4.8. We experiment with new products and services in the local market

5. Role performance

Point score: 1 = Needs much improvement; 2 = Needs some improvement; 3 = Satisfactory; 4 = Good; 5 = Excellent

- 5.1.1. Quantity of work output
- 5.1.2. Quality of work output
- 5.1.3. Accuracy of work

- 5.1.4. Customer service provided (internal and external)
- 5.2.1. Obtaining personal career goals
- 5.2.2. Developing skills needed for his/her future career
- 5.2.3. Making progress in his/her career
- 5.2.4. Seeking out career opportunities
- 5.3.1. Coming up with new ideas
- 5.3.2. Working to implement new ideas
- 5.3.3. Finding improved ways to do things
- 5.3.4. Creating better processes and routines
- 5.4.1. Working as part of a team or work group
- 5.4.2. Seeking information from others in his/her work group
- 5.4.3. Making sure his/her work group succeeds
- 5.4.4. Responding to the needs of others in his/her work group
- 5.5.1. Doing things that helps others when it's not part of his/her job
- 5.5.2. Working for the overall good of the company
- 5.5.3. Doing things to promote the company
- 5.5.4. Helping so that the company is a good place to be

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