



**PREPARING FOR THE FOURTH INDUSTRIAL REVOLUTION: INVESTIGATING
THE RELATIONSHIP BETWEEN LEADERSHIP 4.0, INNOVATIVE
MANAGEMENT PRACTICES AND ORGANISATIONAL PERFORMANCE
CAPABILITIES.**

YANDRI PIENAAR
(PNRYAN001)

Supervisor: Professor Anton Schlechter

A dissertation submitted in partial fulfilment of the requirements for the award of the degree
of Master of Philosophy in People Management.

Faculty of Commerce
University of Cape Town

2019

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Acknowledgements

Firstly, I would like to acknowledge my supervisor, Prof. Anton Schlechter, for his continued support, feedback, advice, mentorship and motivation throughout this study. His guidance throughout the process of writing this dissertation has been invaluable.

I would also like to thank my colleagues at Moyo Africa, specifically my HR team and Dr. Pierre le Roux, for their continued support, encouragement and understanding throughout this year. I would further like to thank Moyo for providing me with financial support to complete this degree.

Lastly, to my family and friends who have been hugely supportive and understanding throughout this process, I am incredibly thankful.

ABSTRACT

Background

It is believed that the fourth industrial revolution (4IR) will bring about unprecedented change to the world, ultimately having such a deep impact that some argue it may change human life at its core. It is believed that many organisations will not survive the radical disruption that will ensue. On the contrary, some authors have argued that the 4IR will bring about many benefits and opportunities for organisations, as with previous revolutions, provided it is managed effectively by business leaders.

Rationale for the research study

There is a growing consensus that existing leadership styles and management practices may not be suitable for organisational performance for the 4IR. It has, therefore, been suggested that different theories, models or approaches to leadership will be required if organisations are to remain competitive and sustainably successful in a business context that will look very different to what leaders have been accustomed to. It is argued here that Leadership 4.0 and innovative management practices, may have merit in this context.

Aim of the study

This present study was an exploratory attempt to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR.

For the purposes of this study, 1) a range of leadership theories/models/approaches/styles, including Transactional Leadership, Transformational Leadership and Leadership 4.0; 2) innovative management practices, including human resource management, organising and information sharing, risk management and stakeholder management as they compare to the old and new economy; and 3) organisational performance capabilities, including human capital, digital risk management and business model value creation were investigated.

Research Design, Sampling and realised sample

An exploratory research design was followed, utilising a mixed method approach. A cross-sectional approach was taken to data collection, with a composite questionnaire designed for the purpose of this study utilised to collect data. A realised sample of n=61 respondents, mainly

from local, privately owned, knowledge-intensive organisations was obtained using a convenience sampling approach.

Statistical analyses

Pearson correlation and hierarchical multiple regression were utilised to estimate the relationships among the abovementioned constructs. Mediation analyses utilising the PROCESS macro was employed to test whether the relationship between Leadership 4.0 and organisational performance capabilities was mediated through innovative management practices.

Results

Statistically significant positive relationships were found between Leadership 4.0, Innovative Management Practices and Organisational Performance Capabilities. A regression model indicated that Leadership styles statistically significantly predicted the most variance in Organisational Performance Capabilities. Results further determined that Transactional Leadership explained a unique variance in risk management and digital risk management. Lastly, the test for mediation indicated that innovative management practices partially mediated the relationship between Leadership 4.0 and organisational performance capabilities.

Findings

Findings from the results supported various discussions and studies in the literature and in practice that leadership, specifically Leadership 4.0, is an important element to navigating the uncertainties and challenges presented by the 4IR. Further evidence was also found in support of contingent leadership theories.

Managerial Implications

The findings of the present research study holds a practical implication for organisations in that the findings support the literature suggesting that leadership is a key element in organisational performance capabilities, specifically for survival and sustainability for the 4IR. The findings further contributes to a growing body of knowledge surrounding the 4IR, leadership, innovative management practices and organisational performance fields of research.

Keywords

Fourth Industrial Revolution; Leadership 4.0; Innovative Management Practices; Contingent Leadership; Transactional Leadership; Risk Management.

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CHAPTER 1

INTRODUCTION

Cisco's CEO, John Chambers, predicts that forty percent of the world's largest organisations will cease to exist within the next decade if these organisations do not prepare sufficiently for the emerging fourth industrial revolution (4IR) (Oxford Leadership, 2016). This prediction comes amid a general consensus, amongst both researchers and practitioners, that the emerging 4IR will bring about unprecedented change to the world as we know it. It is believed that change related to the 4IR will cause extraordinary levels of volatility, uncertainty, complexity and ambiguity. Ultimately, it will have such a deep impact that some argue that human life will be irreversibly changed (Oxford Leadership, 2016; Oosthuizen, 2017).

The 4IR is synonymous with digital transformation, the Internet of Things (IoT) and Artificial Intelligence (AI), which are believed will bring about wide-spread change to economic, environmental and societal advancements (Maynard, 2015). According to Oberer and Erkollar (2018, para. 8), the 4IR is about "... rapid transformations in the design, production, implementation, operations, and service of manufacturing systems, products, and components." On an organisational level, it is argued that the 4IR will have far-reaching implications for business value creation, business models and service offerings – all of which will impact organisational performance capabilities and even organisational survival (Prifti, Knigge, Kienegger & Krcmar, 2017). Several authors and practitioners (for example, Oberer and Erkollar, 2018, as well as Hecklau, Galeitzke, Flachs & Kohl, 2016) believe that organisational performance will be determined by an organisation's capability to adapt to fast-paced change and disrupt markets through innovation, while also driving social, environmental and economic responsibility at higher levels than is currently the case.

The 4IR, as described above, will bring with it unparalleled risks and some organisations may not survive the ensuing turmoil. It is, therefore, easy to see the negative aspects of this change. However, Maynard (2015) and Lee (Lee, 2018) argued that the 4IR may also lead to the advancement of humanity if navigated successfully and may result in greater levels of organisational sustainability. For organisations to survive though, the sustainability of society must be ensured. However, if proactive efforts are not made to ensure that the benefits of the

4IR are realised through proactive and responsible solutions, it could lead to more social harm than good (Maynard, 2015). The question that then arises is: Whose responsibility is it to ensure the successful navigation of 4IR change in such a manner as to ensure the required capabilities for organisational performance, and the realisation of the benefits promised to humanity?

Schwab (2018) suggested that organisations and business leaders need to play an active role in shaping the 4IR to lead to the betterment, and not the detriment, of humanity. More specifically it is believed that leaders and management practices will play an essential role in shaping a positive future amid a context of rapid change and increasingly complex challenges, threatening the survival of organisations in the 4IR. So much so, that it has been a key theme at the World Economic Forum in Davos for the past few years. There is a growing consensus amongst researchers and practitioners alike that, to successfully navigate the changes and challenges of the 4IR, business leaders need to rethink their approach to leadership and management practices, as well as how these approaches may impact organisational performance capabilities within this context. The approach to leadership and management practices for the 4IR is argued to be centred around creating a climate for innovation, collaboration, learning and agility (Shamim, Cang, Yu & Li, 2016).

Inam (2019) stated that Prof. Klaus Schwab first coined the term ‘Leadership 4.0’, back in 2016, as a new approach to leadership. This approach is characterised by higher levels of engagement, empowerment and enthusiasm and is believed to positively influence the level of innovation, collaboration and learning within organisations given the emerging 4IR context (Tredgold, 2017). Also referred to as ‘digital leadership’, this approach to leadership is highly centred around change and people, specifically developing people toward greater creativity and change adoption (Oberer & Erkollar, 2018). Many of these elements (i.e. learning and innovation) were also reflected in Shamim’s et al. (2016) study on management practices for the 4IR, arguing that human resource practices and organisational design may influence organisational and employee learning and innovation, and ultimately organisational capabilities that may be more compatible in dealing with the challenges of the 4IR.

Kreitner and Kinicki (2008) suggested that although leadership and management are not synonymous, they do overlap in that leadership styles tend to influence management practices.

Ranasinghe (1999) investigated the most suitable management practices for organisational performance and found that leadership approaches impact management practices to a large extent. Based on this thinking, Shamim et al. (2016) suggested that traditional command-and-control-type management practices will be counterproductive to organisations in the 4IR. Instead, they suggested management practices that enhance learning, collaboration and innovation. Ranasinghe (1999) also indicated that the transition from traditional, explicit controls to more implicit guidelines through organisational objectives have already opened up organisations to embrace greater innovation and adaptation to change. Given that the 4IR is primarily about rapid innovation in a complex environment to remain competitive (Oberer & Erkollar, 2018), it stands to reason that management practices may have to evolve further to be compatible with the challenges of the 4IR (Shamim et al., 2016).

The above discussion refers to several studies that have contributed to a growing body of knowledge into effective leadership for the 4IR. These studies have considered unique leadership styles and management practices that may positively influence organisational performance capabilities in the future. However, there are still gaps in this field of research. More specifically, several authors have called for studies that provide empirical evidence for the conceptual models that suggest leadership styles, management practices and organisational performance capabilities for the 4IR. The aim of the present study was to do just that.

1.1. Problem statement

The 4IR is alleged to be radically different from the previous economic revolutions, i.e. the shifts from agriculture to industrial to knowledge to services economies, given the unprecedented pace at which change will take place, as well as the significantly broader systemic impact such change will have on the world as we know it (Oxford Leadership, 2016; Schwab, 2018). As with the previous economic revolutions, the 4IR is set to bring about significant benefits and opportunities for organisations, provided it is managed effectively (Schäfer, 2018). From the discussions taking place at the World Economic Forum, there seems to be a growing consensus that existing approaches to leadership and management practices will, however, not be suitable to the 4IR and may need to change (Shamim et al., 2016).

There is overwhelming evidence in the literature indicating that successful change management is a function of effective leadership. As far back as 1994, the American Management Association argued that leadership would be the critical factor in successfully navigating the anticipated revolutionary change in the world of work, which will be brought about by the 4IR (Gill, 2003). It is expected that change leadership, rather than change management, will be vital in overcoming the organisational change that will result from the 4IR and will be a prerequisite for organisational performance capabilities in the 4IR (Gill, 2003).

Since Schwab's (cited in Inam, 2019) introduction of a leadership style fit for the 4IR, many researchers have attempted to define what Leadership 4.0 may entail. Oberer and Erkollar (2018) set out to establish a new leadership style matrix that focused on a digital leadership style. Prifti's et al. (2017) research proposed that leadership styles in the 4IR will be driven by higher levels of cognitive flexibility, innovation and behavioural indicators, rather than traditional domain expertise. Moreover, Oosthuizen (2017) proposed a 4IR leadership intelligence framework for developing future leaders and managers. Although leadership approaches and management practices are often mistakenly regarded to be one and the same, there have been studies indicating that they may not be, and rather that these two approaches are inter-related.

As mentioned above, despite a growing and already substantial body of knowledge, several authors have called for further research to be conducted into leadership, management practices and organisational performance capabilities, specifically empirical research, that may support the various conceptual arguments that have been made. The aim of the present study, therefore, was to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR. Furthermore, the study was intended to make a theoretical contribution by integrating existing literature and logical perspectives from leading researchers, practitioners and authors in the 4IR field of study to bring about further understanding and insight into how organisations and leaders may better equip themselves for the 4IR. Moreover, reframing leadership and adapting to a Leadership 4.0 approach may bring about innovative management practices that will positively contribute to organisational capabilities for surviving and remaining competitive in the 4IR. Finally, by means of conducting empirical research, this study aimed to provide empirical evidence for a

statistically significant positive relationship between Leadership 4.0, innovative management practices and organisational performance capabilities.

1.2. Research objectives

Given the aim of the study, i.e. to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR, as described above, the following theoretical and empirical research objectives were formulated.

1.2.1. Theoretical objectives

This present study was intended to:

- describe the 4IR and the challenges, risks, threats and changes foreseen to impact organisational performance capabilities by means of reviewing the existing body of literature;
- argue why traditional and modern-day leadership styles, management practices and organisational performance capabilities and measures may not be suitable for the challenges that will be brought about as a result of the 4IR by reviewing the existing body of literature;
- propose a Leadership 4.0 theory/approach, innovative management practices and organisational performance capabilities aimed to overcome the challenges of the 4IR, which is based on the integration of existing literature, logical beliefs and conceptual opinions of leading industry experts, researchers and authors; and
- propose a theoretical/conceptual model for empirical research based on existing literature and theory.

1.2.2. Empirical objectives

The primary objective of the present study was aimed at:

- formulating hypotheses based on a proposed theoretical/conceptual model for Leadership 4.0, innovative management practices and organisational performance capabilities aimed at the challenges of the 4IR;

The secondary objectives of the present study was aimed at:

- conducting empirical research to find support for the proposed theoretical/conceptual model; and
- analysing and interpreting the data and offer reasonable interpretations of the data collected for the above-mentioned purpose.

1.3. Conclusion

The above introduction provided an overview of the problem statement at hand, in highlighting some of the conversations and arguments taking place in the 4IR field of study, specifically concerning leadership, management practices and organisational performance capabilities. The discussion further indicated the theoretical and empirical objectives intended to be addressed through the present study, in support of the overall objective of the study, namely to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities.

CHAPTER 2

LITERATURE REVIEW

The following chapter, i.e. the literature review, aims to provide a brief overview of the 4IR, as well as to describe the selected constructs under investigation, namely leadership styles, specifically Leadership 4.0, innovative management practices and organisational performance capabilities.

2.1. The Fourth Industrial Revolution

According to Schwab (2018, p.7), the 4IR describes "... a set of ongoing and impending transformations in the systems that surround us..." and brings about a new chapter in human development through interaction with new technologies. Li, Hou and Wu (2017) stated that the driving force behind the 4IR revolution is that of technological advancements, for example, cloud computing, the IoT, machine learning, AI, and use of big data. The 4IR is also known as the digital revolution in that it brings together human and machine capabilities (Schäfer, 2018). In this regard, the 4IR may be exhibited in all areas of life, from the use of technology to the consumption of products and services (Li et al., 2017). Ultimately, the 4IR is believed to be integrated and cut across the technical, societal, organisational and environmental spheres (Prifti et al., 2017).

There are many challenges, threats and changes associated with the 4IR, which led John Chambers, Cisco's CEO at the time, to predict that those who do not prepare sufficiently for the 4IR, about forty percent of the world's largest organisations, will cease to exist within the next decade (Oxford Leadership, 2016). In other words, it is argued that organisations must enhance their ability to cope with rapid change to retain their competitive advantage and remain sustainably successful (Shamim et al., 2016). Schwab (2016) further argued that the disruption brought forth by the 4IR is not out of human control. Therefore, humans have a responsibility to guide this revolution toward a positive future. As such, it is up to organisations and business leaders to facilitate this adaption and ensure that organisations serve all stakeholders involved and affected by various 4IR-related changes (Schwab, 2018).

2.2. The importance of leadership, innovative management practices and organisational performance capabilities for the 4IR

Due to the impact the 4IR is believed to have on humanity and the responsibility of organisations to drive related changes and threats toward a more positive future, Oosthuizen (2017) suggested that leadership is central to the paradox of potential harm versus benefits to society. Oosthuizen (2017) further stated that, due to the importance of leadership in change management, it may be regarded as the active ingredient to the realisation of positive outcomes given the 4IR. In support of this argument, Tredgold (2017) believed that leadership is key to not only ensuring the survival of organisations, but also driving organisational performance capabilities. Organisational performance may be directly influenced in the 4IR through capabilities, such as innovation, learning, collaboration and agility. Shamim et al. (2016) suggested that this will require new approaches to management practices, which will meet the pace of change and create an organisational climate of innovation and learning. Inam (2019) suggested that, amid the chaos and uncertainty brought on by the 4IR, the future will belong to organisations, managers, leaders and other individuals who can innovate, create, collaborate and adapt.

2.3. Threats, challenges and changes impacting organisational performance capabilities for the 4IR

There are many threats, changes and challenges associated with the 4IR that may impact organisational performance capabilities, which can be summarised into at least three main themes, namely 1) human capital, 2) risk management and 3) business models and value creation.

From a human capital perspective, Carter (2017) reported results from a survey conducted amongst CEOs of leading organisations. One of the main concerns reported around the rapid growth in technology was the impact it would have on human resources and the workplace. With the development of AI and robotics, machines are already taking over various manual labour and decision-making tasks and processes. As a result, less human intervention is required given that this technology is able to think, reason and learn – even at a more rapid pace than humans (Oxford Leadership, 2016; Schäfer, 2018; Li, Hou, & Wu, 2017). The replacement of human jobs with AI and robots poses a threat to society as it may lead to greater

inequality through job losses (Li et al., 2017). Carter (2017) further predicted that a third of the jobs and related skills that exist today will have changed even as soon as 2020. Researchers suggest that in future the focus will be mainly on behavioural competencies, such as innovation, creativity and learning agility, rather than traditional domain-specific skills (Prifti et al., 2017).

For organisations to maintain a competitive advantage, skills development, as well as attraction and retention of top talent, may become a more critical performance capability than ever before. Organisations need to develop its current workforce through supporting human and machine interaction, while training and reskilling workers to adapt to new job profiles, promoting faster learning to adapt to the speed of machine learning (Li et al., 2017; Oberer & Erkollar, 2018). Technology can be seen as one of the main driving forces behind the changes foreseen in human capital for the 4IR, but it also has far-reaching implications for risk management within organisations and society as a whole.

Li et al. (2017) reported that technology development has contributed to around twenty percent growth in gross domestic profit in the United States since 1995. In recent years, this growth has been accompanied by an increase in cyber-attacks and privacy breaches (Piggin, 2016), such as the recent cases at Facebook, Liberty and the widely publicised case of Edward Snowden and the National Security Agency, to name a few. Organisations are more vulnerable than ever before to cyber threats and privacy risks due to an increase in the variety and sophistication of cyber-attack methods and the volume of data that is available (Piggin, 2016).

Carter (2017) argued that vulnerability to cyber threats and privacy risks may bring about major disruptions to organisations unless proactive efforts are made to fully understand and address these risks through more stringent enforcement of data protection regulations, ethical practices and greater investment in security that could support shareholder value (Carter, 2017; Piggin, 2016). Maynard (2015, p.1005) warned that "... without new thinking on risk, resilience and governance....," to ensure organisations are able to identify and address risks early on, organisational performance may fail rapidly. As discussed above, underlying this threat is human capital, and ultimately business models and value creation, which is the purpose or reason for organisations' existence.

Prifti et al. (2017) indicated that, as technology and concepts associated with the 4IR drive the use of automation and real-time sensors, it could lead to transformation in business processes, affecting business models, services and value creation of organisations. Hecklau et al. (2016) argued that traditional business models and value chains may be vulnerable to alternatives and even replacements in the 4IR. In recent years, there have been notable shifts in customer demands toward increased customisation and flexibility (Hecklau et al., 2016). This growth is mainly due to the growth in organisational transparency and the understanding of customer behaviours through customer engagement supported by big data (Schwab, 2017).

Together with changes in manufacturing systems, brought on by technological advancement, there seems to be a shift from a product to a service orientation (Lasi, Fettke, Kemper, Feld & Hoffmann, 2014). Li et al. (2017) identified this trend, arguing that many organisations have introduced technologies, like AI and big data, to adapt design, delivery and customer service processes and systems, causing a shift from production-driven value chains to more service- and design-orientated value creation. These changes in production and customer expectations may force organisations to rethink their existing business models and proactively drive strategic efforts to rise to the challenge by realising the systemic influences to organisations' business models supporting performance capabilities (Li et al., 2017). The ability to adapt to new concepts accompanying the 4IR, as well as the response time to customers' customised needs, are arguably vital in gaining and maintaining a competitive advantage (Parnell & Koseoglu, 2010).

Although there are many threats, changes and challenges associated with the 4IR, as was the case in previous economic revolutions, it may also present many opportunities depending on how it is managed and how organisations respond (Schwab, 2018). The ability of organisations to adapt and overcome such threats, changes and challenges is argued to be a key organisational performance capability for survival in the 4IR. Various management practices may influence organisations' ability to adapt to change and, in turn, reach increased levels of innovation, collaboration and agility for performance. Given that organisational strategy and performance capabilities may need to be re-evaluated in preparation for the 4IR, it stands to reason that management practices may need to be reconsidered as well.

2.4. Innovative management practices

Bill McDermott, SAP's CEO at the time, believed that change management for the 4IR will be about 'initiating the initiated' (World Economic Forum, 2019). This belief suggested a more proactive approach to change management by envisioning a future state through innovative and collaborative thinking, anticipating risks before it comes to realisation and fast adaptation through agility throughout an organisation (Gill, 2003; Piggan, 2016). According to Oberer and Erkollar (2018), the 4IR is primarily focused on innovation and competitiveness, and organisations falling short in this regard may not survive (Li et al., 2017). Although the need for innovation, collaboration and agility becomes more apparent, the question that arises is: How can management practices support and promote greater innovation, collaboration and agility within organisations for sustainable change and service orientation?

Stakeholder management is an essential management practice central to change management. Schwab (as cited in Lee Kuan Yew School of Public Policy, 2016) argued the need for a multi-stakeholder focus, which is not limited to only the immediate stakeholders of an organisation, i.e. employees, shareholders and customers, but rather have a broader focus that includes educational institutions, governments, society and the context/environment. Given that the sustainability of all these stakeholders may directly impact the sustainability of an organisation, SAP CEO Bill McDermott argued that this is what being a global citizen in the 4IR is all about (World Economic Forum, 2019).

Opening stakeholder management and dialogues to a broader group may allow for greater collaboration through alternative considerations and ways of thinking, influencing innovation and preventing over-concentration of power to a select few (Li et al., 2017). This approach has undoubtedly led to great success among various large technology organisations, such as Facebook and SAP. By driving collaboration with multiple stakeholders, such as governments, educational institutions and other organisations, these organisations have managed to gain higher levels of competitive advantage (Schäfer, 2018). Given that employees remain a key stakeholder, and one that can provide insights and links to other stakeholders, human resource management is a management practice that is argued to be key in promoting greater innovation, collaboration and agility, which is necessary in the 4IR.

In 2016 the World Economic Forum published a report highlighting the critical skills that will be required in any industry by 2020. These included creativity, cognitive flexibility, collaboration and innovation (Carter, 2017). These critical skills are all associated with organisational learning and creating a climate for skills development and innovation, which are, therefore, argued to be essential for the 4IR (Mafini, 2015). Moreover, management should rethink its human resource practices, policies and strategies and design them with the intention to promote learning, innovation and collaboration amongst employees and organisations to retrain older employees and attract young talent. A starting point to doing so may be to rethink traditional training plans, i.e. to include critical skills and technology advancements which are believed to be key for the 4IR (Shamim et al., 2016), as well as to support employees by enhancing their capability and performance through collaboration with AI and robotics (Tredgold, 2017). Given the previously discussed threats related to rapidly changing jobs and job profiles, Shamim et al. (2016) argued that employees' ability to adapt, learn, collaborate and innovate at a faster pace can be supported through practices such as job rotations, flexible work assignments and shared tasks as alternative forms of training on the job. These could include adapting management approaches to training and skills development, which should be reinforced in performance management practices and processes; human resource practices, that focus on and promote employee development and the acquisition of key behaviours, rather than domain expertise; and a results-based approach allowing for autonomous work (Shamim et al., 2016).

Furthermore, it is argued that the increased pace of change brought about by the 4IR will contribute to a greater need for autonomy due to the increased speed in decision-making. Organisations can no longer wait for all decisions to go through the traditional chain of command. Instead, frontline employees need to be enabled to make effective decisions on the spot (Tredgold, 2017). However, decentralising decision-making requires more from training and development interventions focused on developing specific skills. It also requires organisational structures and guidelines that support and promote decision-making that allow for greater collaboration, innovation and agility.

Decentralisation is a common theme and concept in research and the discussions concerning the 4IR. Agile organisations that can quickly and easily adapt to change have become

paramount. Therefore, organisational design, as a function of management practices, should support collaboration across various functions and departments within organisations (Oxford Leadership, 2016). Shamim et al. (2016) argued that it would be irrational to suggest a single organisational structure for the 4IR, as it would depend on the specific situation and destination of an organisation. However, flat, matrix and decentralised organisational structures may be more appropriate for bringing about greater agility, autonomous decision-making and collaboration (Shamim et al., 2016). According to Prifti et al. (2017), organisational design should aim to connect people and systems in such a way that it leads to self-organisation and cross-departmental networks that encourage innovation, collaboration and agility for faster results. Finally, within a climate of innovation, collaboration and decentralised, autonomous networks, risk management will become a critical management practice. This relates to the threats that are associated with technological advancements, as discussed above.

Rapid changes in technology have been specifically challenging for policymakers (Schwab, 2018). Management practices need to ensure transparent and ethical policies, processes and guidelines, which guide responsible innovation and decision-making practices (Schäfer, 2018). As such, David Taylor, CEO of Procter & Gamble, believes risk management should be proactive in ensuring protection against privacy breaches, cyber-attacks, as well as the ethical and responsible use of big data in respect of all stakeholders (World Economic Forum, 2019). Schwab (2018) stated that management practices need to further consider two perspectives when designing policies and regulations for governance, namely 1) reconsidering what is governed; and 2) why it is governed. In other words, the 4IR will require more than the traditional approaches to policies and governance. Essentially, it means that risk management should explore more innovative, agile and anticipatory methods to governance (Schwab, 2018).

The effectiveness of management practices for the 4IR may further be supported by what has been termed 'Leadership 4.0'. As Kreitner & Kinicki (2008) suggested, management and leadership are not synonymous, although they are somewhat related in that management practices, such as human resource management, organisational structures and risk management, can be reinforced by adopting the best or most suited leadership style.

2.5. Leadership styles

Like many other researchers and industry practitioners, Oxford Leadership (2016) believes that the traditional and modern-day examples of the well-established full-range leadership theory/model may not be sufficient to cope with the pace, volatility, complexity and ambiguity of change associated with the 4IR and, therefore, business leadership may require something more. The digital revolution also seems to not only be disrupting organisations and society, but leaders as well (Tredgold, 2017). This may explain why leadership remained a key theme at the 2019 World Economic Forum in Davos.

One of the more popular leadership theories or models is the full-range model of leadership, which suggests that leadership behaviour varies along a range of styles, from *laissez-faire* to transactional and transformational leadership (Bass & Avolio, 1995). *Laissez-faire* refers to a lack or absence of leadership, which many academics and researchers have already proven to be inefficient (for example, Louw & Venter, 2010). The transactional leadership style, which is more closely related to traditional command-and-control management practices, is associated with the clarification of roles and responsibilities, as well as the consequences of not meeting set responsibilities (Louw & Venter, 2010). On the other hand, transformational leadership is a popular modern-day leadership style revolving around influencing, inspiration (charismatic) and intellectually stimulating behaviours (Louw & Venter, 2010). Transformational leaders are believed to nurture trust, commitment and loyalty among employees and are more effective in generating a collective drive toward organisational goals instead of individual interest (Kreitner & Kinicki, 2008). Bass and Avolio (1995) suggested that the transformational leadership style consists of four dimensions, namely 1) idealised influence, 2) inspirational motivation, 3) intellectual stimulation and 4) individual consideration. Shamim et al. (2016) argued that these four dimensions of transformational leadership are idealised around influence, motivation and intellectual stimulation and may therefore not be suited for the 4IR. This assertion supported Oxford Leadership's (2016) notion that the full-range leadership model may not be enough to cope with the challenges and changes that will be brought about by the 4IR, and that a new leadership style would be required.

In response to the above, Schwab (as cited in Inam, 2019) defined Leadership 4.0 as leaders who are innovative, emotionally intelligent and who promote collaboration with an existential

purpose. Schwab, as quoted by Professor Ngairie Woods during a panel discussion at the World Economic Forum (World Economic Forum, 2017), further added to the concept of Leadership 4.0 by suggesting that organisational leaders should be able to provide followers with a destination, i.e. purpose and vision; a radar, i.e. what is required to get there; and a compass, i.e. ethical values to guide their actions. Essentially, Leadership 4.0 is focused on taking the traditional influence, motivation and intellectual stimulation behaviours of transformational leadership to the next level, which are believed to be characterised by engaging, empowering and exciting employees from within.

Engaging employees entails not only having a compelling vision, but also having an existential purpose which appeals to all stakeholders and, therefore, encourages collaboration toward defining a meaningful purpose (Tredgold, 2017). Moreover, Leadership 4.0 is considered to be committed to integrating societal values into organisations by providing a purpose to employees that encourage positive contributions to society through work and the impact on an organisation's reputation from within the organisation (Schwab, 2018). It is argued that leaders will require heightened levels of empathy and shared appreciation for the challenges, uncertainties and volatility associated with the 4IR that both their employees and their broader stakeholders will face on a daily basis, as well as to drive purposeful collaboration and collective intuition among them (Gill, 2003; Oberer & Erkollar, 2018; Oxford Leadership, 2016). The primary purpose of engagement is to evoke commitment and drive from within followers, rather than merely receiving motivation and influence from the leader (from outside).

Unlike transformational leadership, Leadership 4.0 seeks to empower employees by not only sharing responsibility, but by actually giving accountability and ownership along with the required skills to succeed (Tredgold, 2017). Such skills include learning agility and innovation, which are enabled by means of inclusion, involvement and experience (van Alphen, 2010). In other words, where leaders coach employees and support cognitive flexibility rather than teach or command (Inam, 2019). Leadership 4.0 also aims to guide employees to be responsible in their actions and decisions, not only to the organisation, but also to the greater society by instilling in them the required values through leading by example (Carter, 2017). Schwab (2018) suggested that through empowerment leaders may ensure that technology does not

control humans, but rather that humans gain the benefits of more choices, opportunities, freedom, and ultimately, control over their own lives.

Finally, Leadership 4.0 is thought to encourage enthusiasm or excitement by creating meaning in work. Schwab (2018) argued that a values-based approach in a rapidly changing environment is essential to ensuring meaningful work and meaning in work. This may be done by linking employee efforts and values to a collective purpose, as well as providing individual guidance and feedback that build employees' beliefs and assurance toward success (Tredgold, 2017). Gill (2003) noted that, according to the Oxford English Dictionary, 'spirit' is an individual's source of stimulation through meaning. This is often related to excitement and enthusiasm that leads to higher levels of creativity and innovation.

In conclusion, by bringing about engagement, empowerment and excitement from within, Leadership 4.0 is argued to promote innovative, collaborative, agile, creative and ethical behaviours, which are all believed to be of great importance for future organisational performance and success in the 4IR. Schwab (2017) suggested that shaping the future of the 4IR ultimately comes down to empowering all stakeholders and putting people first. In this regard, Oberer and Erkollar's (2018) definition of Leadership 4.0 summarises this notion by stating that this leadership style is a fast-paced, cross-functional, collective, people-orientated approach with a strong focus on innovation, collaboration and agility.

2.6. Conceptual/Theoretical models

From research conducted into various leadership styles, management practices, organisational performance and an understanding of the 4IR, two theoretical models were thought to be most applicable for the purposes of the present study, namely that of Ranasinghe (1999) and Shamim et al. (2016). The research and conceptual/theoretical models presented by these authors are discussed in more detail below to further support the arguments made above. Finally, a new integrated model is proposed for the present study, which was adapted from existing models, to provide a visual representation of the literature review and further empirical research conducted in this regard.

2.6.1. Ranasinghe's (1999) conceptual model on the value context of best management practices

Ranasinghe's (1999) study was intended to examine and identify the most effective management practices for high-performing organisations that wish to gain a competitive advantage and achieve sustainable success. The findings of this study were summarised in the conceptual model below (see Figure 1). In Ranasinghe's (1999) model, it was suggested that leadership and vision are the driving forces in balancing feminine, i.e. relationship-orientated, and masculine, i.e. achievement-orientated values in organisational culture. Learning how to integrate achievement and competitive behaviours with relationships or collaborative actions was found to lead to more balanced management practices, which resulted in greater levels of organisational performance and value creation (Ranasinghe, 1999).

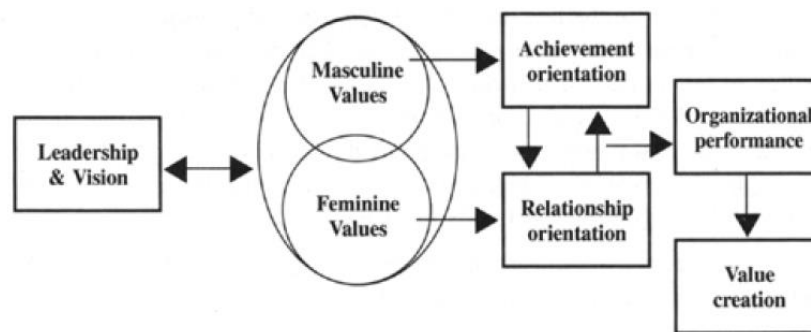


Figure 1. A conceptual model on the value context of best management practices. Reprinted from 'Five best management practices in high-performing companies in the trading sector of Sri Lanka', by Ranasinghe (1999, p.8).

The above-mentioned conceptual or theoretical model suggested that an organisation's ability to succeed is a function of balancing different elements, such as promoting collaboration and being flexible and innovative, in such a manner as to give rise to management practices which are more vigorous and adaptable to change (Ranasinghe, 1999). As this model essentially illustrated that leadership influences management practices, and, in turn, organisational performance, it was considered appropriate to support the argument that the same principle may apply for the 4IR, in that it links to key concepts, such as innovation, collaboration and agility (as described above). A more recent model, presented by Shamim et al. (2016), was also considered given that their model was specifically focused on the 4IR.

2.6.2. Shamim, Cang, Yu & Li's (2016) framework for future research

The purpose of Shamim's et al. (2016) research was to present the most effective management practices required for the 4IR. Their arguments were based on the notion that success in the 4IR is dependent on organisational innovation, which are influenced by management practices (Shamim et al., 2016). Shamim et al. (2016) concluded their research by offering a theoretical framework (see Figure 2 below) for future empirical research to be conducted on management practices for the 4IR.

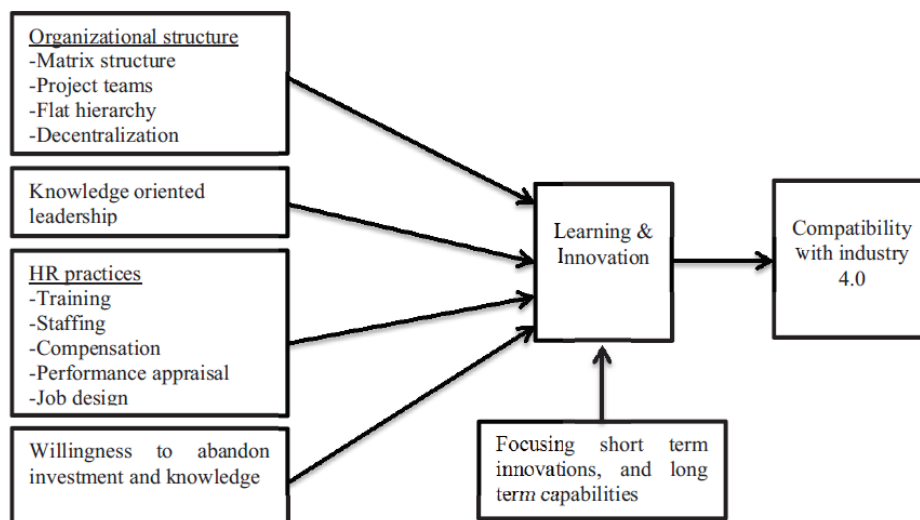


Figure 2. A framework for future research. Reprinted from 'Management approaches for Industry 4.0: A human resource management perspective,' by Shamim et al. (2016, p. 5314).

According to Shamim's et al. (2016) findings, the 4IR requires new thinking in relation to manufacturing and organisational operations, which they believed may require higher levels of innovation, imbedded in employees and their ability to learn and adapt. Innovation, learning and adaptability were found to be influenced by adopting the correct approach to management practices, which, ultimately, led to organisations' compatibility for the 4IR (Shamim et al., 2016). Shamim's et al. (2016) research and theoretical framework support the argument that new or alternative management practices need to be adopted for organisations to succeed in the 4IR. They suggested that being compatible with the 4IR will make it easier for organisations to perform better within this context. Given that both theoretical frameworks and models supported the argument for higher levels of leadership influence on management practices and, in turn, organisational performance, a new theoretical/conceptual model was developed,

adapted from the views of the above models and literature review, to form the basis of the present study and related hypotheses.

2.6.3. Conceptual/Theoretical model proposed for empirical research

Based on the arguments and findings discussed above, the following conceptual or theoretical model was proposed (see Figure 3 below). This theoretical or conceptual model was further investigated empirically in the present study.

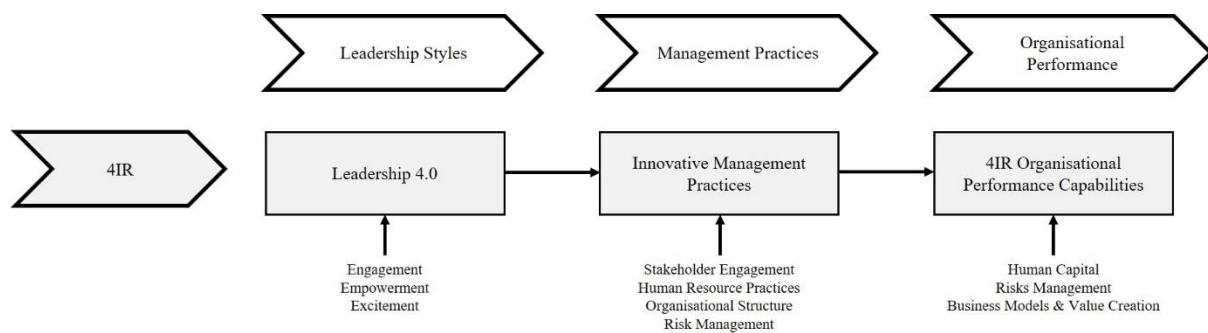


Figure 3. A proposed conceptual/theoretical model for investigating the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities in the present study.

As graphically depicted in the conceptual model above (see Figure 3), it is argued that there is a direct relationship between Leadership 4.0, innovative management practices (including stakeholder management, human resource practices, organisational structure and risk management) and organisational performance capabilities (including human capital, risk management and value creation capabilities) for the 4IR.

2.7. Hypotheses for this research study

Based on the various arguments presented above, the following hypotheses were formulated:

H₁: A significant positive relationship exists between Leadership 4.0 and the selected innovative management practices (i.e. organising and information sharing, human resource management, stakeholder management and risk management).

H₂: A significant positive relationship exists between innovative management practices and the selected organisational performance capabilities (i.e. human capital, digital risk management, business model value creation and total performance capability).

H₃: A significant positive relationship exists between Leadership 4.0 and the selected organisational performance capabilities (i.e. human capital, digital risk management, business model value creation and total performance capability).

H₄: The relationship between Leadership 4.0 and organisational performance capabilities is mediated by innovative management practices.

H₅: A regression model consisting of Leadership 4.0 and innovative management practices significantly explains variance in organisational performance capabilities.

2.8. Conclusion

This chapter presented an overview of the 4IR, as well as described the selected constructs under investigation, namely leadership styles, innovative management practices and organisational performance capabilities, by means of reviewing and presenting existing literature. The chapter concluded with a conceptual/theoretical model as well as hypotheses presented for further investigation in the present study.

CHAPTER 3

METHOD

3.1. Research design and approach

For the purposes of the present research study, an exploratory research design is utilised. Struwig and Stead (2001) explained that exploratory research is research into areas or specific research questions that have not been studied before, with the purpose of developing new ideas and formulating hypotheses for further investigation. Therefore, this design was thought to be appropriate given that previous empirical studies of this kind have not yet been conducted.

Furthermore, this study applied a mixed-method approach, i.e. collecting primary quantitative data using closed-ended questions, as well as qualitative data collected with open-ended questions. The data collection approach can further be described as cross-sectional, i.e. data was collected at a given point in time, or not longitudinal, as well as of the *ex post facto* variety (after the fact).

3.2. Measurement instrument

As suggested above, primary quantitative data were collected by means of a composite questionnaire that comprised of closed-ended and open-ended questions. The questionnaire was designed for the purpose of the present study and consisted of both existing sub-scales that were adapted, as well as new items which were written for the purposes of measuring the selected constructs under investigation. A pilot study of the questionnaire was conducted before data collection commenced in an effort to identify and address any concerns or problems with the questionnaire itself, as well as the administration thereof.

The questionnaire was comprised of four sections, namely leadership, innovative management practices, organisational performance capabilities and a section that included questions pertaining to the demographics of the respondent. Each of these sections are described in more detail below.

3.2.1. Leadership styles

The leadership section of the questionnaire was developed using various sources. Engelbrecht's (2001) adaption of Bass and Avolio's MLQ form 5-45 (copyright 1995) was used to measure transaction and transformation leadership. Based on the arguments presented above, further items were developed to measure Leadership 4.0. This leadership sub-scape, therefore, measured three leadership styles, namely transactional leadership, transformational leadership and Leadership 4.0. A description of the three leadership styles, the corresponding items and an example item for each, are provided below:

- 1. Transactional leadership** (items 5, 11, 16, 21, 24 & 33) is a leadership style characterised by the clarification of roles, responsibilities, related consequences and exchange thereof, and was measured using the MLQ. Transactional leadership is operationally defined in terms of two dimensions, namely 1) management-by-exception (active) and 2) contingent reward. An example item is "33. My line manager/supervisor expresses satisfaction when I meet expectations".
- 2. Transformational leadership** (items 2, 7, 8, 9, 13, 15, 17, 19, 23, 25, 27, 29, 31 & 34) is a leadership style characterised by and measured in terms of four dimensions, namely 1) idealised influence, 2) inspirational motivation, 3) intellectual stimulation and 4) individual, as operationally defined and measured in the MLQ. An example item is "9. My line manager/supervisor instils pride in me for being associated with him/her".
- 3. Leadership 4.0** (items 1, 3, 4, 6, 10, 12, 14, 18, 20, 22, 26, 28, 30, 32 & 35) is a leadership style characterised by empathy, collaboration, learning agility, accountability, inclusion, meaning and values. Based on the arguments above, this construct was operationally defined and measured as three dimensions, namely 1) engagement, 2) empowerment and 3) enthusiasm. An example item is "26. My line manager/supervisor is empathetic and appreciative of the challenges we face".

Each behaviour-based item was responded to on a 5-point Likert-type response scale, where “1 = Strongly Disagree” and “5 = Strongly Agree”. In responding to the items, respondents were requested to evaluate the behaviour of their direct report or line manager/supervisor.

3.2.2. Innovative management practices

The second sub-section of the questionnaire contained questions that were designed to measure the current state of management practices, as described in various sources that can be found in the previous chapter. Some of the questions were obtained from a questionnaire developed by Professors A.F. Schlechter and M. Ungerer (personal communication, May 10, 2019). This sub-scape consisted of four sections for which a total of 35 items were written.

The four sub-sections of innovative management practices are indicated below:

1. Organising and information sharing approach (8 items)

- Organisation
- Collaboration
- Project management
- Locus of decision-making
- Information sharing
- Information availability
- Strategy
- Innovation

2. Human resource practices approach (11 items)

- Job/task sharing/rotation
- Individual performance indicators
- Technology skills development
- Training

- Job titles and job descriptions
- Individual purpose
- Flexibility of work practices
- Work automation
- Performance management focus
- Change management
- Performance appraisal scope

3. Stakeholder management and value creation approach (8 items)

- Stakeholder identification/classification
- Partner relationships
- Environmental and social initiatives
- Decision-making implementation
- Marketing and sales
- Purpose
- Community-building
- Competition

4. Risk management (technology and data specific) approach (8 items)

- Data and data privacy policies
- Risk mitigation procedures
- Risk anticipation procedures
- Policy formulation
- Ethical use of data and big data
- Risk appetite

- Crisis management locus
- Technology impact

Respondents were requested to respond to each item using a semantic differentiation or bipolar response scale, where “-3 =Extremely applicable”, “-2 = Applicable”, “-1 = Somewhat applicable”, “0 = Neither”, “1 = Somewhat applicable”,” 2 = Very applicable” and “3 = Extremely applicable”, to rate the extent to which their line manager/supervisor applies either traditional or innovative management practices, organisational structures and processes within the setting that is under his/her influence, e.g. a team, unit, division or company. An example item is:

Multiple levels in structure, i.e. hierarchical or pyramid structure. Typical command and control structure.	-3 = Strongly Applicable	-2 = Very Applicable	-1 = Somewhat Applicable	0 = Neither	+1 = Somewhat Applicable	+2 = Very Applicable	+3 = Strongly Applicable	Few or minimum levels, i.e. decentralised/flat structure. Typical self-directed team structures where employees have autonomy.
							X	

3.2.3. Organisational performance

The third section of the questionnaire comprised of questions that were designed to assess the current state of organisational performance capabilities that were deemed important for the 4IR as described above. The 25 items in total represent four sub-sections as listed below.

1. **Human capital capabilities** (8 items)
2. **Risk management** (9 items)
3. **Business model and value creation/service orientation** (7 items)
4. **Personal perception of organisational survival/sustainability/competitiveness** (1 item)

Respondents were requested to respond to each item using a response scale, where “1 = Strongly Disagree”, “5 = Strongly Agree” and 6 = “Not applicable”, to rate the typical

performance of the team/unit/division/company that is under the control of a line manager/supervisor.

3.2.4. Demographics sub-scale

The last section of the questionnaire was designed to collect demographic information about respondents and was used to describe the realised sample.

3.3.Sampling and realised sample

Due to cost and time constraints, primary data was collected using convenience or judgment sampling, i.e. a non-probability sample was obtained. Furthermore, a snowball sampling approach was followed in that respondents were asked to forward the questionnaire to other potential respondents who they deemed able to provide appropriate insights given the aim of the present study.

The demographic characteristics or profile of the realised sample (n=61) are summarised in Table 1 and Table 2 below:

Table 1: Demographic characteristics of the sample – Discrete variables (n = 61)

	Frequency	Percentage
Organisation Type		
Public organisation or parastatal	4	6.6
Non-Profit Organisation (NPO)	1	1.6
Private (for profit) organisation	55	90.2
Other	1	1.6
Organisation Description		
A knowledge-intensive organisation where knowledge workers are the clear dominant workforce whose main capital is knowledge.	48	78.7
A more traditional organisation with a focus on standardised and centralised work processes with low decision-making delegation.	11	18.0
Other	2	3.3
Organisational Control Structure		
Locally owned and/or managed organisation(s)	50	82.0
Managed from a global base, i.e. multi-national organisation	10	16.4
Prefer not to answer	1	1.6
Current Employment Status		
Full-time permanent	50	82.0
Part-time permanent	1	1.6
On contract	8	13.1
Freelance/consultant/service provider	1	1.6
Prefer not to answer	1	1.6
Current Role Level		
Non-managerial/non-supervisory	22	36.1
Supervisor/Team Leader	2	3.3
Middle Management	10	16.4
Senior Management	8	13.1
Executive	5	8.2
Specialist	7	11.5
Prefer not to answer	2	3.3
Other	5	8.2
Race		
African	14	23.0
Coloured	2	3.3
Indian	3	4.9
White	40	65.6
Prefer not to answer	2	3.3
Gender		
Female	22	36.1
Male	37	60.7
Prefer not to answer	2	3.3

Table 2: Demographic characteristics of the sample – Nominal variables (n = 61)

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Age	21	60	34.4	8.44	.7	.1
Years of employment in current organisation	0	26	3.1	3.88	3.9	20.4
Years of employment in current position	0	12	2.2	2.27	2.5	7.3
Years of employment under current line-manager/supervisor	0	12	1.8	2.07	3.4	13.3
Size of organisation (employee headcount)	25	69000	3453.0	12652.11	4.4	19.2

The demographic variables, as summarised in Table 1 and Table 2 above, suggested that majority of participants were employed full-time within privately-owned small, medium and large organisations, which were locally based and could be described as knowledge-intensive organisations. Arguably, this was representative of professional/knowledge-intensive and white-collar corporate organisations in South Africa, generally still dominated by white males.

The distribution between employment levels was further argued to be representative of the hierarchical structures within the organisations that were targeted (i.e. South African organisations), with the majority of employees holding non-managerial positions.

The racial distribution indicated that the sample mainly consisted of white respondents (65.6%) who were mainly male (60.7%). In addition, the mean age of the sample was 34 years of age (see Table 2). The realised sample reflected the general race and gender profile of corporate South Africa, as well as the mean employee age. Although the realised, non-probable sample by no means allowed for generalising the results, it was believed that carefully worded inferences could be made based on the argument that the profile of the sample was a relatively close approximation of the population that was targeted.

Furthermore, the average years of employment within the current organisation (mean = 3.1 years; SD = 3.8), the average number of years in the current position (mean = 2.2 years; SD = 2.3), as well as the number of years working under current direct report (mean = 1.8 years; SD = 2.1) seemed to suggest that the respondents had sufficient time to gain a clear understanding of the organisation, their manager’s management practices and leadership styles; i.e.

respondents were in a position to provide useful insights given the aim and empirical objectives of the present study.

3.4.Data collection procedure

An electronic version of the questionnaire was designed using the Qualtrics survey software and were distributed via e-mail as well as shared on social media platforms, specifically LinkedIn and Facebook, targeting various employers' and associations' social media pages. Emails and social media posts consisted of an invitation to individuals to partake in the study by completing the questionnaire. The URL contained in this invitation navigated participants to the questionnaire landing page containing a cover letter providing more detailed information about the study and participation guidelines.

3.5.Ethical considerations and data handling

To ensure that respondents were able to provide informed consent, the landing page of the electronic questionnaire (containing the cover letter) indicated that: participation in the research study was voluntary; that participants could withdraw at any time; the approximate length of time it would take to complete the survey; that no identifiable information of participants would be collected; that the questionnaire would be completed anonymously; and that data would be kept confidential and securely in line with privacy legislation and requirements. The objectives of the research study and proposed dissemination of the results and findings were also provided. Finally, the contact details of the researchers were provided.

After reading the preamble to allow for informed consent, participants needed to answer a question at the bottom of the landing page that asked if they agreed to participate in the study or not. If they indicated 'Yes, I give my consent to participate in the study' by clicking the radio button, they proceeded to complete the questionnaire. However, if they indicated 'No, I do not give my consent and do not wish to participate in the study', the survey was terminated with a thank you message.

An incentive was further provided in the form of a lucky draw. Respondents stood a chance of winning one of three R500.00 (five hundred Rand) Takealot shopping vouchers (an online

retailer). At the end of the survey, respondents were given an opportunity to take part in this lucky draw by voluntarily entering their e-mail address. E-mail addresses were used only for the purpose of choosing the winners of the three prizes and were not be linked to any specific responses. A random number generator was used to pick the three winners and, once this was done, the winners were contacted and all the e-mail addresses were deleted to ensure that it was not part of the data file.

Before commencing with data collection, ethical clearance and the questionnaire for the research study were obtained from the UCT Commerce Research in Ethics Committee (see letter attached in Appendix B).

3.6. Statistical analysis

Before the descriptive and inferential statistical analyses were conducted, the measurement properties of each of the sub-scales, i.e. its validity and reliability, were assessed. The construct validity of the scale was assessed by utilising factor analysis (FA), more specifically principal component analysis (PCA). The reliability or internal consistency of each sub-scale was assessed by means of calculating the Cronbach's alpha coefficient and following the SPSS item analysis procedure.

To summarise the data, descriptive statistics were calculated. Thereafter, various inferential statistical analyses were conducted to find support for the hypotheses stated above, including calculating Pearson product moment correlations coefficients and using hierarchical multiple regression. The Statistical Programme for the Social Sciences (SPSS version 25) was utilised for the purpose of analysing the data obtained in the present study.

CHAPTER 4

RESULTS

The primary objective of the present research study, as described in Chapter 1, was to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities. In this chapter, the results of the data analysis, which were based on the data, which was collected for the purposes of the current study (n = 61) as per the research methodology discussed in the previous chapter, are presented.

As described above, the measurement properties, i.e. the construct validity and reliability of each sub-scale was first assessed utilising principal component analysis (PCA). The reliability or internal consistency of each sub-scale was then assessed by means of calculating the Cronbach's alpha coefficient and following the SPSS item analysis procedure. Finally, descriptive and inferential statistics were calculated in line with the objectives of the research study discussed above. The results of the null-hypothesis testing procedures conducted are presented here and discussed further in the next chapter.

4.1. Assessing unidimensionality

Before calculating descriptive statistics and further conducting inferential statistical analyses, the measurement properties of the three sub-scales that were used to measure the selected constructs under investigation, i.e. leadership, innovative management practices and organisational performance capabilities, were assessed. This was done to ensure that the measures of the selected constructs were valid and reliable and, therefore, appropriate to base inferences on.

The construct validity of each sub-scale was assessed utilising factor analysis (FA). Tabachnick and Fidell (2014) suggested the use of FA when the purpose is to obtain an empirical summary of a data set. For the sub-scales which were designed to be unidimensional, PCA was conducted utilising the principal components extraction method. Given that the sub-scales were considered to be unidimensional, as suggested above, no rotation method was employed. The measurement model of the transformation leadership and Leadership 4.0 sub-scales consisted

of items that were thought to load on four and three dimensions, respectively. Therefore, exploratory factor analysis (EFA) was conducted on the data collected with the transformational leadership and Leadership 4.0 sub-scales utilising the principal axis factoring extraction method and employing the Direct Oblimin rotation method. An oblique rotation method, i.e. Direct Oblimin, that assumes that the dimensions are inter-correlated was utilised, rather than an orthogonal rotation method, which assumes independent factors (Tabachnick & Fidell, 2014).

To first assess the factorability of the data, i.e. if it was indicated that the data was appropriate for the FA, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity (BTS) were calculated. Tabachnick and Fidell (2014) suggested that a KMO statistic of .6 or more indicates that it may be appropriate to conduct FA on the data. Pallant (2016) further suggested that, for conducting FA to be deemed appropriate, the BTS should be statistically significant ($p < .05$).

To determine the appropriate number of components to be retained, both Kaiser's criterion and the so-called scree plot test were employed. According to Kaiser's criterion, factors with an eigenvalue of greater than 1.0 are believed to indicate meaningful or interpretable factors or components which should be retained (Pallant, 2016). According to the scree plot test, Cattell (1966) recommended retaining the number of factors indicated above the break or 'elbow' of the scree plot.

Once it was deemed appropriate to conduct FA on the data utilising the methods described above, i.e. that the data was factorable, the number of components to be extracted was determined. The component matrix was then inspected. Items with factor loadings greater than .4 were retained, i.e. slightly higher than Cohen's (1988) guideline for practical significance (i.e. $r > .3$). This inclusion (or exclusion) criterion was applied iteratively until a 'clean' component structure was obtained. Item inter-correlations were further inspected and should be greater than .3 to retain an item (Tabachnick and Fidell, 2014).

The internal consistency or reliability of each sub-scale was assessed by calculating Cronbach's alpha coefficient and utilising SPSS's item analysis procedure. According to Tabachnick and Fidell (2014), a Cronbach's alpha coefficient of equal to or larger than 0.7 is considered to indicate satisfactory reliability or internal consistency.

The results of the assessments of the measurement properties of each sub-scale are reported below.

4.1.1. Transactional leadership

As described in the previous chapter, the transactional leadership sub-scale consisted of six items measuring two dimensions, namely 1) management-by-exception (3 items) and 2) contingent reward (3 items). The factorability of the data was believed to be satisfactory (KMO = .61, i.e. $>.6$; BTS was significant, i.e. $p < .01$) (Pallant, 2016). As such, PCA was performed on the data obtained using the Transactional Leadership sub-scale, utilising the Principal components extraction method.

A single component emerged, i.e. only one component revealed an eigenvalue greater than 1.0 (eigenvalue = 2.0, which explained 49% of the variance). All the items were loaded on this single component and were based on the inclusion/exclusion criterion. They were all retained ($.58 < r < .76$, i.e. $>.4$). Considering the item wording, it was deemed appropriate to label the component 'Transactional Leadership'.

Cronbach's alpha coefficient for the sub-scale was found to be satisfactory and indicative of a reliable measure of the transactional leadership construct (Cronbach $\alpha = .7$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014). In addition, the SPSS item-analysis procedure indicated that removing any of the items would not yield a greater Cronbach's alpha coefficient and, therefore, that all items could be retained.

Based on the basket of evidence discussed above, the transactional leadership sub-scale had demonstrated satisfactory measurement properties, i.e. have demonstrated construct validity

and internal consistency or reliability. Therefore, it was deemed appropriate to use these measures of the construct in further statistical analyses. A composite score for the transactional leadership construct was calculated and is reported in Table 3 (on p.55 below).

4.1.2. Transformational leadership

As described above, the transformational leadership sub-scale consisted of 14 items measuring four dimensions, namely 1) idealised influence (4 items), 2) inspirational motivation (3 items), 3) intellectual stimulation (3 items) and 4) individual consideration (4 items). The factorability of the data was believed to be satisfactory and, therefore, appropriate to conduct FA on (KMO = .68, i.e. >.6; and BTS was found to be significant, i.e. $p < .01$) (Pallant, 2016).

Given that the transformational leadership sub-scale consisted of four dimensions, as described above, exploratory factor analysis (EFA) was conducted utilising the principal axis factoring extraction and Direct Oblimin rotation method to assess construct validity. However, support for the original measurement model comprising of four dimensions was not found, and the items converged into a single factor. It was decided that PCA was to be used to find support for a unidimensional transformational leadership scale with the aim of maintaining consistency.

Therefore, PCA was employed and a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 6.4, which explained 45.3% of the variance). Based on the inclusion/exclusion criterion, item 19 was removed ($r = .38$, i.e. $<.4$). PCA was run again on the remaining items. Based on the inclusion/exclusion criterion, all the remaining items were retained ($.53 < r < .84$, i.e. $>.4$) and a so-called ‘clean’ factor structure was obtained. The component was labelled ‘Transformational Leadership’.

The Cronbach’s alpha coefficient for the sub-scale was calculated and found to be satisfactory and indicative of a reliable measure of the construct (Cronbach $\alpha = .91$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014). The SPSS item-analysis procedure further indicated that removing any of the remaining items did not yield a higher Cronbach’s alpha coefficient and, therefore, were retained.

From the evidence discussed above, the transactional leadership sub-scale had demonstrated satisfactory measure properties. Therefore, it was considered appropriate to use this as a measure of the construct in further statistical analyses. A composite score for the transactional leadership sub-scale was then calculated and is reported in Table 3 (on p.55 below).

4.1.3. Leadership 4.0

The Leadership 4.0 sub-scale consisted of 16 items, which were designed to measure three respective dimensions, namely 1) engagement, 2) empowerment and 3) enthusiasm.

Given that the Leadership 4.0 sub-scale consisted of three dimensions, as described above, exploratory factor analysis (EFA) was conducted utilising the principal axis factoring extraction and Direct Oblimin rotation method to assess construct validity. However, support for the measurement model comprising of three dimensions was not found, and the items converged into a single factor. PCA was used to assess construct validity with the aim of maintaining consistency. Thus, unidimensionality of each one of the dimensions was assessed utilising PCA.

The measurement properties for each of the sub-groups of items designed to measure each of the dimensions, consistent with the approaches above, were assessed individually utilising PCA. The results of these analyses are reported below.

4.1.3.1. Engagement dimension

The engagement dimension consisted of six items. The KMO statistic was indicated to be satisfactory (KMO = .71, i.e. >.6) (Pallant, 2016) and the BTS was found to be significant ($p < .01$). It was believed that these results suggested the factorability of the data. PCA was performed utilising the principal components extraction method. Based on the results of the PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 2.9, which explained 48.6% of the variance). All the items loaded satisfactorily on this single component based on the inclusion/exclusion criterion and were, therefore, all retained ($.58 < r < .80$, i.e. >.4). Considering the item wording, it was deemed appropriate to label the component 'Engagement'. The Cronbach's alpha coefficient of the sub-

scale was found to be satisfactory and indicative of a reliable measure of the construct (Cronbach $\alpha = .76$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

4.1.3.2. Empowerment dimension

The empowerment dimension consisted of five items. As with the other dimensions' scales, the factorability of the data was indicated to be satisfactory (KMO = .70, i.e. $> .6$; and BTS was found to be significant, i.e. $p < .01$) (Pallant, 2016). PCA was employed and revealed a single interpretable component, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 2.4, which explained 48.1% of the variance). All the items loaded satisfactorily on this single component based on the inclusion/exclusion criterion and were, therefore, all retained ($.54 < r < .78$, i.e. $> .4$). Based on the item phrasing, the component was subsequently labelled 'Empowerment'. The Cronbach's alpha coefficient of the sub-scale was found to be satisfactory and indicative of a reliable measure of the construct (Cronbach $\alpha = .72$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

4.1.3.3. Enthusiasm dimension

The enthusiasm dimension consisted of four items. The KMO statistic indicated to be satisfactory (KMO = .78, i.e. $> .6$) (Pallant, 2016) and the BTS was found to be significant ($p < .01$). This confirmed the factorability of the data. From the PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 2.6, which explained 65.3% of the variance). All the items loaded on this single component and based on the inclusion/exclusion criterion, they were all retained ($.67 < r < .88$, i.e. $> .4$). The component was labelled 'Enthusiasm,' based on the item wording. The Cronbach's alpha coefficient of the sub-scale was found to be satisfactory and indicative of a reliable measure of the construct (Cronbach $\alpha = .82$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

Applying the SPSS item-analysis procedure on each of the above dimensions indicated that removing any of the items would not yield an increased Cronbach's alpha coefficient and, therefore, no items were removed.

Based on the basket of evidence presented above, the dimension scales in the Leadership 4.0 sub-scale had demonstrated satisfactory measurement properties. The composite scores for each of the dimensions (engagement, empowerment and enthusiasm) were calculated (see Table 3 on p.55 below) and was deemed appropriate to be used as a valid and reliable measure of the Leadership 4.0 dimension.

4.1.4. Organising and information sharing

The organising and information sharing sub-scale consisted of eight items, which were designed to measure 1) the approach to project management, 2) collaboration, 3) organisation, 4) locus of decision-making, 5) information sharing, 6) information availability, 7) strategy and 8) innovation.

The KMO statistic was indicated to be satisfactory (KMO = .72, i.e. >.6) (Pallant, 2016) and the BTS was found to be significant ($p < .01$). These results established the factorability of data. Therefore, PCA was considered appropriate.

Based on the results from the PCA, the items loaded on a single component, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 3.2, which explained 39.6% of the variance). Based on the inclusion/exclusion criterion, all items loaded satisfactorily on this single component, and, therefore, all items were retained ($.46 < r < .78$, i.e. >.4). Based on the item wording, it was deemed appropriate to label the component ‘Organising & Information Sharing.’

The Cronbach’s alpha coefficient was further found to be satisfactory and indicative of a reliable measure (Cronbach $\alpha = .78$; i.e. $\geq .7$) (Tabachnick & Fidell, 2014). The SPSS item-analysis procedure further indicated that removing any of the items would not yield a greater Cronbach’s alpha coefficient and, therefore, that all items be retained.

From the evidence discussed above, this sub-scale demonstrated satisfactory measurement properties, i.e. construct validity and internal consistency or reliability, and it was deemed

appropriate to use these measures of the construct in further statistical analyses. A composite score for the organising and information sharing sub-scale was then calculated and is reported in Table 3 (on p.55 below).

4.1.5. Human resource management

The human resource management sub-scale consisted of 11 items measuring the approach to 1) job sharing and rotation, 2) individual performance indicators, 3) technology skills development, 4) training, 5) job titles and descriptions, 6) individual purpose, 7) flexibility of work practices, 8) work automation, 9) performance management, 10) change management and 11) scope of performance appraisals.

The factorability of the data was indicated to be satisfactory (KMO = .76, i.e. >.6) and BTS was found to be significant, i.e. $p < .01$) (Pallant, 2016). These results established the factorability of the data, and the 11 items were subjected to PCA.

PCA was employed on the data obtained using the human resource management practices sub-scale, from which a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 4.4, which explained 40.2% of the variance). Based on the inclusion/exclusion criterion, item 8 was removed ($r = .39$; i.e. >.4). PCA was run again on the remaining items. Based on the inclusion/exclusion criterion, all the remaining items were retained ($.50 < r < .83$, i.e. >.4). Considering the phrasing of the related items, the component was labelled 'Human Resource Management.'

The Cronbach's alpha coefficient was found to be satisfactory (Cronbach $\alpha = .85$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014). The SPSS item-analysis procedure further indicated that removing any of the items would not yield a greater Cronbach's alpha coefficient and, therefore, that all items be retained.

Based on the basket of evidence presented above, this sub-scale had demonstrated satisfactory measurement properties and it was deemed appropriate to use these measures of the construct

in further statistical analyses. A composite score for the human resource management sub-scale was then calculated (see Table 3 on p.55 below) and to be used as a measure for the human resource management construct.

4.1.6. Stakeholder management

The stakeholder management and value creation sub-scale consisted of eight items which were designed to measure the management practices approach to 1) stakeholder identification, 2) partner relationships, 3) environmental and social initiatives, 4) decision-making implementation, 5) marketing and sales, 6) purpose, 7) community building and 8) competition.

Before performing PCA, the factorability of the data was assessed. The KMO statistic was found to be satisfactory (KMO = .77, i.e. >.6) (Pallant, 2016) and the BTS was found to be significant ($p < .01$), supporting the factorability of the data. PCA was performed, utilising the principal components extraction method.

Based on the PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 3.9). This single component explained 48.9% of the variance. All items loaded satisfactorily on this single component based on the inclusion/exclusion criterion and were, therefore, all retained ($.56 < r < .81$, i.e. >.4). The component was labelled 'Stakeholder Management,' which was deemed appropriate given the item wording. The Cronbach's alpha coefficient was found to be satisfactory (Cronbach $\alpha = .85$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

From the basket of evidence presented above, the stakeholder management sub-scale demonstrated satisfactory measurement properties. Therefore, it was deemed appropriate to use these measurements of the construct in further statistical analysis. A composite score was subsequently calculated for this sub-scale (see Table 3 on p.55 below) and to be used as a measure of the stakeholder management construct.

4.1.7. Risk management

The risk management sub-scale consisted of eight items which were designed to measure the risk management practices specific to technology and data, such as 1) data privacy policies, 2) risk mitigation, 3) risk anticipation procedures, 4) policy formulation, 5) ethical use of data, 6) risk appetite, 7) crisis management and 8) technology impact.

The KMO was found to be satisfactory (KMO = .83, i.e. >.6) (Pallant, 2016) and the BTS was found to be significant ($p < .01$). These results established the factorability of data, and therefore, PCA was considered appropriate.

Based on the PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 4.5, which explained 56.2% of the variance). All the items loaded on this single component and, based on the inclusion/exclusion criterion, they were all retained ($.57 < r < .83$, i.e. >.4). Considering the item phrasing, it was deemed suitable to label this component 'Risk Management.'

The Cronbach's alpha coefficient was found to be satisfactory (Cronbach $\alpha = .88$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014). The SPSS item-analysis procedure further indicated that removing any of the items would not yield a greater Cronbach's alpha coefficient and, therefore, that all items be retained.

Based on the basket of evidence, discussed above, the risk management sub-scale demonstrated satisfactory measurement properties, i.e. construct validity and internal consistency or reliability. As such, it was deemed appropriate to use these measures of the construct in further statistical analyses. A composite score for the risk management sub-scale was then calculated (see Table 3 on p.55 below) and further used as a measure of the risk management construct.

4.1.8. Human capital

The human capital sub-scale consisted of eight items which were designed to assess the current state of human capital capabilities deemed important for organisational performance in the 4IR.

The factorability of the data was indicated to be satisfactory (KMO = .82, i.e. >.6) and BTS was found to be significant, i.e. $p < .01$) (Pallant, 2016). This confirmed the factorability of the data.

From the PCA employed, on the data obtained using the human capital capabilities sub-scale, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 4.6), which explained 51.4% of the variance. All items were retained based on the inclusion/exclusion criterion ($.50 < r < .80$, i.e. >.4). Given the item wording, it was deemed appropriate to label the component 'Human Capital.' The Cronbach's alpha coefficient was found to be satisfactory (Cronbach $\alpha = .85$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

From the basket of evidence presented above, the human capital sub-scale demonstrated satisfactory measurement properties. Therefore, it was deemed appropriate to use these measurements of the construct in further statistical analysis. A composite score for the human capital sub-scale was then calculated (see Table 3 on p.55 below) and to be used further as a measure of the human capital construct.

4.1.9. Digital risk management

The digital risk management sub-scale consisted of nine items which were designed to assess the current state of digital risk management deemed important for organisational performance in the 4IR.

The factorability of the data was indicated to be satisfactory (KMO = .87, i.e. >.6) (Pallant, 2016) and BTS was significant, i.e. $p < .01$ (Pallant, 2016). Therefore, PCA was considered appropriate.

Based on PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 4.9, which explained 54.4% of the variance). All items loaded on this single component and were retained based on the inclusion/exclusion criterion ($.58 < r < .83$, i.e. >.4). Considering the item wording, it was considered suitable to label the component

‘Digital Risk Management.’ The Cronbach’s alpha coefficient was found to be satisfactory (Cronbach $\alpha = .90$, i.e. $\geq .7$) (Tabachnick & Fidell, 2014).

The basket of evidence presented above indicated that the digital risk management sub-scale demonstrated satisfactory measurement properties and it was, therefore, deemed appropriate to use these measurements of the construct in further statistical analysis. A composite score was subsequently calculated for digital risk management and is reported in Table 3 (on p.55 below).

4.1.10. Business model value creation

The business model value creation and service orientation sub-scale consisted of seven items which were designed to assess the current state of business model value creation and service orientation deemed important for organisational performance in the 4IR.

Before performing PCA, the factorability of the data was assessed. The KMO statistic was found to be satisfactory (KMO = .78, i.e. $> .6$) (Pallant, 2016) and the BTS was found to be significant ($p < .01$), supporting the factorability of the data.

Based on PCA, a single component emerged, i.e. only one component revealed an eigenvalue greater than 1 (eigenvalue = 4.0, which explained 57.4% of the variance). However, based on the inclusion/exclusion criterion, item 8 was removed ($r = .39$, i.e. $< .4$). PCA was run again on the remaining items. Based on the inclusion/exclusion criterion, all the remaining items were retained ($.67 < r < .82$, i.e. $> .4$). The component was labelled 'Business Model Value Creation', which was considered appropriate given the item wording.

The Cronbach’s alpha coefficient was found to be satisfactory (Cronbach $\alpha = .89$, i.e. $\geq .7$) (Tabachnick and Fidell, 2014). The SPSS item-analysis procedure further indicated that removing any of the items would not yield a greater Cronbach’s alpha coefficient and, therefore, that all items be retained.

Based on the basket of evidence discussed above, this sub-scale demonstrated satisfactory measure properties, i.e. construct validity and internal consistency or reliability. Therefore, it was deemed appropriate to use these measures of the construct in further statistical analyses. A composite score for the business model value creation sub-scale was then calculated (see Table 3 on p.55 below) and to be used as a measure of the business model value creation construct.

4.1.11. Assessing unidimensionality conclusion

The results presented above indicate that all the sub-scales indicated satisfactory construct validity utilising PCA and confirm the factorability of the data through satisfactory KMO and BTS. All sub-scales also indicated satisfactory internal consistency (Cronbach $\alpha \geq .7$). Given these findings, all sub-scales were deemed appropriate measures of the constructs under investigation for further analysis. Composite scores were calculated for each sub-scale and are reported in Table 3 under 'Descriptive statistics'.

4.2. Descriptive statistics

Descriptive statistics were calculated using the composite scores for each of the sub-scales, including calculating the mean, standard deviation, kurtosis and skewness, as well as identifying the minimum and maximum values. A summary of the descriptive statistics, per sub-scale, are presented in Table 3 below.

Table 3: Descriptive statistics for all factor analysis derived sub-scales

	n	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
TAL	61	1.5 ¹	5.0 ¹	3.5 ¹	0.73	-0.3	-0.3
TFF	61	2.3 ¹	5.0 ¹	3.7 ¹	0.73	-0.1	-1.0
ENG	61	2.3 ¹	5.0 ¹	3.7 ¹	0.70	-0.3	-0.8
EMP	61	2.2 ¹	5.0 ¹	3.7 ¹	0.75	-0.3	-1.0
ENTH	61	1.5 ¹	5.0 ¹	3.5 ¹	0.88	-0.4	-0.6
OI	61	1.5 ²	6.8 ²	4.2 ²	1.19	0.0	-0.3
HRM	61	2.0 ²	6.7 ²	4.7 ²	1.14	-0.5	-0.4
SHM	61	1.9 ²	7.0 ²	4.9 ²	1.17	-0.3	-0.2
RM	61	1.3 ²	7.0 ²	4.8 ²	1.33	-0.4	-0.6
HC	61	2.4 ¹	5.0 ¹	4.0 ¹	0.74	-0.5	-0.7
DRM	61	2.1 ¹	5.0 ¹	3.9 ¹	0.72	-0.2	-0.5
BMVC	61	2.9 ¹	5.0 ¹	4.3 ¹	0.66	-0.7	-0.7
PCTotal	61	2.9 ¹	5.0 ¹	4.0 ¹	0.60	-0.3	-0.8

Note: ¹ based on a five-point Likert-type response scale; ² based on a seven-point Likert-type response scale

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management, HC = Human Capital, DRM = Digital Risk Management, BMVC = Business Model Value Creation, PCTotal = Total Performance Capability.

The mean scores on all the leadership style constructs indicated a slightly higher than average perceived rating on leadership styles, i.e. > the mid-point of 3 on a 5-point Likert-type response scale. The mean scores for the management practices scales also indicated a slightly higher than average perceived rating of innovative management practices (>3). However, the mean scores for the constructs related to organisational performance capabilities indicated a higher than average perceived rating, which may be indicative of high-performing organisations.

Tabachnick and Fidell (2014) suggested that skewness and kurtosis values between -1 and 1 are indicative of a normal distribution. The skewness and kurtosis values presented in Table 3 fell within this acceptable normal distribution range, with values that begin negatively and were slightly skewed to the right. Boxplots (see Figures 4 to 6 below) for each of the sub-scales indicated there were no outliers in the data.

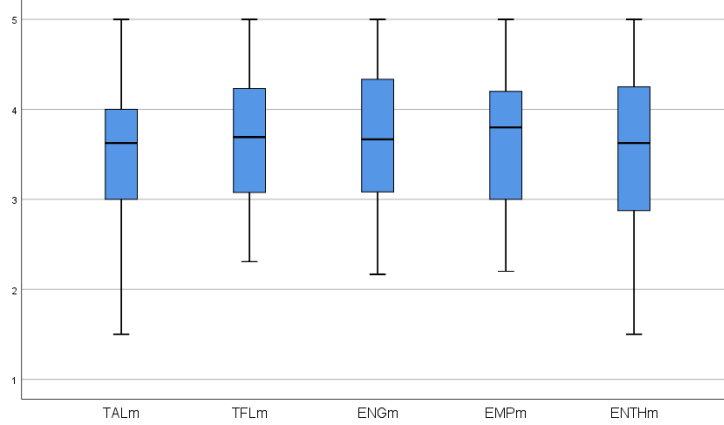


Figure 4. Leadership styles constructs boxplot

Note: TALm = Transactional Leadership; TFLm = Transformational Leadership; ENGm = Engagement; EMPm = Empowerment; ENTHm = Enthusiasm.

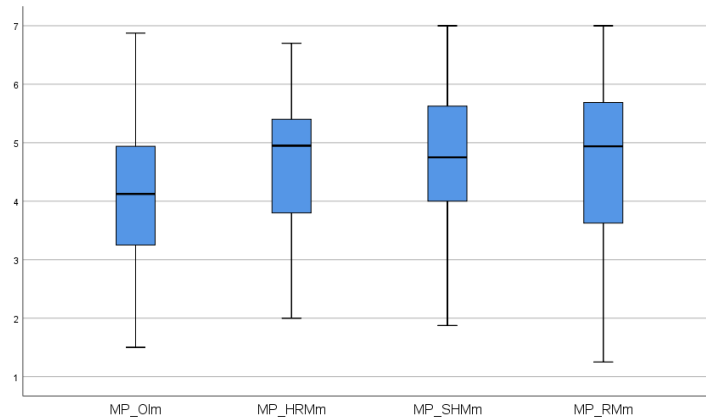


Figure 5. Management practices constructs boxplot

Note: MP_OIm = Organising and Information Sharing; MP_HRMm = Human Resource Management; MP_SHMm = Stakeholder Management; MP_RMm = Risk Management.

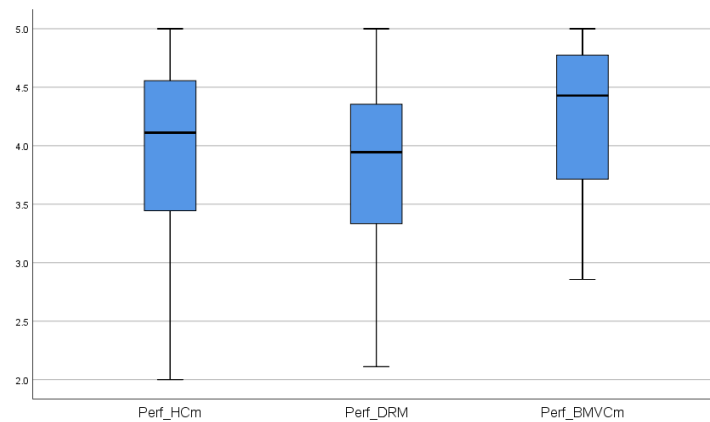


Figure 6. Organisational performance capability constructs boxplot

Note: Perf_HCm = Human Capital; Perf_DRMm = Digital Risk Management; Perf_BMVCm = Business Model Value Creation.

4.3. Assessing the relationships between the selected variables

Before investigating the relationships between variables, z-scores were calculated for each of the variables under investigation to allow for comparison of scores on the different variables. As described above, some of the variables were responded to on a 7-point Likert-type response scale, while other sub-scales made use of a 5-point Likert-type sub-scale. This was done by standardising the distribution, as was suggested by Tabachnick and Fidell (2014).

The relationship between leadership styles, innovative management practices and organisational performance capabilities were investigated by calculating Pearson correlation coefficients using the calculated z-scores.

Cohen (1988) suggested the following narrative guidelines for interpreting the strength of the correlations between variables:

- Small/low ($r = .10$ to $.29$)
- Medium/moderate ($r = .30$ to $.49$)
- Large/strong ($r = .50$ to 1.0).

To learn more about the distribution of the sample statistic and given the small size of the sample ($n = 61$), the bootstrap method was employed. Bootstrapping was set at 1000 sample and resamples, with a 95% confidence interval on the lower and upper case. The results of this analysis are reported in Table 4 below.

Table 4: The relationship between leadership styles and management practices based on z-scores.

			OI	HRM	SHM	RM	
TAL	Pearson Correlation		.36**	.39**	.52**	.52**	
	Bootstrap ^c	Bias	-.00	-.00	.00	.00	
		Std. Error	.12	.12	.10	.09	
		95% CI	Lower	.11	.15	.31	.32
			Upper	.56	.61	.71	.69
TFL	Pearson Correlation		.40**	.45**	.52**	.43**	
	Bootstrap ^c	Bias	-.01	-.01	.00	.00	
		Std. Error	.13	.10	.09	.12	
		95% CI	Lower	.12	.24	.34	.17
			Upper	.61	.64	.69	.65
ENG	Pearson Correlation		.35**	.45**	.46**	.426**	
	Bootstrap ^c	Bias	-.01	-.01	.00	.00	
		Std. Error	.12	.09	.09	.12	
		95% CI	Lower	.11	.24	.28	.18
			Upper	.54	.62	.63	.63
EMP	Pearson Correlation		.40**	.33**	.48**	.39**	
	Bootstrap ^c	Bias	-.01	-.01	.00	.00	
		Std. Error	.13	.12	.10	.12	
		95% CI	Lower	.13	.08	.28	.15
			Upper	.62	.55	.65	.62
ENTH	Pearson Correlation		.37**	.37**	.48**	.38**	
	Bootstrap ^c	Bias	-.00	-.01	.00	.00	
		Std. Error	.12	.11	.09	.12	
		95% CI	Lower	.09	.14	.31	.13
			Upper	.57	.57	.64	.61

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

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

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management.

For the study sample ($n = 61$), the correlation analysis indicated statistically significant relationships ($p < .05$) between all the leadership and innovative management practices constructs. It was noted that the correlation analysis indicated a strong statistically significant positive relationship between transactional leadership and stakeholder management ($r = .52$, $p < .01$, i.e. $>.50$; Cohen, 1988), as well as risk management ($r = .52$, $p < .01$). A strong statistically significant positive relationship was also indicated between transformational leadership and stakeholder management ($r = .52$, $p < .01$). Moreover, a moderate statistically significant relationship was identified between Leadership 4.0 constructs (i.e. engagement, empowerment and enthusiasm) and all innovative management practices constructs. These findings are discussed further in Chapter 5.

The evidence provided above, together with the bootstrapping estimation values, confirmed that there is a statistically significant positive relationship ($p < .05$) between the leadership style constructs and the innovative management practices constructs. Based on the results reported here, it was suggested that Hypothesis 1 was corroborated, i.e. that a statistically significant positive relationship exists between the selected Leadership 4.0 constructs, i.e. engagement, empowerment and enthusiasm, and all innovative management practices constructs.

Table 5: The relationship between leadership styles and organisational performance capabilities based on the transformed data

		HC	DRM	BMVC	PCTotal		
TAL	Pearson Correlation	.71**	.54**	.43**	.67**		
	Bootstrap ^c	Bias	.00	-.00	-.00	.00	
		Std. Error	.06	.09	.09	.07	
		95% CI	Lower	.59	.32	.25	.53
			Upper	.81	.70	.59	.78
TFL	Pearson Correlation	.80**	.38**	.62**	.71**		
	Bootstrap ^c	Bias	.00	.00	-.00	-.00	
		Std. Error	.05	.11	.08	.06	
		95% CI	Lower	.70	.14	.43	.57
			Upper	.89	.59	.76	.82
ENG	Pearson Correlation	.80**	.39**	.59**	.70**		
	Bootstrap ^c	Bias	-.00	.00	-.00	-.00	
		Std. Error	.05	.11	.09	.07	
		95% CI	Lower	.68	.16	.39	.55
			Upper	.87	.60	.74	.82
EMP	Pearson Correlation	.78**	.42**	.60**	.71**		
	Bootstrap ^c	Bias	.00	.00	-.00	.00	
		Std. Error	.05	.11	.09	.07	
		95% CI	Lower	.66	.19	.40	.56
			Upper	.86	.62	.74	.83
ENTH	Pearson Correlation	.82**	.40**	.63**	.73**		
	Bootstrap ^c	Bias	.00	.01	-.00	.00	
		Std. Error	.04	.12	.07	.06	
		95% CI	Lower	.73	.17	.48	.61
			Upper	.88	.62	.75	.83

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

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

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; HC = Human Capital, DRM = Digital Risk Management, BMVC = Business Model Value Creation, PCTotal = Total Performance Capability.

For the study sample ($n = 61$), the correlation analysis indicated statistically significant positive relationships between all leadership style and organisational performance capability constructs. Among all the leadership style constructs, transactional leadership indicated the strongest statistically significant positive relationship with digital risk management ($r = .54, p < .01$). The analysis further showed that enthusiasm (a Leadership 4.0 construct) indicated the

strongest statistically significant positive relationship with all other organisational performance capability constructs, excluding risk management, as mentioned before. These findings are discussed further in Chapter 5.

The above evidence presented on the relationships identified between leadership styles and organisational performance capabilities, together with the bootstrapping estimation values, confirms there is a statistically significant positive relationship between the leadership style constructs and the organisational performance capability constructs. Furthermore, the above evidence suggests that Hypothesis 3 was corroborated in that a statistically significant positive relationship was found between Leadership 4.0 constructs (i.e. engagement, empowerment and enthusiasm) and all organisational performance capability constructs.

Table 6: The relationship between management practices and organisational performance capabilities

				HC	DRM	BMVC	PCTotal
OI	Pearson Correlation			.32*	.17	.27*	.30*
	Bootstrap ^c	Bias		-.00	.00	-.01	-.00
		Std. Error		.11	.15	.12	.12
		95% CI	Lower	.09	-.13	.01	.04
			Upper	.52	.45	.50	.51
HRM	Pearson Correlation			.42**	.21	.29*	.36**
	Bootstrap ^c	Bias		-.01	.00	-.01	-.01
		Std. Error		.11	.13	.12	.11
		95% CI	Lower	.18	-.08	.03	.15
			Upper	.61	.46	.49	.55
SHM	Pearson Correlation			.55**	.53**	.38**	.58**
	Bootstrap ^c	Bias		.00	-.00	.00	.00
		Std. Error		.08	.10	.10	.08
		95% CI	Lower	.39	.31	.16	.40
			Upper	.69	.70	.57	.73
RM	Pearson Correlation			.40**	.59**	.35**	.53**
	Bootstrap ^c	Bias		.00	.00	.01	.00
		Std. Error		.12	.10	.12	.10
		95% CI	Lower	.17	.36	.11	.31
			Upper	.62	.77	.57	.72

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

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

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

Note: OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management; HC = Human Capital, DRM = Digital Risk Management, BMVC = Business Model Value Creation, PCTotal = Total Performance Capability.

For the study sample ($n = 61$), the correlation analysis indicated statistically significant positive relationships between all innovative management practices and organisational performance

capability constructs, except for the relationship between organising and information sharing, as well as human resource management, and digital risk management, which was found to not be significant ($p > .05$).

Strong statistically significant positive relationships (i.e. $r > .5$) (Cohen 1988) were found between stakeholder management and human capital ($r = .55, p < .01$), digital risk management ($r = .53, p < .01$), as well as total performance capability ($r = .58, p < .01$). Strong statistically significant positive relationships were also identified between risk management and digital risk management ($r = .59, p < .01$), as well as total performance capability ($r = .53, p < .01$).

The abovementioned evidence presented on the relationships identified between innovative management practices and organisational performance capabilities, together with the bootstrapping estimation values, confirms there is a statistically significant positive relationship between all the innovative management practices constructs and the total performance construct. Furthermore, the above evidence suggests that Hypothesis 2 was corroborated in that a statistically significant positive relationship was found between innovative management practices constructs and all organisational performance capabilities constructs.

4.4. Multiple regression

Hierarchical multiple regression was used to estimate the amount of variance in the dependent variable (DV) that could statistically significantly be explained by regression models consisting of several independent variables (IV's). It was further assessed whether the IV's explained unique variance in the DV over and above that which was explained by the regression model.

Multicollinearity was assessed by calculating the variance inflation factor (VIF) and tolerance indicator. VIF values exceeding 10 and tolerance indicator values smaller than .10 are believed to indicate the presence of multicollinearity (Pallant, 2016). In the regression models presented below, the first regression model consisted of demographic variables, i.e. age and gender, and was included to determine how much additional variance was explained in the DV by the explanatory variables (IV's) under investigation.

4.4.1. Using hierarchical multiple regression to assess the relationship between leadership styles, innovative management practices (IV's) and organisational performance capabilities (DV).

Several multiple regression analyses were conducted. The first regression model consisted of demographic IV's, as mentioned above. The second regression model consisted of the leadership style IV's, while the third model consisted of the innovative management practices IV's. Applying the criteria for assessing multicollinearity, the results suggested that multicollinearity was not found to be present (VIF < 10 and tolerance indicator values < .10; Pallant, 2016).

Tables 7 to 10 below summarises the results from the aforementioned multiple regression analysis.

4.4.1.1. Using the explanatory variables (IV's) to predict total performance capability

Table 7 below summarises the hierarchical multiple regression results for IV's predicting total performance capability.

Table 7: Using the explanatory variables (IV's) to predict total performance capability

Predictor Variable (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				.001	0.10	.04	.96
Demographics							
Age	.01	.29	.77				
Gender	.00	.01	.96				
Model 2				.606	60.5	11.43	.00
Demographics							
Age	.00	.26	.80				
Gender	-.08	-.59	.56				
Leadership Styles							
TAL	.21	1.42	.16				
TFL	-.15	-.56	.57				
ENG	.23	1.09	.28				
EMP	.24	1.32	.19				
ENTH	.34	1.94	.05*				
Model 3				.682	7.6	9.36	.00
Demographics							
Age	.01	.80	.43				
Gender	-.06	-.41	.68				
Leadership Styles							
TAL	.05	.34	.74				
TFL	-.17	-.68	.50				
ENG	.23	1.06	.29				
EMP	.26	1.19	.14				
ENTH	.33	1.96	.05*				
Innovative Management Practices							
OI	-.16	-1.18	.25				
HRM	-.03	-.18	.86				
SHM	.26	1.70	.10				
RM	.19	1.46	.15				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management. * $p < .05$ ** $p < .01$

The results above seemed to suggest that the selected leadership styles (IV's) contributed most to the statistically significant prediction of variance in total performance capabilities (60.5% of the total 68.2%), while innovative management practices IV's only presented a small contribution to this prediction (7.6% of the total 68.2%). Enthusiasm was found to be the only IV that explained unique variance in total performance capabilities, i.e. in addition to the amount of variance explained by the regression model, consisting of the selected demographic, leadership styles and innovative management practices variables (Model 3: $t = 1.96$, $p < 0.05$, $\beta = .33$).

4.4.1.2. Using the explanatory variables (IV's) to predict human capital

Table 8 below summarises the hierarchical multiple regression results for IV's predicting human capital.

Table 8: Using the selected explanatory variables (IV's) to predict variance in human capital

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.01	1.4	.42	.66
Demographics							
Age	.01	.70	.49				
Gender	.12	.59	.56				
Model 2				.75	73.5	22.21	.00
Demographics							
Age	.01	1.27	.21				
Gender	.05	.46	.65				
Leadership Styles							
TAL	.10	.88	.38				
TFL	-.01	-.06	.95				
ENG	.28	1.71	.09				
EMP	.16	1.19	.24				
ENTH	.38	2.79	.01**				
Model 3				.77	2.4	14.90	.00
Demographics							
Age	.01	1.21	.23				
Gender	.05	.38	.70				
Leadership Styles							
TAL	.05	.44	.67				
TFL	-.06	-.31	.76				
ENG	.26	1.52	.14				
EMP	.21	1.50	.14				
ENTH	.38	2.73	.01**				
Innovative Management Practices							
OI	-.14	-1.34	.19				
HRM	.09	.67	.50				
SHM	.15	1.23	.23				
RM	.01	.08	.93				

*Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management. * $p < .05$ ** $p < .01$

The first model presented above, consisting of demographic variables, did not statistically significantly predict variance in human capital. Results from the second model indicated that leadership styles IV's statistically significantly predicted the variance in human capital (73.5%). When adding innovative management practices IV's to the third model, it was found that the innovative management practices IV's significantly predicted only 2.4% of the total 77.3% variance in human capital. Therefore, these results suggest that leadership styles

explained most of the variance in the DV. Enthusiasm was again found to be the only IV that explained a unique variance in the DV ($t = 2.73, p < 0.05, \beta = .38$).

4.4.1.3. Using the explanatory variables (IV's) to predict digital risk management

Table 9 below summarises the hierarchical multiple regression results for IV's predicting digital risk management.

Table 9: Using the selected explanatory variables (IV's) to predict variance in digital risk management (DV)

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.00	0.4	.12	.89
Demographics							
Age	-.01	-.34	.74				
Gender	.07	.34	.73				
Model 2				.32	31.9	3.54	.00
Demographics							
Age	-.01	-.87	.39				
Gender	-.02	-.09	.93				
Leadership Styles							
TAL	.60	3.13	.00**				
TFL	-.46	-1.30	.20				
ENG	.11	.39	.70				
EMP	.15	.64	.53				
ENTH	.18	.77	.45				
Model 3				.53	20.7	4.91	.00
Demographics							
Age	-.00	-.17	.86				
Gender	.04	.23	.82				
Leadership Styles							
TAL	.34	1.86	.07				
TFL	-.45	-1.46	.15				
ENG	.11	.43	.67				
EMP	.16	.76	.45				
ENTH	.16	.77	.45				
Innovative Management Practices							
OI	-.25	-1.51	.14				
HRM	-.14	-.71	.48				
SHM	.41	2.16	.04*				
RM	.36	2.23	.03*				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management. * $p < .05$ ** $p < .01$

The results in Table 9 suggested that the selected demographic variables, once again, did not significantly predict variance in the DV. However, the second model, consisting of leadership styles as IV's, statistically significantly predicted digital risk management (31.9%), with

transactional leadership explaining a unique variance in the DV ($t = 3.13, p < 0.05, \beta = .60$). In the third model, innovative management practices also significantly predicted the variance in digital risk management (20.7% of the total 53%). Both stakeholder management ($t = 2.16, p < 0.05, \beta = .41$) and risk management practices were found to explain a unique variance in the DV ($t = 2.23, p < 0.05, \beta = .36$).

4.4.1.4. Using the explanatory variables (IV's) to predict business model value creation

Table 10 below summarises the hierarchical multiple regression results for IV's predicting business model value creation.

Table 10: Using the selected explanatory variables (IV's) to predict variance in business model value creation (DV)

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.02	2.0	.59	.56
Demographics							
Age	.01	.39	.70				
Gender	-.20	-1.01	.32				
Model 2				.48	45.4	6.70	.00
Demographics							
Age	.01	.72	.48				
Gender	-.26	-1.62	.11				
Leadership Styles							
TAL	-.20	-1.19	.24				
TFL	.10	.33	.75				
ENG	.19	.77	.44				
EMP	.29	1.40	.17				
ENTH	.29	1.46	.15				
Model 3				.49	2.0	4.26	.00
Demographics							
Age	.01	1.00	.32				
Gender	-.25	-1.40	.17				
Leadership Styles							
TAL	-.28	-1.55	.13				
TFL	.09	.29	.77				
ENG	.19	.71	.48				
EMP	.28	1.29	.21				
ENTH	.29	1.37	.18				
Innovative Management Practices							
OI	.01	.06	.95				
HRM	-.03	-.15	.88				
SHM	.09	.47	.64				
RM	.12	.73	.47				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm; OI = Organising and Information Sharing; HRM = Human Resource Management; SHM = Stakeholder Management; RM = Risk Management.
* $p < .05$ ** $p < .01$

The pattern of the above results suggested that leadership style IV's contributed most to the statistically significant prediction of variance in business model value creation (45.4%), while innovative management practices IV's only presented a small contribution to this prediction (2.0% of the total 49.4%). No IV's were identified that further explained a unique variance in the DV.

The above tables (Tables 7, 8, 9 and 10) indicated support for Hypothesis 5 in that the regression models consisting of Leadership 4.0 and innovative management practices significantly explain variance in organisational performance capabilities. Overall, it was also found that, between leadership styles and innovative management practices, leadership styles contributed most to the statistically significant prediction of variance in the various organisational performance capability DV's.

4.4.2. Using hierarchical multiple regression to assess the relationship between leadership styles (IV's) and innovative management practices (DV's).

Further hierarchical multiple regression analyses were conducted to assess the relationship between leadership styles and innovative management practices. The first regression model consisted of demographic IV's, i.e. age and gender. The second regression model consisted of the leadership style IV's. Applying the criteria for assessing multicollinearity, the results suggested that multicollinearity was not found to be present ($VIF < 10$ and tolerance indicator values $< .10$; Pallant, 2016).

Tables 11 to 14 below summarises the results from the aforementioned multiple regression analysis.

4.4.2.1. Using the explanatory variables (leadership style IV's) to predict organising and information sharing

Table 11 below summarises the hierarchical multiple regression results for leadership style IV's predicting organising and information sharing.

Table 11: Using the selected explanatory variables (IV's) to predict variance in organising and information sharing (DV)

Predictor Variables (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				.05	4.5	1.34	.27
Demographics							
Age	-.02	-.98	.33				
Gender	.26	1.31	.20				
Model 2				.22	17.1	2.05	.07
Demographics							
Age	-.02	-1.12	.27				
Gender	.22	1.15	.26				
Leadership Styles							
TAL	.12	.62	.54				
TFL	.19	.53	.60				
ENG	-.11	-.36	.72				
EMP	.14	.55	.59				
ENTH	.08	.32	.75				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm. * $p < .05$ ** $p < .01$

The pattern of the above results suggested that leadership style IV's statistically significantly predicted variance in organising and information sharing (17.1%). No IV's were identified that further explained a unique variance in the DV.

4.4.2.2. Using the explanatory variables (leadership style IV's) to predict human resource management

Table 12 below summarises the hierarchical multiple regression results for leadership style IV's predicting human resource management.

Table 12: Using the selected explanatory variables (IV's) to predict variance in human resource management (DV)

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.01	0.6	.18	.83
Demographics							
Age	-.01	-.48	.64				
Gender	.07	.37	.71				
Model 2				.24	23.3	2.34	.04
Demographics							
Age	-.01	-.52	.61				
Gender	.07	.39	.70				
Leadership Styles							
TAL	.15	.78	.44				
TFL	.33	.95	.35				
ENG	.25	.88	.38				
EMP	-.25	-1.03	.31				
ENTH	-.03	-.15	.89				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm. * $p < .05$ ** $p < .01$

The results in Table 12 suggested that demographic variables again did not significantly predict variance in the DV. However, the second model, consisting of leadership style IV's, did statistically significantly predict human resource management (23.3%), with no IV's further explaining unique variance.

4.4.2.3. Using the explanatory variables (leadership style IV's) to predict stakeholder management

Table 13 below summarises the hierarchical multiple regression results for leadership style IV's predicting stakeholder management.

Table 13: Using the selected explanatory variables (IV's) to predict variance in stakeholder management (DV)

Predictor Variables (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				.03	2.5	.74	.48
Demographics							
Age	-.01	-.41	.68				
Gender	.23	1.14	.26				
Model 2				.34	30.9	3.74	.00
Demographics							
Age	-.01	-.70	.49				
Gender	.21	1.17	.25				
Leadership Styles							
TAL	.30	1.61	.11				
TFL	.32	.95	.35				
ENG	-.13	-.49	.63				
EMP	-.05	-.21	.83				
ENTH	.13	.56	.58				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm. * $p < .05$ ** $p < .01$

The first model presented above, consisting of demographic variables, did not statistically significantly predict variance in stakeholder management. Results from the second model indicated that leadership style IV's statically significantly predicted the variance in stakeholder management (30.9%). No further IV's explaining unique variances were found.

4.4.2.4. Using the explanatory variables (leadership style IV's) to predict risk management

Table 14 below summarises the hierarchical multiple regression results for leadership style IV's predicting risk management.

Table 14: Using the selected explanatory variables (IV's) to predict variance in risk management (DV)

Predictor Variables (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				0.5	5.7	1.73	.19
Demographics							
Age	-.03	-1.71	.09				
Gender	-.15	-.74	.46				
Model 2				.36	30.4	4.21	.00
Demographics							
Age	-.03	-2.35	.02				
Gender	-.22	-1.25	.22				
Leadership Styles							
TAL	.53	2.96	.01**				
TFL	-.12	-.36	.72				
ENG	.17	.63	.53				
EMP	.02	.11	.91				
ENTH	-.05	-.22	.83				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; ENG = Engagement; EMP = Empowerment; ENTH = Enthusiasm. * $p < .05$ ** $p < .01$

The results in Table 14 suggested that demographic variables did not significantly predict variance in risk management. However, the second model, consisting of leadership style IV's, statistically significantly predicted variance in risk management (30.4%), with transactional leadership explaining a unique variance in the DV ($t = 2.96, p < 0.05, \beta = .53$).

4.4.3. Using hierarchical multiple regression to assess the relationship between leadership styles (IV's) and organisational performance capabilities (DV's)

A final set of hierarchical multiple regression analyses were conducted to assess the relationship between leadership styles and organisational performance capabilities. The first regression model consisted of demographic IV's, i.e. age and gender. The second regression model consisted of the leadership style IV's. Applying the criteria for assessing multicollinearity, the results suggested that multicollinearity was not found to be present (VIF < 10 and tolerance indicator values < .10; Pallant, 2016).

Tables 15 to 18 below summarises the results from the aforementioned multiple regression analysis.

4.4.3.1. Using the explanatory variables (leadership style IV's) to predict total performance capability

Table 15 below summarises the hierarchical multiple regression results for leadership style IV's predicting total performance capability.

Table 15: Using the selected explanatory variables (IV's) to predict variance in total performance capability (DV)

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.00	0.1	.04	.96
Demographics							
Age	.01	.29	.77				
Gender	.00	.01	1.0				
Model 2				.61	60.4	16.59	.00
Demographics							
Age	.00	.27	.79				
Gender	-.09	-.66	.51				
Leadership Styles							
TAL	.20	1.44	.16				
TFL	-.16	-.64	.52				
Lead 4.0	.77	3.05	.00**				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; Lead 4.0 = Leadership 4.0

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

The pattern of the above results suggests that leadership style IV's contributed most to the statistically significant prediction of variance in total performance capabilities (60.4%). Leadership 4.0 was found to be the only IV that explained a unique variance in total performance capabilities ($t = 3.05$, $p < 0.05$, $\beta = .77$).

4.4.3.2. Using the explanatory variables (leadership style IV's) to predict human capital

Table 16 below summarises the hierarchical multiple regression results for leadership style IV's predicting human capital.

Table 16: Using the selected explanatory variables (IV's) to predict variance in human capital (DV)

Predictor Variables (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				.01	1.4	.42	.66
Demographics							
Age	-.54	.70	.49				
Gender	.01	.59	.56				
Model 2				.75	73.2	31.74	.00
Demographics							
Age	.01	1.28	.21				
Gender	.03	.32	.75				
Leadership Styles							
TAL	.09	.81	.42				
TFL	-.01	-.06	.95				
Lead 4.0	.77	3.95	.00**				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; Lead 4.0 = Leadership 4.0; * $p < .05$ ** $p < .01$

The first model presented above, consisting of demographic variables, did not statistically significantly predict variance in human capital. Results from the second model indicated that leadership styles statistically significantly predicted the variance in human capital (73.2%). Leadership 4.0 was again found to be the only IV that explained a unique variance in the DV ($t = 3.95$, $p < 0.05$, $\beta = .77$).

4.4.3.3. Using the explanatory variables (leadership style IV's) to predict digital risk management

Table 17 below summarises the hierarchical multiple regression results for leadership style IV's predicting digital risk management.

Table 17: Using the selected explanatory variables (IV's) to predict variance in digital risk management (DV)

Predictor Variables (IV)	β	t	p-value	R^2	%	F	p-value
Model 1				.00	0.4	.12	.89
Demographics							
Age	-.01	-.34	.74				
Gender	.07	.34	.73				
Model 2				.32	31.8	5.14	.00
Demographics							
Age	-.01	-.89	.38				
Gender	-.02	-.10	.92				
Leadership Styles							
TAL	.60	3.21	.00**				
TFL	-.47	-1.41	.16				
Lead 4.0	.42	1.26	.21				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; Lead 4.0 = Leadership 4.0; * $p < .05$ ** $p < .01$

The first model presented above, consisting of demographic variables, did not statistically significantly predict variance in digital risk management. However, results from the second model indicated that leadership styles statistically significantly predicted the variance in this DV (31.8%). The results also indicated that transactional leadership was the only IV that explained a unique variance in digital risk management ($t = 3.21, p < 0.05, \beta = .60$).

4.4.3.4. Using the explanatory variables (leadership style IV's) to predict business model value creation

Table 18 below summarises the hierarchical multiple regression results for leadership style IV's predicting business model value creation.

Table 18: Using the selected explanatory variables (IV's) to predict variance in business model value creation (DV)

Predictor Variables (IV)	β	t	p-value	R ²	%	F	p-value
Model 1				.02	2.0	.59	.56
Demographics							
Age	.01	.39	.70				
Gender	-.20	-1.01	.32				
Model 2				.47	45.3	9.7	.00
Demographics							
Age	.01	.74	.46				
Gender	-.26	-1.67	.10				
Leadership Styles							
TAL	-.19	-1.20	.24				
TFL	.08	.28	.78				
Lead 4.0	.73	2.54	.01**				

Note: TAL = Transactional Leadership; TFL = Transformational Leadership; Lead 4.0 = Leadership 4.0; * $p < .05$ ** $p < .01$

The results suggest that the selected demographic variables did not statistically significantly predict variance in the DV. However, the second model, consisting of leadership style IV's, did statistically significantly predict variance in business model value creation (45.3%), with Leadership 4.0 explaining a unique variance in the DV ($t = 2.54, p < 0.05, \beta = .73$).

4.4.4. Multiple regression conclusion

The results from the hierarchical multiple regressions, presented in the first part of the above discussion, corroborated Hypothesis 5 in that Leadership 4.0 and innovative management practices statistically significantly explained variances in the various organisational performance capability variables. It was also found that enthusiasm (a Leadership 4.0 variable) explained a unique variance in both human capital and total performance capability, while management practices explained a unique variance in digital risk management.

The second part of the above discussion provided further support to the corroboration of Hypothesis 1 in that Leadership 4.0 variables significantly explained variances in the

innovative management practices variables. Here, transactional leadership was found to explain a unique variance in risk management.

The final part of the above discussion provided further support to the corroboration of Hypothesis 3 in that Leadership 4.0 significantly explained variances in the organisational performance capabilities variables. The results further indicated that Leadership 4.0 explained a unique variance in total performance capabilities, human capital and business model value creation, while transactional leadership explained a unique variance in digital risk management.

The above findings are further discussed in the next chapter.

4.5. Testing for mediation

The Haye's PROCESS macro for SPSS was utilised to test the mediating effect of innovative management practices in the relationship between Leadership 4.0 and organisational performance capabilities. The results from this analysis are presented below.

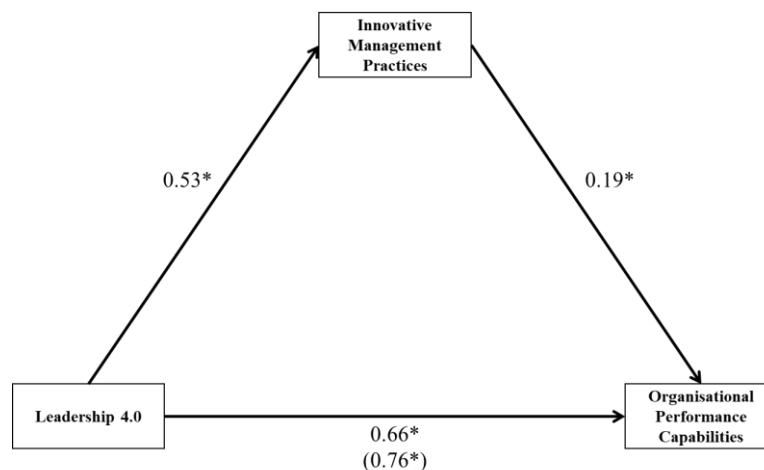


Figure 7. Standardised regression coefficients for the relationship between Leadership 4.0 and organisational performance capabilities as mediated by innovative management practices.
* $p < .05$.

As Figure 7 illustrates, the standardised regression coefficient, between Leadership 4.0 and innovative management practices, was found to be statistically significant (coefficient/statistic, $p < .05$), as was the standardised regression coefficient between innovative management

practices and organisational performance capabilities (coefficient/statistic, $p < .05$). A significant indirect effect of Leadership 4.0 on organisational performance capabilities, through innovative management practices ($ab = 0.1$) was also revealed. The significance of this indirect effect was tested using bootstrapping (set at 10 000 bootstrapped samples) with 95% confidence intervals (CI). Preacher and Hayes (2004) suggests that if zero is not in the 95% confidence interval it can be concluded that the indirect effect is significant. The 95% CI ranged from -0.01 to 0.21. Though the lower limit of the 95% CI was -0.01, it is argued that within 10 000 bootstrap samples the difference between zero and the lower limit CI is immaterial as it crosses zero with a mere .01. Therefore, the indirect effect was considered to be statistically significant. The mediator, i.e. innovative management practices, was found to account for only a small portion of the total effect ($P_M = .13$). Preacher and Hayes (2004) further stated that partial mediation occurs when the effect of the independent variable on the dependent variable decreases to a small amount, not equal to zero. Therefore, the results above indicate that innovative management practices only partially mediated the effect of Leadership 4.0 on organisational performance capabilities, and full mediation did not occur. Based on this basket of evidence, the null hypothesis was rejected and support was found for Hypothesis 4.

4.6. Conclusion

In chapter 4 the results from various analyses and investigations conducted on the data collected were presented. The first part of the chapter presented the findings from investigations conducted into the measurement properties of the various constructs and indicated all sub-scales were deemed appropriate measures of the constructs under investigation. Following this, descriptive statistics were presented. The relationships between leadership styles, innovative management practices and organisational performance capabilities were investigated by calculating Pearson correlation coefficients, from which the results corroborated the first three hypotheses of the present study. Furthermore, results from hierarchical multiple regression analyses were presented which corroborated the fifth hypothesis. Finally, results from the mediation test indicated support for the fourth hypothesis of the present study. These results are further discussed in the following chapter.

CHAPTER 5

DISCUSSION

Many researchers and industry practitioners believe that by adopting a new leadership style, such as Leadership 4.0, and innovative management practices, organisations may be better equipped to survive the impending challenges, risks and threats associated with the 4IR. Given these notions and views, the aim of the present research study was to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR.

By following a systematic approach, applying correlation analysis and hierarchical multiple regression to newly developed constructs, the present study aimed to bring greater understanding to the Leadership 4.0, innovative management practices, organisational performance capabilities and 4IR fields of research.

The first part of this discussion focusses on the hypothesised relationships between the various constructs, outlining the evidence found in support for each of the present study's hypotheses and relating these findings back to the literature and expectations of the present study. In the second part of the discussion, attention is given to research findings in the present study that suggested alternative views, or contradictions, in addition to the hypotheses. Finally, the limitations of the present study, theoretical and practical implications and suggestions for future studies are discussed.

5.1. The relationship between Leadership 4.0 and innovative management practices

The calculated Pearson correlation coefficients, presented in the previous chapter, indicated that a statistically significant positive relationship ($p < .05$) existed between the selected Leadership 4.0 constructs and innovative management practices constructs. This finding supported Kreitner and Kinicki's (2008) suggestion that leadership styles may influence management practices and therefore, although they are not one in the same, there may be overlap. It further contributed to Ranasinghe's (1999) finding, that leadership styles impact management practices, by indicating that the two constructs moved together in a positive

direction in the present study (positive relationship suggests that when the presence of one construct increases, the presence of the other increases as well).

The hierarchical multiple regression model also indicated that the selected Leadership 4.0 constructs statistically significantly predicted variance in the selected innovative management practices constructs, further explaining unique variances in organising and information sharing, human resource management and stakeholder management. The literature presented various arguments and beliefs from many authors and industry practitioners that organisations need to rethink approaches to management practices to drive innovation, collaboration, learning and agility. Shamim et al. (2016) specifically stated the need for increased levels of innovation within management practices to be more compatible with the 4IR. Schwab (as cited in Inam, 2019) indicated that Leadership 4.0 may positively influence such approaches. In this regard the results presented above support Schwab's belief in this instance.

Although innovation is a practice that may be taught, it is also a trait that stems from an inherent drive and passion within individuals to challenge their own, and others, way of thinking and finding alternative approaches or solutions to drive societies forward. As Oberer and Erkollar (2018) stated, Leadership 4.0 is about developing people toward greater innovation, creativity and change adoption. Leadership 4.0, in this sense, promotes innovation from within individuals through encompassing dimensions such as engagement and enthusiasm, supporting both inherent drive and passion from within followers. This leadership style further supports innovation through empowering individuals, equipping them with the necessary skills, tools and values to practice innovation in an ethical and sustainable manner. As stated by SAP CEO Bill McDermott (World Economic Forum, 2019), being a global citizen in the 4IR is about driving innovative and sustainable solutions for a broad group of stakeholders in an ethical manner. When considering the results presented, this may come down to Leadership 4.0 positively relating to increased levels of innovative management practices.

Although the results provided support for the hypothesis, that a positive relationship existed between Leadership 4.0 and innovative management practices, it also indicated results to the contrary in Risk Management practices. Within the regression model, transactional leadership explained unique variance in risk management. This finding was contradictory to the

expectations of the present study, as well as many arguments presented in the literature that the traditional command and control leadership style may not be suitable for the 4IR. This finding requires more insight and consideration, and will therefore be discussed further in the second portion of this discussion.

5.2. The relationship between innovative management practices and organisational performance capabilities

A statistically significant positive relationship was found between all the selected innovative management practices constructs and the total organisational performance capability construct in the presented study. The regression model also indicated that the selected innovative management practices constructs statistically significantly predicted variance in the selected organisational performance capability constructs. Therefore, the evidence, presented in the previous chapter, corroborated the hypothesis that a significant positive relationship exists between innovative management practices and selected organisational performance capabilities.

These results build on the existing beliefs and arguments of several authors and industry practitioners (for example, Oberer and Erkollar, 2018, as well as Hecklau et al., 2016) that management practices need to adapt and support innovation to meet the pace of change in the 4IR to ensure organisational performance capabilities, and ultimately survival. The underlying elements or constructs of innovative management practices investigated and described in the present study, are all centred around creating a framework of organisational structures, processes and guidelines that support innovation, collaboration and agility. Therefore, the results presented above, provided support to Shamim's et al. (2016) argument that innovative management practices may influence organisations' compatibility with the 4IR through positively relating to organisational performance capabilities required to overcome many of the impending challenges that may be presented by the 4IR.

Further results from the correlation analysis found that risk management practices indicated the strongest statistically significant positive relationship with digital risk management, which supports both David Taylor's (World Economic Forum, 2019) and Schwab's (2018) views that more proactive, anticipatory and innovative approaches to risk management practices will be

required to protect organisations against the digital risks threatening organisational survival in the 4IR. Although it was previously mentioned that transactional leadership seemed to play an important role in risk management, and will again be found to be the case in digital risk management in the discussion below, it is important to note that risk management as a management practice should be focused on early threat detection and risk mitigation or prevention practices to ensure organisations are prepared in terms of structures, processes and guidelines when digital threats arise and leaders need to step in to guide such related actions.

5.3. The relationship between Leadership 4.0 and organisational performance capabilities

In investigating the relationships between the selected leadership style constructs and organisational performance constructs, a statistically significant positive relationship was found between all Leadership 4.0 constructs (engagement, enthusiasm and empowerment) and all the selected organisational performance capability constructs. A hierarchical regression model further indicated that the selected leadership style constructs (Transactional, Transformational and Leadership 4.0) statistically significantly predicted the variance in all the selected organisational performance capability constructs, with Leadership 4.0 explaining a unique variance in human capital, business model value creation and total performance.

As Schwab (2018) stated with much conviction, the 4IR poses many threats to organisations and society, and the responsibility for navigating such challenges toward a more positive future rests on the shoulders of business leaders and their adoption of a suitable leadership style, such as Leadership 4.0. The evidence from the present study presented above supported Schwab's conviction. However, it is important to note that positive relationships were also found between all leadership styles, not only Leadership 4.0, and organisational performance capabilities. This suggested that leadership in general is an important factor for organisational success in the 4IR. Many discussions and studies existing in the literature and industry practice regarding organisational performance, and even management practices, include a focus on leadership and the relationship or effect thereof to the aforementioned topics. Furthermore, many of these discussions and studies provide support, evidence or convictions that leadership is a key element to many organisational issues, as was again found to be the case in the present study.

What was evident, however, in the results presented above, was that though all leadership styles indicated positive relationships with organisational performance capabilities, Leadership 4.0 was found to present a unique variance and Enthusiasm, a dimension of Leadership 4.0 indicated stronger positive relationships in all organisational performance capability constructs, except digital risk management. This suggested that although the presence of leadership in general (all leadership styles presented) may be important, Leadership 4.0 indeed seemed to be more suitable in ensuring organisational survival in the 4IR. Given that the full-range leadership theory essentially presents an evolution of leadership styles over time, Leadership 4.0 may therefore be considered a further evolution to this theory. It may be argued that as society and organisations have evolved throughout the past economic revolutions, so have leadership styles. Therefore it stands to reason that leadership styles and the theories surrounding it would further evolve in relation to the evolution brought forth by the 4IR.

Similar to the contradiction presented in the regression model in support of the first hypothesis, the evidence found regarding the relationship between leadership styles and risk management also indicated a contradiction in the expectations of the present study and arguments of many authors in the literature. Transactional leadership was found to explain a unique variance in digital risk management. This unexpected result will be discussed in more detail at a later stage in this discussion.

5.4. Innovative management practices as a mediator in the relationship between Leadership 4.0 and organisational performance capabilities

A test for mediation was conducted through Hayes' process model 4 to test the hypothesis that the relationship between Leadership 4.0 and organisational performance capabilities is mediated by innovative management practices. Results indicated that a partial mediation existed, thus corroborating the fourth hypothesis. The direct effect of Leadership 4.0 on organisational performance capabilities was, however, found to be larger than the total effect when partially mediated by innovative management practices. This provided support to Oosthuizen's (2017) suggestion that Leadership 4.0 may be the active ingredient in navigating the challenges posed by the 4IR toward a positive future. It further relates back to the previous discussion of leadership being a key element to consider when investigating organisational performance related topics and highlights the importance of Leadership 4.0 in the 4IR.

5.5. Leadership 4.0 and innovative management practices explaining variance in organisational performance capabilities

Results from the hierarchical multiple regression model indicated that leadership styles (including Leadership 4.0) and innovative management practices statistically significantly predicted the variance in the various organisational performance capability constructs. Evidence further indicated that the enthusiasm construct, a dimension of Leadership 4.0, explained a unique variance in human capital and total performance capability.

Kreitner and Kinicki (2008) explained that transformational leadership aims to inspire and motivate followers. However, in taking this leadership style to a new level of leadership, as suggested by Schwab (2018), enthusiasm seems to be the active ingredient in Leadership 4.0. Enthusiasm relates to igniting excitement and passion from within followers, speaking to their spirit, as suggested by Gill (2003). As previously mentioned, Leadership 4.0 may be considered as a further addition to the various leadership styles discussed in the present study, having evolved from Transformational leadership. Though there are certain similarities in these two leadership styles, such as both relating to inspiration, motivation and stimulation, Leadership 4.0 may be explained as a next level of Transformational leadership in that it ignites inspiration, motivation and stimulation from within individuals, i.e. the spirit as stated by Gill (2003).

Given that many arguments presented in the literature study indicated that the traditional full-range leadership styles may not be sufficient for the 4IR and may require something more, Leadership 4.0 may be seen as a leadership styles that builds on the existing, traditional models and theories. In this regard, leadership styles may in future, as in the past, be found to evolve further and further with each impending revolution driving the evolution of societies, organisations and economies.

Lastly, within this regression model, it was found, as in other previously discussed regression models, that transactional leadership explained a unique variance in digital risk management. From the findings presented throughout this discussion thus far regarding transactional leadership's relationship with risk management practices and digital risk management performance capability, it would seem that, although Leadership 4.0 indicated statistically significant positive relationships with innovative management practices and organisational

performance capabilities, there may be room for transactional leadership within the context of the 4IR, specific to risk management scenarios.

5.6. Transactional leadership and risk management

Although the evidence, presented in this research study, indicates statistically significant positive relationships between Leadership 4.0 and innovative management practices, as well as organisational performance capabilities, in certain instances it was found that, in addition to Leadership 4.0, transactional leadership explained unique variances in risk management (as an innovative management practice) and digital risk management (as an organisational performance capability).

Drawing on the body of knowledge existing in the literature, there is overwhelming evidence of transactional leadership being a more suitable leadership style when it comes to risk management. Gong (2017) explained that transactional leadership is about encouraging employees to perform their work in a prevention-focused manner. McCleskey (2014) further explained that transactional leadership is characterised by an exchange between leaders and their subordinates, which allows subordinates to drive toward performance goals while avoiding unnecessary risks. In their study, Baškarada, Watson and Cromarty (2017) suggested that this leadership style is essential for risk mitigation, specifically when risks were indicated to be time sensitive. They provided the example of transactional leadership in military decision-making, where the traditional command-and-control style is of great importance for time-sensitive decisions, especially when the troops are in the trenches (Baškarada et al., 2017).

Baškarada et al. (2017) further explained that, within the emergence of external pressures and motivation for change, where increased risk appetite is required, followers may expect transformational leadership (positively associated with an increased appetite for risk). However, in their study, Willis, Clarke and O'Connor (2017) found that, when the perceived risk of such impending changes is high, employees might be more receptive to transactional leadership, especially in risk critical circumstances.

Given the risks, challenges and threats associated with the 4IR, as discussed in the literature review, and the results of transactional leadership explaining unique variances in risk management practices and digital risk management, it may stand to reason that the sample perceived these impending risks, challenges and threats as critical and high risk, and that Leadership 4.0 alone might not be enough. Thite (1999) supported this argument in suggesting that, though transactional leadership is an essential component in leadership effectiveness, it must be augmented by other leadership styles to form an optimal leadership profile. This argument and the findings in the present study may, therefore, suggest that neither Leadership 4.0, nor transformational leadership or transactional leadership alone may lead to organisational success in the 4IR, but rather that a combination of these leadership styles may be best suited, which links to the Contingency Theory of Leadership.

5.7. Contingency Theory of Leadership

According to McKenzie and Love (2016), the Contingency Theory of Leadership states that the effectiveness of leadership is contingent upon matching the most suitable leadership styles to any given situation or context. Many models and theories have been developed over the years to explain and make sense of contingent leadership, including Fiedler's Contingency Theory (McCleskey, 2014), Vroom and Yetton's Leadership Decision-making Model and Hersey and Blanchard's Situational Leadership Theory (Hornstein, Heilman, Mone & Tartell, 1987). McCleskey (2014) further explained that business leaders may need to engage a mix of task and relational leadership behaviours to successfully adapt to various scenarios.

Hollenbeck, McCall and Silzer (2006) also believed that leaders need to adapt their leadership styles accordingly to different situations, as what may be useful in one scenario may not be in another. By adopting a leadership style best suited to a specific situation or organisational strategy, leaders may influence management practices toward achieving the desired organisational performance (Shamim et al., 2016). Given that the 4IR poses a new world of challenges and scenarios, it stands to reason that a new leadership style may be needed, namely Leadership 4.0. The findings and discussions in the present study corroborated that a statistically significant positive relationship exists between Leadership 4.0, innovative management practices and organisational performance capabilities in the 4IR. However, the unique variances explained by transactional leadership in risk management and digital risk

management suggested that, even within the 4IR, leaders may still need to select and adopt various leadership styles in order to best navigate these uncertain times.

5.8. Limitations of the present research study and recommendations for future research

The discussion below highlights certain limitations to the present study and suggests recommendations for future studies in this field of research.

Similar to other research studies, the present study posed certain limitations. The first limitation was the size and composition of the sample. As indicated in Chapter 3, the sample was small ($n = 61$) and consisted mainly of respondents from private, locally-owned (i.e. South African), knowledge-intensive organisations. Furthermore, utilising the snowball sampling technique meant that responses centred around this group. Although the constructs under investigation in the present study were universal, this study's research findings cannot be generalised outside this sample. Future studies should, therefore, aim to obtain a larger sample size that is representative of more organisational types, descriptions and control structures.

Another limitation may be the length of the questionnaire used to collect data. Although the time estimated to complete the questionnaire was only 15 minutes, the mass of information and knowledge-intensive constructs under investigation, together with the use of Likert-scales, may have influenced respondents' fatigue and focus in providing accurate responses.

A third limitation is that causality could not be determined, as this was a cross-sectional study. Therefore, for future research in this field, it is suggested that a longitudinal study with data collected at different intervals may be more suited to collecting data on leadership styles, management practices and organisational performance capabilities.

Another limitation is that, although statistically significant positive relationships were identified between Leadership 4.0, innovative management practices and organisational performance capabilities, the results also indicated significant relationships among other leadership styles (transformational and transactional leadership), innovative management

practices and organisational performance capabilities. Therefore, it would be deemed inappropriate to draw an absolute conclusion that Leadership 4.0 is the best leadership style for the 4IR as discussed before. Rather, as suggested in the discussion around contingent leadership, investigating the most suitable leadership styles for the different scenarios and challenges posed by the 4IR is suggested.

The last recommendation for future research may be to investigate the relationship between Leadership 4.0 and organisational performance capabilities, and the relationship between innovative management practices and organisational performance capabilities, respectively, without innovative management practices as a mediating factor or by including an alternative potential mediator, as the results from the mediation analysis indicated only a partial mediation.

5.9. Theoretical contributions

The present study contributed to the growing body of knowledge regarding leadership styles, specifically Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR by integrating existing literature, logical beliefs and conceptual opinions of various industry practitioners, researchers and authors. The study further proposed a theoretical/conceptual model upon which empirical research was done, ultimately providing empirical evidence about the relationships between these constructs. Arguments were presented as to why traditional and modern-day leadership styles and management practices may not be suitable for organisational survival in the 4IR and were subsequently disproved through the empirical research conducted, further providing an argument for contingent leadership as a more suitable approach to leadership for the 4IR.

5.10. Practical implications

The findings obtained from the present research study provided guidelines for organisations and leaders on how to better equip themselves for survival and sustainability in the 4IR, specifically by adopting more suitable leadership styles, such as Leadership 4.0 and innovative management practices. By better understanding this, it is believed that organisations and business leaders may be able to respond more appropriately to the challenges, risks and threats associated with the 4IR. Lastly, the information and insights provided in this research study

may assist organisations in leveraging such information to improve management practices related to decision-making, employee development, stakeholder management, organisational design and risk management, as well as the selection of leaders or leadership styles best suited to the different challenges and scenarios organisations may face in the 4IR.

5.11. Conclusion

The aim of the present research study was to investigate the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the 4IR. The findings from the literature review and empirical research conducted indicated that indeed a statistically significant positive relationship existed among these constructs. A regression model, consisting of leadership style constructs and innovative management practices, indicated that leadership styles contributed most to the statistically significant prediction of variance in the various organisational performance capability constructs. This suggests that, although innovative management practices are important to overcome the challenges believed to be presented in the 4IR, leadership ultimately contributes the most to ensuring organisational performance capabilities relevant for the 4IR. This finding should alert organisations and business leaders to build and maintain focus on effective leadership.

Further to the above, evidence from the present study indicated support for the Contingency Theory of Leadership in that, although Leadership 4.0 indicated significant positive relationships with organisational performance capabilities, transactional leadership was found to explain unique variances in risk management practices and digital risk management performance capabilities. This suggested that the 4IR, together with the challenges and changes predicted to accompany it, may be considered as different situations or scenarios in which successful leadership and organisational sustainability, as well as survival, may be dependent on business leaders adopting the most suitable leadership style for their specific organisations and scenarios they may come to face. It can however be concluded that leadership in general ultimately has a positive effect on both innovative management practices and organisational performance capabilities in the 4IR and, as such, studies into, development of and investment in leadership in organisations should continue to gain more attention, as has been the case in discussions taking place at the World Economic Forum in recent years.

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Appendix A: The Questionnaire



Welcome to the research study!

Dear Respondent

My name is Yandri Pienaar, and I am collecting data. I want to invite you to participate in a research study with the title *Investigating the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the fourth industrial revolution*. Please take some time to read the information provided below.

What is this research about?

The fourth industrial revolution poses many threats and challenges to society and organisations. However, it is believed that leadership and management practices may play a critical role in successfully navigating and steering these challenges and uncertainties toward a better future and ensure organisational performance. To provide empirical evidence to this belief, the aim of this research study is, therefore, investigating the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the fourth industrial revolution.

It is envisaged that new knowledge will be gleaned from the data that is collected, which will contribute to our better understanding of leadership science and management practices for a changing future. The findings of the research study may be used in future studies, disseminated by means of typical research output channels, including conference presentations, published conference papers, journal articles, popular articles, textbooks and books at the discretion of the researchers. When doing so, your personal anonymity and confidentiality will always be maintained, and no identifiable information will ever be disclosed.

What do we need from you?

You will be presented with information relevant to this topic and asked to answer some questions about it. Please take some time to familiarise yourself with the information about the study we have provided below. You are welcome to ask us any question(s) and/or request further clarification regarding any aspect of the study or the information provided here.

Are there any risks for you in participating?

Your participation in this research study is entirely voluntary. You have the right to withdraw at any point during the study, for any reason, and without any negative or adverse consequence to you. You are not required to disclose

your name or any other personal identifier anywhere in the questionnaire either. All responses collected will be treated confidentially. Data will be stored in accordance with best practice guidelines and privacy legislation, including always being kept securely and password protected.

There are no inherent/implicit risks in participating in the research study – nor associated to withdrawing from it at any time, even if you initially agreed to participate in the research study. All that we ask of you is that you give us of your time. If you agree to participate in the research study, the survey should take you around 15 minutes to complete.

The UCT Commerce Research in Ethics Committee has approved this research study.

Are there any benefits for you in participating?

We will be grateful if you participate in the research study; however, you will not necessarily benefit personally from taking part in the research study. Your time and effort will contribute to our understanding of this field of study and, ultimately, the insights will benefit many people and organisations.

You can choose to enter into a lucky draw to win one of three R 500.00 (five hundred Rand) Takealot shopping vouchers, if you participate in the research study. If you would like to take part in the lucky draw, there will be an opportunity at the end of the survey to provide your e-mail address. Taking part in the lucky draw is voluntary, and by providing your e-mail address you indicate that you agree to participate in the lucky draw. The e-mail addresses will only be used for the purpose of choosing the winners of the prizes and will not be linked to specific responses. A random number generator will be used to pick three lucky winners, and once that has been done, the winner will be contacted, and all the e-mail addresses will be deleted.

Do you have any further questions?

If you would like to contact the principal investigators to discuss any aspect of this research study and/or your participation, please e-mail Yandri Pienaar at pnryan001@myuct.ac.za and/or Professor Anton Schlechter at anton.schlechter@uct.ac.za.

What next?

By clicking the radial button below, you declare that you:

- are 18 years of age or older;
- agree to participate in the research study, as described above;
- acknowledge that your participation in the research study is voluntary and that you are under no pressure to take part in it;

- are aware that you may choose to terminate your participation in the study, at any time and for any reason with no adverse impact for you at all even if you agreed initially to; and
- are satisfied with the issues of risk, privacy, confidentiality and the use of the information you share with us, as described above.

Thank you in advance for your participation and contribution.

- Yes, I give my consent to participate in the study
- No, I do not give my consent and do not wish to participate in the study.

If **yes** is chosen, proceed to the questionnaire starting on the next page.

If **no** is chosen, do not proceed to the questionnaire. Informed consent is required to participate in this research study.

Section 1: Leadership

Think about your line manager/supervisor, i.e. the person to whom you report.

Your rating should reflect the extent to which you believe that each statement is indicative of the way that your line manager/supervisor **typically** thinks, feels or acts at work. Do not base your rating on a unique event, situation and/or interaction with your line-manager/supervisor. Also, do not think too long about your answers either. **There are no right or wrong answers.**

Consider each of the statements below and rate your line manager/supervisor on a response scale where “1 = Strongly Disagree” and “5 = Strongly Agree”.

Do not base your rating on a single event, but preferably **your typical experience.**

My line manager/supervisor...	1	2	3	4	5
	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. creates a sense of calm amongst the uncertainties of change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. re-examines critical assumptions to question whether they are still appropriate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. engages the team/unit to solve problems collaboratively.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. encourages innovation and creativity through experiential learning on the job (trying new ideas).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. focuses attention on mistakes and/or deviations from standards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. regularly encourages team members to acquire new skills and/or knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. regularly shares his/her values and beliefs with the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. encourages alternative perspectives when solving problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. makes me proud to be associated with him/her.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. makes use of the team’s collective intuition to solve novel/unknown problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- | | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 11. clearly assigns responsibility for specific performance targets. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. generates a sense of stewardship to society. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. talks enthusiastically about what needs to be accomplished. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. often disrupts the status quo (existing state of affairs) for the better. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 15. spends time mentoring and coaching me. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 16. makes clear what I can expect to receive when performance goals are achieved. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 17. goes beyond his/her self-interest for the good of the group. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 18. sees approaches/solutions others do not. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 19. treats you as an individual, rather than just a member of the team. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 20. generates enthusiasm/excitement in the group. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 21. corrects anticipated mistakes, complaints and failures. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 22. promotes a higher purpose (a reason for being/meaning for existence) that is greater than the group/organisation. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 23. considers the moral and ethical consequences of his/her decisions. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 24. keeps track of my mistakes. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 25. articulates a compelling vision of the future. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 26. is empathetic and appreciative of the challenges we face. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 27. considers me as having different needs, abilities and aspirations from others. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 28. inspires high-performance. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 29. helps me to develop my strengths. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 30. acts in ways that build trust. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 31. suggests new ways of looking at how to complete assignments. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- | | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 32. translates organisational vision and strategy to explain how my efforts contribute to achieving strategic objectives of the company. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 33. expresses satisfaction when I meet expectations. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 34. expresses confidence that team goals will be achieved. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35. proactively initiates and leads change (rather than being reactive). | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| | <input type="radio"/> | | <input type="radio"/> | | <input type="radio"/> |

Briefly describe the leadership attributes and/or characteristics that your line manager/supervisor possesses, which you believe will ensure that your organisation will remain competitive and sustainably successful and in an uncertain future.

Section 2: Management practices

Think about how your line manager/supervisor typically applies management practices, organisational structures and processes within the setting that is under his/her influence (e.g. the team, unit, division or company he/she manages and that you work in).

Each item contains a description of a management practice, organisational structure or process at opposite ends of a continuum. Using a response scale, where “-3 = Extremely applicable”, “-2 = Applicable”, “-1 = Somewhat applicable”, “0 = Neither”, “1 = Somewhat applicable”, “2 = Very applicable” and “3 = Extremely applicable” indicate the extent to which you agree with either statement, i.e. on the left or right of the continuum.

Do not base your rating on a single event, but preferably **your typical experience** in your work setting.

Below find an example item and response:

	-3 =	-2 =	-1 =	0 =	+1 =	+2 =	+3 =	
	Strongly Applicable	Very Applicable	Somewhat Applicable	Neither	Somewhat Applicable	Very Applicable	Strongly Applicable	
Leave approval is manual and bureaucratic								
							X	
								Leave approval is automated and efficient.

If a respondent believes that his/her line manager or supervisor’s approval of leave requests is manual and bureaucratic, then “-3 = Strongly Applicable” would be an appropriate response. However, if a respondent perceives his/her line manager/supervisor’s approval of leave requests as automated and quick, then “+3 = Strongly Applicable” would be an appropriate response.

Organising and information sharing approach

- | | | |
|------------------------|--|--|
| 1 Organisation | <ul style="list-style-type: none"> Multiple levels, i.e. more hierarchical or pyramid structure. Typical command and control structure. | <ul style="list-style-type: none"> Few or minimum levels, i.e. decentralised/flat structure. Typical self-directed team structures where employees have autonomy. |
| 2 Collaboration | <ul style="list-style-type: none"> Functional tasks are kept within functional areas (i.e. only HR handles HR matters). | <ul style="list-style-type: none"> Functional tasks are shared to promote collaborative problem solving (i.e. finance and operations assist with HR matters). |

3	Project Management	<ul style="list-style-type: none"> Primarily centralised and highly structured step by step project management practices (i.e. linear, sequential phases and step by step like Waterfall methodology). Centralised project managers manage projects, control complexity and prioritise resources. 	<ul style="list-style-type: none"> Agile approach to project management practices by collaborative effort to define requirements and design solutions. More self-organised and cross-functional, team-driven, guided by central lead (e.g. project manager or Scrum Master).
4	Locus of decision-making	<ul style="list-style-type: none"> Executive decision-making is mostly centralised and autocratic with relative low input from direct stakeholders. 	<ul style="list-style-type: none"> Decentralised and collaborative (collegial) decision-making approach.
5	Information sharing	<ul style="list-style-type: none"> Information is shared on a need-to-know basis. 	<ul style="list-style-type: none"> Information is shared freely to improve contextual understanding and work performance.
6	Information availability	<ul style="list-style-type: none"> Secrecy is the default position. 	<ul style="list-style-type: none"> Transparency and access to information allows everyone to contribute to better business solutioning.
7	Strategy	<ul style="list-style-type: none"> Strategic course charted by top leadership. 	<ul style="list-style-type: none"> Strategy emerges organically from the collective intelligence of self-managing employees and teams.
8	Innovation	<ul style="list-style-type: none"> Innovation comes from outside the organisation; implemented from a central entity using a top-down approach. 	<ul style="list-style-type: none"> Innovation comes from within the organisation as a distributed capacity and is both a bottom-up and top-down practice.

Human resource practices approach

9	Job/task sharing/rotation	<ul style="list-style-type: none"> Employees must focus on specific jobs and tasks only. 	<ul style="list-style-type: none"> Employees are encouraged to learn new skills and knowledge through job/task sharing and/or rotation.
10	Individual performance indicators	<ul style="list-style-type: none"> Individual performance is mainly focused on domain knowledge and functional competencies. 	<ul style="list-style-type: none"> Individual performance is focused on behavioural competencies, e.g. innovation, collaboration, agility and collaboration.
11	Technology skills development	<ul style="list-style-type: none"> Employees have little opportunity or encouragement to learn new technologies and software. 	<ul style="list-style-type: none"> Employees are encouraged to adopt new technologies and software through related skills development opportunities.
12	Training	<ul style="list-style-type: none"> Development plans are determined by HR policies and mostly focus on skills and management training. 	<ul style="list-style-type: none"> Employees are responsible for developing their own training and development plans with the support of their line manager/supervisor/team members.
13	Job titles & job descriptions	<ul style="list-style-type: none"> Standardised job levels and job descriptions that focus on KPAs, objectives and task lists. 	<ul style="list-style-type: none"> Fewer position titles. Role descriptions are more fluid and written at a principal level to focus on outputs required.
14	Individual purpose	<ul style="list-style-type: none"> It is not the organisation's role to assist employees to identify their personal calling. Alignment between personal purpose and work role is not a priority. 	<ul style="list-style-type: none"> Line manager/supervisor explores the juncture of individual calling and organisational purpose in determining role contributions and future development. Alignment between personal purpose and work role is a priority.
15	Flexibility of work practices	<ul style="list-style-type: none"> No or limited flexible work practices are offered. 	<ul style="list-style-type: none"> High degree of flexibility, both in terms of time (when) and place (where) employees work.

16	Work automation	<ul style="list-style-type: none"> • Tasks/processes are mainly performed manually. 	<ul style="list-style-type: none"> • Tasks/processes are mostly automated.
17	Performance management focus	<ul style="list-style-type: none"> • Focus primarily on individual performance against set objectives. 	<ul style="list-style-type: none"> • Greater focus on team-based/organisational/collaborative performance contributions.
18	Change management	<ul style="list-style-type: none"> • Change management is event driven. Generic change management models/approaches are used to get from A to B. Often managed by external change specialists. 	<ul style="list-style-type: none"> • Change management is not an event, but an ongoing evolutionary process. The organisation leverages a culture to adapt from within (agile). Change is owned by all employees, and high levels of communication and participation are the norm.
19	Performance appraisal scope	<ul style="list-style-type: none"> • Performance appraisals are done to meet HR policy (compliance focus). 	<ul style="list-style-type: none"> • Performance appraisal discussions focus on personal development and how values are lived in the achievement of outputs.

Stakeholder management and value creation approach

20	Stakeholder identification / classification	<ul style="list-style-type: none"> • Stakeholders are considered to be limited to customers, partners and shareholders and employees. 	<ul style="list-style-type: none"> • Stakeholders are classified broader to include suppliers, community/society, government, tertiary institutions and more (even competitors).
21	Partner relationships	<ul style="list-style-type: none"> • Organisation functions alone with little partnerships formed. 	<ul style="list-style-type: none"> • Organisation has a symbiotic relationship with various partners, such as suppliers, other organisations, tertiary institutions etc.
22	Environmental and social initiatives	<ul style="list-style-type: none"> • Cannot initiate environmental and social initiatives with financial consequences on own accord. Executive approval is required. 	<ul style="list-style-type: none"> • Environmental and social initiatives are initiated to align with the strategic focus of the organisation and is initiated in a bottom-up and top-down fashion.
23	Decision-making implementation	<ul style="list-style-type: none"> • Decisions are cascaded down the ranks for implementation. 	<ul style="list-style-type: none"> • Key stakeholders are part of the decision-making process to enable execution.
24	Marketing & Sales	<ul style="list-style-type: none"> • Marketing and sales focus on selling only a product or service to specific customers / key stakeholders only. 	<ul style="list-style-type: none"> • Marketing and sales focus on clear value proposition, which centres around an offer to make the world a better place / make a positive difference for a broader stakeholder group.
25	Purpose	<ul style="list-style-type: none"> • No deliberate focus on a higher order purpose for the organisation and its stakeholders (the why). 	<ul style="list-style-type: none"> • Organisation is seen as a living entity, with its own evolutionary higher order purpose to serve all stakeholders.
26	Community building	<ul style="list-style-type: none"> • No intentional community or team building activities. 	<ul style="list-style-type: none"> • Strong sense of community is instilled by the line manager/supervisor, e.g. story-telling and team building practices to support self-disclosure and to build a sense of community.
27	Competition	<ul style="list-style-type: none"> • Competing in the organisations' environment takes a winning-at-all-costs approach with little focus on sustainability for all. 	<ul style="list-style-type: none"> • Organisation is more concerned with longer term sustainability for all with less focus on aggressive competition.

Risk management (technology/data specific) approach			
28	Data & data privacy policies	<ul style="list-style-type: none"> No data / data privacy policies or procedures exist. 	<ul style="list-style-type: none"> Data / data privacy policies and procedures are in place and followed on a daily basis.
29	Risk mitigation procedures	<ul style="list-style-type: none"> Little to no risk mitigation procedures are implemented (somewhat reactive). 	<ul style="list-style-type: none"> Risk mitigation procedures are clear and implemented proactively.
30	Risk anticipation procedures	<ul style="list-style-type: none"> Little to no risk anticipation practices are followed (somewhat reactive). 	<ul style="list-style-type: none"> Risks are anticipated through practice efforts and procedures (i.e. early warning system).
31	Policy formulation	<ul style="list-style-type: none"> Policies are vague and do not address the what, why and how something is governed. 	<ul style="list-style-type: none"> Policies are detailed indicating the what, why and how something is governed clearly.
32	Ethical use of data & big data	<ul style="list-style-type: none"> Data is distributed and utilised with little to no ethical consideration. 	<ul style="list-style-type: none"> Ethical practices are promoted and governed in the use of data.
33	Risk appetite	<ul style="list-style-type: none"> Organisation has a low appetite for risk. 	<ul style="list-style-type: none"> Organisation has a healthy appetite for risk.
34	Crisis management locus	<ul style="list-style-type: none"> Small central group meets confidentially to develop a response. Communication in a top-down manner; only once decisions have been made. 	<ul style="list-style-type: none"> Employees from different levels and functions are involved in dealing with crises, and the best response emerges from the collective.
35	Technology impact	<ul style="list-style-type: none"> New technologies are implemented with little consideration around potential risks and impacts on the broader stakeholder groups (i.e. no consideration for impact on safety or sustainability for society). 	<ul style="list-style-type: none"> New technologies are carefully investigated to ensure little risk association for broader stakeholder groups. (i.e. careful and empathetic consideration for impact on safety or sustainability for society).

Describe management innovations, including management practices, processes, systems and other initiatives your team/unit/division has because of your line manager, that you believe will ensure that it is competitive and sustainable in the fourth industrial revolution.

Describe management practices/processes/initiatives your team/unit/division/company has that you believe will hinder/prevent its competitiveness and sustainability in the fourth industrial revolution.

Section 3: Performance

Think about the typical performance of the team/unit/division/company you work in, which is under the influence of your line manager/supervisor (i.e. your workplace setting).

Consider each of the statements below and rate the team/unit/division/company you work in and which is under the control of your line manager/supervisor on a response scale where “1 = Strongly disagree” and “5 = Strongly Agree” and 6 = ”Not applicable”.

My line manager/supervisor runs a team/unit/division/company that...

	1	2	3	4	5	6
	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Not Applicable
Human Capital						
1. is able to deliver innovative / forward-thinking solutions to problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. is able to rapidly refocus in response to changing demands.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. has a track record of being resilient to change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. is able to quickly adopt new skills/competencies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. challenges the status quo.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. has a clear sense of purpose.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. is always looking for innovative ways to tackle new challenges.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. has a track record of successfully implementing change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. is seen as a great place to work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Digital Risk Management

Risks in this instance relates to cyber, technology or data privacy/protection risks.

10.	responds effectively to technology disruption.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	has a data protection and privacy policy in place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	responds effectively to cyber-attacks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	quickly mediates risks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	has a multi-stakeholder focus.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	anticipates risks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	has an effective early warning system/s in place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	has a healthy appetite for risk.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	continuously tracks and reports risks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Business model & Value Creation / Service Orientation

19.	is connected to an ecosystem (universal network / professional network).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	collaborates with a network of strategic partners and alliances.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21.	provides a value-added service to internal or external clients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22.	has a track record of going above and beyond to internal or external client expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23.	has a track record of delivering viable products/services/solutions to internal or external clients in record time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24.	is able to rapidly adapt to better suit the changing business/customer environment/landscape.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	has a strong focus on value creation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Personal perception of organisational survival/sustainability/competitiveness

26. has the capability to survive the fourth industrial revolution.
27. has the capability to excel in the fourth industrial revolution.

Describe the capabilities (e.g. knowledge, skills, competencies, expertise, experience, processes, systems) your team/unit/division/company already possess that will allow it to remain sustainable and competitive in the fourth industrial revolution.

Describe the capabilities (e.g. knowledge, skills, expertise, experience, processes, systems) your team/unit/division/company still needs to put in place that will allow it to remain sustainable and competitive in the fourth industrial revolution.

Section 4: Demographic variables

What type of organisation are you employed in?

- Public organisation or parastatal
- Non-Profit Organisation (NPO)
- Non-Governmental Organisation (NGO)
- Private (for profit) organisation
- Prefer not to answer

Which description below best describes the organisation you are employed in?

- A knowledge-intensive organisation** where knowledge workers are the clear dominant workforce whose main capital is knowledge. Examples include programmers, physicians, pharmacists, architects, engineers, scientists, design thinkers, accountants, lawyers, consultants, academics and any other role that requires ‘thinking for a living’.
- A more **traditional organisation** with a focus on standardised and centralised work processes with low decision-making delegation. Examples are large retail groups, financial services groups, including large brick-and-mortar banks, manufacturing and processing industries, sales organisations with standardised products, government institutions, etc.
- Other.** Please specify:

What is the control structure of your organisation?

- Locally-owned and/or managed organisation
- Managed from a global base, i.e. multi-national organisation
- Prefer not to answer

Approximately how many employees are there in your organisation?

How long have you been employed at this organisation (in years)?

How long have you been employed in your current position (in years)?

How long have you been managed by your current line manager/supervisor (in years)?

What is your current employment status in the organisation?

- Full-time permanent
- Part-time permanent

- On contract
- Freelance / consultant/ service provider
- Other. Please specify
- Prefer not to answer

What is your current role level?

- Non-managerial/non-supervisory
- Supervisor/Team Leader
- Middle Management
- Senior Management
- Executive
- Specialist
- Other. Please specify
- Prefer not to answer

What is your current function (i.e. Finance, Operations, IT, Human Resources etc)?

Please specify your highest level of qualification:

- No formal schooling
- Grade 12 or Matric
- First undergraduate degree or national diploma
- First postgraduate degree or postgraduate diploma
- Masters' degree
- Doctorate
- Other. Please specify
- Prefer not to answer

Please specify your race (only for statistical purposes):

- Asian
- African
- Coloured
- Indian
- White
- Other. Please specify
- Prefer not to answer

Please specify the gender that you identify with (only for statistical purposes):

- Female
- Male
- Transgender
- Other. Please specify
- Prefer not to answer

What is your current age?

THE END

Appendix B: Ethical Clearance

Project title: Investigating the relationship between Leadership 4.0, innovative management practices and organisational performance capabilities for the fourth industrial revolution.

Author: Yandri Pienaar
Reviewer: Signe Rousseau
Submitted: 6/20/2019
Review Completed: True
Reviewer Score: 3
Overall Submission Score: 3

SUBMISSION:

Cover letter providing a summary of the research project
A copy of the research proposal
Questionnaire to be used in the research (if needed)
Consent form (where needed)
Application signed by relevant authorities (e.g. supervisor)

SUPERVISOR SIGNATURE:

Yes

Is the application complete?:

Yes

Comments on the submission:

All required documents provided.

Explanation Ethics Issues:

Adequately covered in the proposal

Comments on Explanation of Ethics Issues:

Adequately considered and explained in the proposal, including that participation is voluntary and anonymous, and that participants may withdraw at any time without consequence.

Risk:

Low risk data unlikely to cause harm

Comment on Risk:

Anonymous responses indicate low risk data unlikely to cause harm.

Data Security:

Data stored securely and disposed of after use

Comments on the use of data:

Proposal indicates that 'data will be kept confidentially and securely in line with privacy legislation and requirements', yet not how or where this will be, nor whether the data will be destroyed after use.

However, low risk anonymous data indicates no special handling required.

Consent:

Consent required and obtainable

Comments Informed Consent:

Consent form provided with a fairly detailed description of the study. However, the form does not indicate that participants should be employed (or have knowledge of a work setting) in order to be able to complete the questionnaire. Please add such details so participants can give fully informed consent.

Consent Organisation:

Consent is not required

International Research:

No

Further Comments:

The application is in order and approved with the following recommendations:

- Please revise questionnaire carefully for spelling errors (cf. q.33 'Risk apatite')
- Please consider providing further information about the nature of questions to be asked (i.e. an assumption that participants are currently employed) in order for fully informed consent to be given before proceeding with the questionnaire.

RECOMMENDATION:

Approved
(Score: 3)