

The influence of digital leadership, innovation and organisational learning on the digital maturity of an organisation

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Abstract

Digital disruption constantly threatens organisations due to the exponential evolution of digital technologies and increased rates of digitisation across all facets of organisations through the adoption of digital capabilities. This digital evolution has increased the necessity for managers to incorporate digital capabilities into their digital strategies. Managers need to have a clear understanding of their organisation's digital maturity and how to effectively leverage leadership, innovation and organisational learning in efforts to enhance digital maturity.

The research approach was deductive, and the philosophy employed was positivism. Comparative and multivariate data analysis was conducted on 136 responses from organisations utilising and evolving digital capabilities.

Research findings indicate that digital innovation and managing performance metrics strongly influenced digital maturity. Leadership and learning culture was found to significantly influence the digital organisation and culture aspects of digital maturity. Finally, the knowledge sharing was shown to influence the digital competencies aspect of digital maturity. The findings provide managers with further insights to successfully leverage leadership, innovation and organisational learning to influence digital maturity.

Future research could replicate the results using alternative measurement instruments identified for digital maturity or conduct a longitudinal study to consider how digital maturity changes over time by manipulating the factors identified.

Keywords

Digital maturity, digital leadership, organisational learning, digital innovation, digital strategy

Declaration

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

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List of Tables

Table 1: Cronbach's Alpha results.....	38
Table 2: KMO and Bartlett's Test of Sphericity results.....	39
Table 3: Industry Results.....	47
Table 4: Digital Maturity – Mean and Standard Deviation	48
Table 5: Leadership – Mean and Standard Deviation	49
Table 6: Correlation results – Leadership and digital maturity factors.....	50
Table 7: Innovation – Mean and Standard Deviation	52
Table 8: Correlation analysis – Innovation and digital maturity factors.....	52
Table 9: Organisational learning - Mean and Standard Deviation	54
Table 10: Correlation results – Knowledge Sharing OL factor and the DM factors.....	54
Table 11: Correlation results – Information Access OL factor and the DM factors	56
Table 12: Correlation results – Knowledge Management OL factor and the DM factors	57
Table 13: Correlation results – Learning Culture OL factor and the DM factors	58
Table 14: Correlation results – Performance OL factor and the DM factors	59
Table 15: Model summary with digital competence as the dependent variable.....	61
Table 16: Summary of multiple regression analysis with digital competence as the DV	61
Table 17: Model summary with digital insights as the dependent variable	62
Table 18: Summary of multiple regression analysis with digital insights as the DV	63
Table 19: Model summary with digital organisation and culture as the dependent variable	63
Table 20: Summary of multiple regression analysis with digital organisation and culture as the DV	64
Table 21: Model summary with digital strategy as the dependent variable	65
Table 22: Summary of multiple regression analysis with digital strategy as the DV	65
Table 23: Summary of Pearson correlation results for the first three sub-research questions.....	67
Table 24: Summary of multiple regression covariance findings	68
Table 25: Overview of attributes identified	70
Table 26: Summary of the Pearson correlation results for leadership and DM.....	72
Table 27: Summary of the Pearson correlation results for innovation and DM.....	77
Table 28: Summary of the correlation results for the organisational learning and DM attributes	82
Table 29: Summary of the regression results for all attributes	88

List of Figures

Figure 1: Relationship diagram depicting independent and dependent variables.....	30
Figure 2: Respondent Gender	45
Figure 3: Respondent tenure.....	46
Figure 4:Seniority within the organisation	46
Figure 5: Approximate total number of employees	48

TABLE OF CONTENTS

Abstract.....	ii
Keywords	iii
Declaration	iv
List of Tables.....	v
List of Figures.....	vi
TABLE OF CONTENTS	vii
Chapter 1: Introduction to Research Problem.....	1
1.1 Introduction.....	1
1.2 Research aim and purpose	4
1.3 Research problem	4
1.4 Research objectives.....	5
1.5 Scope of the proposed research	5
Chapter 2: Literature Review	7
2.1 Introduction.....	7
2.2 The resource-based view of the firm and dynamic capabilities.....	8
2.3 Digital maturity	9
2.3.1 Digital maturity.....	9
2.3.2 Digital maturity and the concepts of digitisation and digital transformation...11	
2.3.3 Digital maturity and digital business strategy	12
2.3.4 Digital maturity and digital culture	13
2.4 Digital leadership	14
2.4.1 Leadership and organisational learning	15
2.4.2 Leadership and innovation	16
2.5 Organisational learning.	17
2.5.1 Organisational learning as a dynamic capability.	17
2.5.2 Organisational learning.....	19
2.6 Digital Innovation	20
2.6.1 Innovation, Dynamism and Ambidexterity as a Dynamic Capability	21

2.6.2 Digital innovation and digital maturity	26
2.7 Conclusion	27
Chapter 3: Research Questions	29
Chapter 4: Research Methodology	31
4.1 Choice of methodology	31
4.2 Population.....	33
4.3 Unit of analysis	33
4.4 Sampling method and size.....	34
4.5 Measurement instrument	34
4.6 Data gathering process.....	35
4.7 Analysis approach	37
4.7.1 Reliability and Validity.....	38
4.7.2 Factor Analysis.....	39
4.7.3 Descriptive analysis.....	41
4.7.4 Correlation analysis.....	41
4.7.5 Regression analysis	42
4.8 Limitations	44
Chapter 5: Results.....	45
5.1 Introduction	45
5.2 Description of the sample obtained	45
5.2.1 Respondent Demographics	45
5.2.2 Organisational Demographics	47
5.3 Descriptive statistics for the digital maturity construct	48
5.4 Results for Sub Research Question 1	49
5.4.1 Descriptive Analysis for Sub Research Question 1.....	49
5.4.2 Correlation analysis.....	50
5.5 Results for Sub Research Question 2	51
5.5.1 Descriptive Analysis for Sub Research Question 2.....	51
5.5.2 Correlation analysis.....	52

5.6 Results for Sub Research Question 3	53
5.6.1 Descriptive Analysis for Sub Research Question 3	53
5.6.2 Correlation analysis	54
5.7 Overarching research question – Cumulative effect of all the components on the level of digital maturity	60
5.7.1 Multiple regression results with digital competence as the DV	60
5.7.2 Multiple regression results with digital insights as the DV	62
5.7.3 Multiple regression results with digital organisation and culture as the DV ..	63
5.7.4 Multiple regression results with digital strategy as the DV	64
5.8 Summary of findings	66
Chapter 6: Discussion of Results.....	69
6.1 Introduction	69
6.2 Digital leadership	72
6.2.1 Leadership and the competence DM attribute	72
6.2.2 Leadership and the insights DM attribute.....	73
6.2.3 Leadership and the organisation and culture DM attribute	74
6.2.4 Leadership and the strategy DM attribute	75
6.2.5 Conclusion: Sub-Research Question 1	76
6.3 Innovation	77
6.3.1 Innovation and the competence DM attribute	77
6.3.2 Innovation and the insights DM attribute.....	78
6.3.3 Innovation and the organisation and culture DM attribute	79
6.3.4 Innovation and the strategy DM attribute	79
6.3.5 Conclusion: Sub-Research Question 2	81
6.4 Organisational learning	81
6.4.1 Knowledge sharing and DM.....	82
6.4.2 Knowledge management and DM.....	83
6.4.3 Culture and Information access attributes and DM	84
6.4.4 Performance and DM	86

6.4.5 Conclusion: Sub-Research Question 3.....	87
6.5 What is the cumulative effect of all the components on the digital maturity of the organisation?	87
Chapter 7: Conclusion.....	90
7.1 Principal findings.....	90
7.1.1 The nature of the relationship between digital leadership and digital maturity of an organisation.....	90
7.1.2 The nature of the relationship between digital innovation and the digital maturity of an organisation	91
7.1.3 The nature of the relationship between organisational learning and the digital maturity of an organisation	92
7.1.4 The cumulative effect of organisational learning, digital innovation and digital leadership on the DM of the organisation	93
7.2 Implications and recommendations for management	94
7.3 Limitations of the research	95
7.3.1 Sampling bias.....	95
7.3.2 Research design	95
7.3.3 Research experience.....	95
7.3.4 Research theory	96
7.4 Suggestions for future research	96
Reference List	97
Appendices	109
Appendix 1: Research Questionnaire.....	109
Appendix 2: Coding	115
Appendix 3: Cronbach's Alpha results at the construct level	122
Appendix 4: KMO and Bartlett's Test of Sphericity results	123
Appendix 5: Factor analysis results	123
5.1 Digital maturity factor analysis results.....	124
5.2 Innovation factor analysis results.....	126
5.3 Leadership factor analysis results	127

5.4 Organisational learning factor analysis results.....	128
Appendix 6: Sub Research Question 1 – Normality and Correlation results.....	130
Appendix 7: Sub Research Question 2 – Normality and Correlation results.....	132
Appendix 8: Sub Research Question 3 – Normality and Correlation results.....	133
Appendix 9: Regression Results	134
9.1 Digital competence regression results	134
9.2 Digital insights regression results	137
9.3 Digital org and culture regression results.....	140
9.4 Digital strategy regression results.....	143
Appendix 10: Ethical clearance confirmation.....	147

Chapter 1: Introduction to Research Problem

1.1 Introduction

Various authors (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Catlin, Scanlan, & Willmott, 2015; Chanias & Hess, 2016; Deloitte Digital, 2015; Gottschalk, 2009; Westerman, Tannou, Bonnet, Ferraris, & McAfee, 2012) report on their views as to what constitutes digital maturity. Some argue (Bharadwaj et al., 2013; Chanias & Hess, 2016) that digital maturity describes the extent to which the information flows and company tasks of the organisation are based on information technology (IT). Others (Catlin et al., 2015; Deloitte Digital, 2015; Gottschalk, 2009; Westerman et al., 2012) view digital maturity as the current status or outcomes of what has already been achieved through the organisation's digital transformation related efforts. These views, however, fail to provide clarity on what the influence of leadership, innovation and organisational learning (within the context of the digital organisation) is on the digital maturity of the organisation. A clear understanding as to how to successfully leverage leadership, innovation and organisational learning to enhance digital maturity will allow digital leaders to prioritise activities accordingly in their digital business strategies.

This study aims to understand the nature of the relationship digital maturity has with leadership, innovation and organisational learning respectively. This study will also investigate the cumulative influence leadership, innovation and organisational learning may have on digital maturity. This will allow this study to provide insights to digital leaders as to how leadership, innovation and organisational learning can be leveraged to enhance digital maturity.

Digital maturity reflects on the digital capabilities an organisation currently has at its disposal, or are in the process of developing. Digital maturity is enhanced through the process of digitalisation, which is the adoption and leveraging of digital technologies with the goal to enhance existing or to create new digital capabilities within the organisation (Gassmann, Frankenberger, & Csik, 2014). As technology advances exponentially, digitalisation will also increasingly affect the non-digital aspects within the organisation. Examples of this are the conversion of manual, repetitive labour-intensive processes to automated robotics enabled digital platforms for managing warehouses and inventory, or the digitisation of physical products and services into a new digital format which can

be sold to customers online, all of which requires the organisation to develop and mature digital capabilities.

Digital maturity also influences the design and execution phases of the digital business strategy, as the current level of maturity would determine the capabilities available to the organisation for the digital business strategy to leverage off (Bharadwaj et al., 2013; Catlin et al., 2015; Kane, Palmer, Phillips, & Kiron, 2015; Westerman et al., 2012). Understanding how innovation, leadership and organisational learning influence digital maturity is of particular importance, as it may enable digital leaders to effectively leverage this knowledge in their efforts to enhance the digital maturity of their organisations, as part of their digital business strategies. Sia, Soh and Weill (2016) and Woodard, Ramasubbu, Tschang and Sambamurthy (2013) argue that a clear understanding of an organisation's digital capabilities and a roadmap on how to establish, grow and develop them may enable organisations to more effectively respond to change. An example of this is scalability, which has always been seen a traditional driver of profitability, and with infrastructure becoming increasingly digital, dynamic capabilities which can be scaled fast and exponentially now needs to be considered in both physical and digital terms (Bharadwaj et al., 2013).

Organisations today are faced with the risk of being disrupted digitally and must, therefore, innovate to compete and potentially survive. Despite this, very few guidelines exist on how to successfully leverage innovation to enhance DM as a response to these digital threats and opportunities (Desmet, Duncan, Scanlan, & Singer, 2015; Hess, Benlian, Matt, & Wiesböck, 2016; Sia et al., 2016). Both digitalisation and innovation require organisational learning as a critical enabler to ensuring the effective learning, sharing and management of new and existing knowledge flows from both internal and external sources (Chiva, Ghauri, & Alegre, 2014). Through innovation and leadership this knowledge is transformed into new or enhanced capabilities or products for the organisation as sources of unique value creation (Desmet et al., 2015; Meihami & Meihami, 2014; Piccoli & Ives, 2005; Sia et al., 2016; von Krogh, Nonaka, & Rechsteiner, 2012). Enhanced digital capabilities, as an outcome of this process, would lead to an increase in digital maturity for the organisation. Business demands on the technical teams within their organisations to deliver new or enhanced products and services through digital means are also increasing, and this creates further internal pressure to innovate, which in turn exposes cultural and technical barriers to digital transformation within the organisation. Innovation and organisational learning could overcome these barriers by enabling both the knowledge and capabilities (Fichman, Dos Santos, &

Zheng, 2014; Huang, Henfridsson, Liu, & Newell, 2017; Jung, Chow, & Wu, 2003) the organisation needs for competitive advantage.

Organisational learning is, therefore, a critical capability which enables the creation, sharing and leveraging of digital knowledge across the organisation, leading to an increase in the digital maturity of the organisation. Leadership, on the other hand, enables the organisational culture needed for innovation and organisational learning while ensuring that there is alignment to and a focus on the end goal (Bryant, 2003; Davison & Ou, 2017; Kane, Palmer, Phillips, Kiron, & Buckley, 2016).

The process of innovation is a dynamic capability which organisations should be leveraging to maintain or sustain competitive advantage (Fichman et al., 2014; Huang et al., 2017; Teece, Pisano, & Shuen, 1997). Innovation is also seen an important driver of organisational growth, whether it is through the enhancement of existing products, or the creation of new products for new markets (El Sawy et al., 2016). In the context of digital maturity, innovation would be critical in creating new and supporting existing digital initiatives, the outcomes of which would lead to enhanced digital maturity for the organisation.

Leadership ensures congruence amongst dynamic capabilities such as innovation and organisational learning with the ultimate goal of digital transformation, ensuring that organisational efforts are prioritised and focused on achieving the required digital outcomes. Leadership styles such as transactional and transformational leadership also contribute significantly to enabling the digital organisational culture required for enhancing digital maturity through the process of digitalisation. According to Bryant (2003), transactional leadership would be more appropriate for the creation of information systems and knowledge management; whereas transformational leadership would be more effective at knowledge creation and sharing. Leadership is also viewed as an enabler of the digital culture required for increased digital maturity by ensuring that the required cultural values and norms are in place, which is important as an organisation's culture could either limit or enhance learning and innovation (Bryant, 2003; Jung et al., 2003; Singh, 2008; von Krogh et al., 2012).

Organisational learning is a process that creates different ways for viewing and understanding knowledge concepts within an organisation (Chiva et al., 2014). This knowledge is embedded into processes, practices and behaviours through the creation, dissemination and application of knowledge (Meihami & Meihami, 2014; Tsou & Hsu, 2015; Younger, 2016). Through mature organisational learning processes, the knowledge required to enhance digital maturity in the organisation is therefore acquired.

1.2 Research aim and purpose

The primary aim of this research project is to understand the influence innovation, organisational learning and leadership in the digital age will have on the digital maturity of the organisation. Organisation's existing digital capabilities or digital maturity affects their ability to react to change or exploit digital opportunities. Leadership, innovation and organisational learning are seen as antecedents to increased levels of digital maturity. Clarifying the nature of these relationships is therefore crucial for leveraging them successfully as part of the organisation's digital transformation journey (Catlin et al., 2015; Desmet et al., 2015; Dinh et al., 2014; El Sawy, Amsinck, Kræmmergaard, & Vinther, 2016; Kane et al., 2016; Lin & Wu, 2014).

The study will analyse the individual relationships between digital maturity and innovation, leadership and organisational learning. The study will also examine the cumulative effect innovation, leadership and organisational learning may have on digital maturity.

The academic value of this research may be to contribute to existing insights on digital maturity by clarifying the roles of innovation, leadership and organisational learning on the level of digital maturity of the organisation. Through examining the cumulative effect innovation, leadership and organisational learning may have on digital maturity, the attributes which may significantly predict digital maturity could also be identified.

The business value as a result of the research is in that it may provide digital leaders with a better understanding of how innovation, leadership and organisational learning could be leveraged in their efforts to influence the organisation's DM. This would also allow them to focus their limited resources on the attributes identified as part of this research which may significantly contribute to enhanced digital maturity for the organisation. The insights from the research will, therefore, assist organisations to formulate their digital business strategy strategically.

1.3 Research problem

There is a need to clarify the role innovation, leadership and organisational learning have in influencing the digital maturity of the organisation if they are to be leveraged successfully as part of the digital business strategy. The digital technology landscape is

expanding exponentially, with more organisations adopting digital capabilities such as cloud computing, big data and machine learning. Organisations will have to continually create, adapt and review their digital business strategy if they want to remain relevant for the changing digital needs of their customers.

There is currently little academic literature that quantitatively analyses both the individual relationships between as well as the cumulative effect of innovation, leadership and organisational learning on the digital maturity of the organisation. The literature review in Chapter 2 will also show that the academic literature is divided as to what constitutes the elements within the digital maturity construct. To this extent, a definition for digital maturity is also proposed as part of this study.

1.4 Research objectives

The first research objective is to understand the nature of the relationship between innovation and digital maturity. The second research objective is to understand the nature of the relationship between leadership and digital maturity. The third research objective is to understand the nature of the relationship between organisational learning and digital maturity. The fourth and final research objective of this study is to understand the overall effect organisational learning and digital innovation as dynamic capabilities, and digital leadership may have on the level of digital maturity of the organisation.

1.5 Scope of the proposed research

The scope of this research is bound by the definitions below of the four concepts: namely, digital maturity, digital innovation, digital leadership and organisational learning. The definitions of these concepts are:

Digital maturity is defined by this research study as the outcome of digital business strategy aspects concerned with the enhancement of the digital capabilities of an organisation.

Digital innovation is defined as “the recombination of digital components in a layered, modular architecture to create new value-in-use to users or potential users of a service”(Huang et al., 2017, p. 302).

Digital leadership refers to leading the organisation in a digital context, whether it is in business strategy, models or mindset, and is broadly defined as “doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem”(El Sawy et al., 2016, p. 142).

Organisational learning is defined as “the process through which organizations change or modify their mental models, rules, processes or knowledge, maintaining or improving their performance”(Chiva et al., 2014, p. 689).

These definitions set the context in which these concepts were understood, results discussed, and conclusions are drawn in relation to this study.

Chapter 2: Literature Review

2.1 Introduction

This research study aimed to understand the influence digital innovation, digital leadership and organisational learning would have on the digital maturity of an organisation. Much of the literature reviewed (Catlin et al., 2015; Chanias & Hess, 2016; Parviainen, Tihinen, Kääriäinen, & Teppola, 2017; Westerman et al., 2012) did not consider these concepts holistically, and in not doing so have indicated a shortfall in the existing literature as to whether relationships exist and what the nature of these relationships may be. Through an understanding of the nature of these relationships and how they may influence digital maturity, digital leaders would be able to effectively leverage innovation, leadership and organisational learning to enhance DM.

Innovation is an important driver of growth and should be leveraged to maintain or sustain competitive advantage (Fichman et al., 2014; Huang et al., 2017; Teece, Pisano, & Shuen, 1997) through the enhancement of existing, or the creation of new digital capabilities through the process of digitalisation (El Sawy et al., 2016). Organisational learning supports innovation and digital transformation by enabling the capturing and sharing of existing and new digital knowledge from both internal and external sources (Chiva et al., 2014) which is critical to establishing and maturing digital capabilities. Leadership ensures alignment between innovation and organisational learning activities with the organisation's digital transformation objectives, while also enabling the organisation culture required for digital learning and transformation to take place (Bryant, 2003; Jung et al., 2003; Singh, 2008; von Krogh et al., 2012). As the literature suggests, leadership, organisational learning and innovation may also have interdependencies which need to be explored within the context of digital maturity. This would allow for a better understanding as to how they could be leveraged successfully to enhance digital maturity.

Current literature did, however, provide context to the concepts of digital innovation, digital leadership, digital maturity and organisational learning. The literature review explores the theory of dynamic capabilities and the resource-based view, a pertinent theory that was used as a lens for examining the constructs and anchor this study. Digital maturity is also explored, and the relationships between digital maturity, digital business strategy and digital culture are understood. Innovation was then linked to digital maturity, and the current literature pertaining the influence of leadership styles on innovation was also explored. Organisational learning was discussed further and linked to dynamic

capabilities and the resource-based view. The final section in the literature review discusses the concept of digital leadership.

The following section provides context on the relevant theory that was applied as a lens for the analysis of this research study.

2.2 The resource-based view of the firm and dynamic capabilities

The resource-based view (RBV) and dynamic capabilities (DC) is used as the theoretical lens for analysis within this research project. RBV and DC is an appropriate frame to use, as the literature review to follow will link Digital Maturity, Digital Innovation and Organisational Learning to the concept of DC's as defined in these frameworks. As per Bharadwaj et al. (2013) and Catlin et al. (2015) the concept of digital maturity is quite complex, and from a strategic perspective this theory makes the most sense to use as a lens when looking at digital maturity, as influenced by the constructs of leadership, innovation and organisational learning, which in turn can be linked to the definition of dynamic capabilities.

RBV and DC's is also positioned at the strategic level, whereas other theories including the technology acceptance model (TAM) was considered but not found as suitable for this research project as TAM is positioned at the operational, and not the strategic level (Marangunić & Granić, 2015; Mathieson, 1991). TAM also focusses on the constructs of usage behaviour and intention to use when considering how technology will be adopted and is therefore not useful as a lens for the objectives of this research (Marangunić & Granić, 2015; Mathieson, 1991; Venkatesh & Davis, 2000).

The resource-based view is a theoretical framework for comprehending how competitive advantage is obtained and maintained over an extended period (Peteraf, 1993). This is achieved by focusing value creation strategies against resources the firm currently has at its disposal (Lin & Wu, 2014; Nyberg, Moliterno, Hale, & Lepak, 2014; Peteraf, 1993; Ployhart, Nyberg, Reilly, & Maltarich, 2014). How organisations combine these resources is what makes them rare or unique, in such a way that is not easily substitutable by competitors; accumulating these resources to increase strategic competitive advantage would be at the core of the organisation's strategy (Eisenhardt & Martin, 2000; Teece et al., 1997). RBV also perceives the organisation as a mixed bundle of resources, and the differences between these resources would stay the same over time (Eisenhardt & Martin, 2000; Peteraf, 1993; Teece et al., 1997).

According to Teece et al. (1997), 'dynamic' within the frame of DC refers to the ability to continuously create new capabilities or competencies through a process of constant re-combination, to stay aligned with the changing business setting; while 'capabilities' within the frame of dynamic capabilities refers to the crucial role of strategy in sourcing, changing, aligning or releasing skills, resources or functional competencies to create new or meet the existing requirements of the market, in order to obtain a competitive advantage in a changing environment (Teece et al., 1997). While RBV and DC are considered complementary, a fundamental difference from the concept of RBV is that in the DC view these changes occur in fast-changing environments in pace with the volatility of the market, where RBV takes a long-term view. This further supports the appropriateness of RBV and DC as the theoretical lens for this study.

The above literature (Eisenhardt & Martin, 2000; Peteraf, 1993; Teece et al., 1997) therefore suggests that DC can then be viewed as the organisational processes which are leveraged in order to manipulate these resources. Lin & Wu (2014) also suggested that an integrated approach between RBV and the DC will provide far more enhanced competitive advantage than just focusing on either RBV or DC would enable in isolation.

The first concept investigated in relation to this study is that of digital maturity, which is discussed in the following section.

2.3 Digital maturity

This section provides background on a pertinent area of this study, which is digital maturity (DM). The various views (Catlin et al., 2015; Deloitte Digital, 2015; Gottschalk, 2009; Kane et al., 2015) of what constitutes DM demonstrates the complexity and multidimensional nature of the topic. A definition for DM is also proposed, and the relationships between DM and both digital culture and digital business strategy is also discussed.

2.3.1 Digital maturity

Literature pertinent to the concept of maturity models suggests that maturity models represents stage of growth theories (Earl, 2000; Subba Rao, Metts, & Mora Monge, 2003) which assumes organisational capabilities evolves in a stage like manner along a

predictable route, with each stage clearly delineated by benchmark variables appropriate to the stage. This assumption, however, is the most significant disadvantage of using maturity models, as not everything evolves along a linear path. An example of this is technology, which may advance exponentially. Despite this, the value of maturity models is that they enable structured planning against each stage (Gottschalk, 2009) while continuously measuring progress against the benchmark variables.

As the literature review below indicates, there are numerous views as to what constitutes the elements within the DM construct. Strategy, leadership, culture, managing knowledge, talent and skills in the context of digital, and the ability to engage with customers in a digital manner are common themes amongst the literature reviewed (Catlin et al., 2015; Deloitte Digital, 2015; Gottschalk, 2009; Westerman et al., 2012). Also, Catlin et al. (2015) argue for digital capabilities which enable scale, examples of which would be capabilities enabling data empowered decision making, process automation and two-speed IT, should be understood as part of DM. Deloitte Digital (n.d.) argues that an understanding of the right products and services is important, and whether the organisation has the capabilities to develop, run, and manage them. They also believe the organisation's digital operations capabilities, which includes processes, controls and digital technologies, needs to be measured to understand if these would be sufficient to support the digital operations of the organisation (Deloitte Digital, 2015). Westerman et al. (2012) further describes DM as a combination of two dimensions, transformation management intensity and digital intensity, where the first describes the process that creates the leadership capabilities required to drive digital transformation within the organisation, and the latter refers to the investments in tech-enabled activities that change how the organisation operates.

What the above authors have in common, is that their respective models rely on processes or activities which either establishes or matures digital capabilities, aligned with the principles of DC and the RBV. Defining these processes and activities for an organisation would depend on the existing resources or capabilities the organisation has access to and can successfully re-combine in a unique way, executed as part of the organisation's digital business strategy (Catlin et al., 2015; Kane et al., 2015; Sebastian, Beath, & Ross, 2017; Teece et al., 1997).

Based on the above, for purposes of this research study, DM is defined as the outcome of digital business strategy aspects concerned with the enhancement of the digital capabilities of an organisation. DM can also be, depending on the context perceived as either an input or output. In this research study, the primary view of DM is as an output

or an outcome, however the literature to follow will also show that the DM capabilities which exist within the organisation would be an input to the creation of the digital business strategy and the process of digital innovation, where existing DM capabilities is a building block or enabler for the next iteration of digital capabilities to be created.

The next section explores the concepts of digitisation and digital transformation, and their potential relationships to DM.

2.3.2 Digital maturity and the concepts of digitisation and digital transformation.

Depending on the context used digitisation could have various meanings. Some (Parviainen et al., 2017) refer to digitisation as a process of digitising or converting to a digital form, whether it is analogue data, text, images or video for example. Chanas and Hess (2016) further describe digitisation in terms of technological flows of information and activities to a computer (Chanas & Hess, 2016). For the purposes of this research project, the views of Gassmann et al. (2014) are supported, which defines digitisation as “the ability to turn existing products or services into digital variants, and thus offer advantages over tangible products, e.g., easier and faster distribution”(Gassmann et al., 2014, p. 6). The concepts of services and digital products align closely with the theme of creating new digital capabilities and therefore with dynamic capabilities as per the DC view. Gassmann et al. (2014) further argue that the process of digitisation would not reduce the value of the product or service as perceived by the customer. Based on the above literature (Chanas & Hess, 2016; Gassmann et al., 2014), it can, therefore, be argued that digitisation may not directly contribute to the level of DM within the organisation; as digitisation is not necessarily involved with the creation of new or enhancement of existing digital capabilities. However, it assumes that some level of DM exists within the organisation which would allow digitisation to take place.

Digital transformation on the other hand, is described as change driven by the increased use of technology (Chanas & Hess, 2016), or “changes in ways of working, roles, and business offering caused by adoption of digital technologies in an organization, or in the operation environment of the organization”(Parviainen et al., 2017, p. 64). The DBS would drive these digital transformation activities, which may include the creation or enhancement of digital capabilities, in which case it would directly influence the level of DM, while other transformation initiatives may be related to digitisation.

Both digitisation and digital transformation as discussed in this section would lead to the creation of enhanced digital capabilities. The execution and prioritisation of the activities to create these capabilities would be done as part of the organisation's digital strategy, which is discussed in the next section. We also look at the influence DM has on digital business strategy (DBS), as the existing DM of an organisation will determine the capabilities you have available to leverage off as part of the strategy.

2.3.3 Digital maturity and digital business strategy

DBS is a part of an organisations corporate strategy, with 'digital' being the manner in which it is delivered to obtain a competitive advantage. Bharadwaj et al. (2013) define DBS as an organisational strategy which leverages digital resources to create differentiated value. This unique value proposition must incorporate digital technologies in such a manner that makes it hard for competitors to duplicate as per Sebastian et al. (2017), who argues that a digital strategy provides direction to executives leading digital initiatives, enabling them to measure progress and adjust as need be. Hess et al. (2016) argue for a digital transformation strategy (DTS), which is concerned with deploying and exploiting digital technologies and argues that it should be separate to an IT strategy due to the impact it has on the entire organisation, both internally and externally. Sia et al. (2016) further argue that DBS is cross-functional and requires real-time development and reconfiguration of resources, as well as the development of capabilities specifically in the areas of leadership, operations, innovation and customer needs. The above literature, therefore, suggests that there is an alignment with the DC's view, where resources (capabilities) are recombined to create value, and it is how these are combined that delivers the unique value proposition for the organisation (Eisenhardt & Martin, 2000; Teece et al., 1997). This is based on the assumption that there are existing digital capabilities to leverage off to create a DBS, therefore some level of DM.

DM may also directly influence the design and execution of the DBS, as the level of DM will determine the digital capabilities, or digital resources as per the DC view, the organisation currently has to leverage off (Kane et al., 2015), who also states that the key differentiator between digitally mature companies is the extent to which they are willing to utilise digital to transform their entire business model. It can, therefore, be argued that the choices made as part of the DBS may have a substantial and positive influence on the level of DM of the organisation as an output and that the DBS is one of

the processes under the DC view that could be utilised to manipulate and recombine existing resources to sustain competitive advantage.

In the next section, we look at the relationship between DM and digital culture. Culture is linked to the DC view as an enabler for DC's, as a digital culture may be an enabler for organisational learning and innovation, which in turn may influence the DM of the organisation.

2.3.4 Digital maturity and digital culture

“Corporate culture refers to the values and beliefs that employees hold; culture can be a de facto governance system as it mediates the behaviour of individuals and economizes on more formal administrative methods“(Teece & Pisano, 1994, p. 9). Teece and Pisano (2004) further state that culture, values and experience is a soft asset or capability that cannot be bought, and should be built within the organisation. The literature, therefore, confirms that culture is part of the DC's view as per Teece 1997 and Eisenhardt 2000.

Vey, Fandel-Meyer, Zipp, and Schneider (2017) proposes the concept of a culture of change and innovation in times of digital transformation, where a more traditional organisation culture could pose barriers to the agility and flexibility needed to stay in pace with the rate of change within an industry. El Sawy et al. (2016) argues that the key to successful digital transformation lies with strategy, culture and talent development and less so with the technology choices made. Kane et al. (2015) argue for a culture of collaboration and experimentation which if strong and adaptive (Catlin et al., 2015), can help make up for lack of technical abilities. Kane et al. (2016) found that an effective digital culture is an industry agnostic denominator that enables or drives digital efforts within the organisation, and as a net result will drive the various stages of DM of the organisation.

The literature reviewed above highlights the different perspectives these authors have on digital culture. Digital culture should support change and innovation (Vey et al., 2017), collaboration and experimentation (Kane et al., 2015), the development of strategy and talent (El Sawy et al., 2016) and drive digital efforts within the organisation (Kane et al., 2016). The literature, therefore, suggests that digital culture may be an enabler for DC, in this research specifically on Innovation and Organisational Learning, which in turn may influence DM.

The literature reviewed in this section highlighted the importance of digital culture as a DC and explored the various perspectives that constitute digital culture, and how this may influence DM within the organisation. In the next section, the concept of digital leadership is explored via current literature, and how leadership contributes to digital culture and therefore DM is also explored. The relationship between digital leadership and organisational learning is also unpacked in more detail.

2.4 Digital leadership

In this section, we explore the theory behind digital leadership and the possible relationship between the various leadership styles and organisational learning as well as innovation. The concept of leadership as an enabler for the organisational culture required for innovation and organisational learning is also discussed.

El Sawy et al. (2016) defines digital leadership as doing what is right and for digitisation to be strategically successful for both the organisation and its greater business ecosystem. Therefore, digital leadership implies that the leader focuses on the digital context when thinking about business strategy and models, IT, talent, opportunities and other relevant digital capabilities as unique sources of value creation.

Leaders who do not consider capabilities within the digital context or who does not understand how to leverage off them will be at a significant disadvantage and would essentially be left behind (Bennis, 2013). Numerous organisations such as McDonald's, General Electric, Harvard University and Travelex formalises the roles and responsibilities of digital leadership, i.e. to leverage digital opportunities within organisations and to lead the transformation required, under the title of chief digital officer (CDO) (Davison & Ou, 2017). Primarily, the CDO (or equivalent) is actively involved in strategic planning and execution activities (the result of which is the DBS) and understanding how digital technologies could be used or combined to create value for the organisation.

The most important skills a digital leader should have are a transformative vision, to be forward-looking and to have an understand technology (Kane et al., 2016). Digital transformation starts with a digital vision, and where it has been shared, it ensured significant buy-in from employees (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2013). However, Teece (2007) argues that senior leadership skills are needed to sustain DC's, and that leadership's role is that of ensuring decisions are made and that goals, values

and expectations are communicated while ensuring employees are motivated. It can, therefore, be argued that while leadership in itself is not necessarily a DC; Jing and Avery (2008) state insufficient research has explicitly addressed the possible associations between leadership styles and the organisation's performance, which is required to link it with the DC framework.

Given the above literature (Bennis, 2013; El Sawy et al., 2016; Fitzgerald et al., 2013; Jing & Avery, 2008; Kane et al., 2016), leadership may still have a positive influence on DC's, which in the context of this research would be DM, innovation and organisational learning. Digital leaders will attempt to make sense of the external environment with regards to digital threats and opportunities. RBV and DC's is positioned at the strategic level, and therefore the strategic decisions digital leaders will make based on their transformative vision will determine the nature of the activities within the DBS to create digital capabilities, which may influence the DM of the organisation.

In this section, the literature reviewed found that leadership, while not a DC, is still expected to have a positive influence on DC's such as innovation, organisational learning and DM. The next section discusses the relationship between consultative, transformative and transactional leadership styles and organisational learning. The literature review below will show these leadership styles may positively influence organisational learning which in turn may influence DM.

2.4.1 Leadership and organisational learning

Leaders portray a critical role in the process whereby knowledge is managed effectively by providing "vision, motivation, systems and structures at all levels of the organization that facilitate the conversion of knowledge into competitive advantages"(Bryant, 2003, p. 32). Within the above-mentioned knowledge management processes, a leader can have various roles including innovator, mentor and/or facilitator, all of which are positively linked with knowledge sharing within organisations (Bryant, 2003; Yang, 2007). The above literature suggests that leadership and leadership styles have a significant role in shaping the way knowledge is created and flows throughout the organisation.

Various authors (Antonakis & House, 2014; Dinh et al., 2014; Eagly & Johnson, 1990; Parris & Peachey, 2013; Sierra & Banzato, 2016) report on leadership styles. However, in the context of organisational learning (Bryant, 2003; Singh, 2008; Williams & Sullivan, 2011), have examined two predominant types of leadership applicable to organisational

learning, namely transactional and transformational leadership. Research by Sing (2008) established that consultative and delegating leadership styles were significantly and positively related to managing knowledge and that delegating leadership was significant when predicting the creation and management of knowledge to create a competitive advantage. Bryant (2003) argues that the transactional leadership style would be more appropriate for the creation of information system and knowledge management; whereas transformational leadership would be more effective at knowledge creation and sharing. However, Williams and Sullivan (2011) argue for learning leaders who utilises a combination of transactional and transformational behaviours which would be more effective than just transactional behaviours. Based on the above literature (Bryant, 2003; Singh, 2008; Williams & Sullivan, 2011) it can be argued that transactional and transformational leadership styles may positively influence organisational learning as these leadership styles may significantly influence the way knowledge is created and flows throughout the organisation.

In this section, the role of leadership styles was discussed as an enabler for organisational learning. In the next section, the role of leadership styles and how they may influence innovation and therefore the DM of the organisation is explored.

2.4.2 Leadership and innovation

Various authors (Antonakis & House, 2014; Dinh et al., 2014; Eagly & Johnson, 1990; Parris & Peachey, 2013; Sierra & Banzato, 2016) report on leadership styles. However, in the context of Innovation, (Jansen, Vera, & Crossan, 2009; Jung et al., 2003; Lubatkin, Simsek, Ling, & Veiga, 2006; Zacher & Rosing, 2015) found two predominant types of leadership styles applicable to innovation, namely transactional and transformational leadership.

Jung et al. (2003) found that organisational innovation is influenced positively by a transformational leadership style, which creates a culture where experimentation is encouraged freely, and that through the development of transformational behaviours in leaders, innovation outcomes can be improved. Transformational leaders support exploratory innovation by encouraging employees to share knowledge, question the status quo and underlying assumptions, to be inquisitive, and to come up with creative solutions to problems (Jansen et al., 2009). Therefore, organisations need to be more aware of how leadership styles shape the strategic direction of the company.

Exploitative (or incremental) innovations, on the other hand, are a means to respond to existing environmental conditions through the adaptation of existing technologies which allows for existing customers needs to be further met (Lubatkin et al., 2006), and is supported by transactional leadership behaviours (Jansen et al., 2009). Ismail-Saville (2017) further argues that from an innovation leadership perspective you need to minimise restrictions, as these will have a limiting effect on innovation. Limited decision-making power is an example of this. Transactional leadership, for example, does not promote open conversations or the sharing or creating of knowledge at an individual level, where transformational leadership, on the other hand, is not well suited to ensure there is alignment and tracking against goals (Bryant, 2003).

All authors agree that there needs to be a balance between transformational and transactional leadership styles, with transactional ensuring that there is some form of structure and a clear goal that is being worked towards and transformational leadership enabling the right culture and values for knowledge sharing and innovation (Bass, 1990; Bryant, 2003; von Krogh et al., 2012; Williams & Sullivan, 2011).

Based on the above literature review, there may be a relationship between leadership styles and innovation outcomes. As established previously, there may also a relationship between digital innovation and DM, and therefore digital innovation leadership may indirectly influence the organisation's DM.

The literature reviewed in this section has shown that leadership styles would influence innovation outcomes and therefore the DM of the organisation. In the next section, the relationship between innovation and organisational learning is explored, and organisational learning as a dynamic capability is also discussed in detail.

2.5 Organisational learning.

2.5.1 Organisational learning as a dynamic capability.

The literature in this section establishes the link between organisational learning and dynamic capabilities, and highlight the importance of organisational learning in the development of resources and capabilities for improved and sustained competitive advantage, as per the RBV.

Aligned with RBV and DC, Lin and Wu (2014) found that among three defined types of dynamic capabilities (dynamic reconfiguration capability, dynamic integration and dynamic learning capabilities), dynamic learning was the most effective at mediating the influence of valuable, rare, inimitable and non-substitutable (VRIN) resources in order to improve their performance within the organisation. Dynamic reconfiguration is used to monitor trends allowing for timely response through the re-configuration of resources. Dynamic integration capabilities are used in for the integration of internal and external resources in an efficient and effective manner. Dynamic learning capability, however, refers to organisational processes that create competitive advantage through learning mechanisms and differentiates between internal and external learning processes. Eisenhardt and Martin (2000) supports this view by describing how well-known learning mechanisms (for example cyclic learning) guides the evolution of DC down a path that is unique for every organisation.

Teece et al. (1997) discuss the dynamic capabilities approach, which emphasises the development of management capabilities and combinations of technological, organisational and functional skills that are not easily copied, and draws from areas such as organisational learning, Human Resources and technology transfer to support and enable this development.

The literature reviewed (Eisenhardt & Martin, 2000; Lin & Wu, 2014; Teece et al., 1997) therefore confirms that organisational learning is a DC, and highlights the critical enabling role organisational learning plays within the RBV and DC framework. This further aligns to the literature reviewed related to DM; as management capabilities and functional skills are developed throughout the organisation, it is expected to have a positive influence on the DM of the organisation, and would also enable new capabilities that could be leveraged as part of the DBS.

The literature reviewed in this section established that organisational learning is a DC. It was also proposed that organisational learning may have a positive influence on the DM of the organisation. In the next section, we explore current literature pertaining organisational learning and discuss the relationship between organisational learning and innovation based on current literature.

2.5.2 Organisational learning

Chiva et al. (2014) define organisational learning as a process which organisations can leverage to maintain or improve performance through changing or modifying information, processes or mental models. Organisational learning is, therefore, a process that creates different ways of viewing or understanding knowledge concepts within an organisation. Organisational learning is also supported by, or seen as the outcome of knowledge management (KM). KM enables the organisation to embed knowledge into processes to improve behaviours and practices, with the aim to achieve its goals through the creation, dissemination and application of knowledge (Meihami & Meihami, 2014). In the previous section (2.5.1) it was shown that organisational learning is both an enabler and a platform to build on for other DC, and through leveraging the process of OL and KM as the above literature suggests, the DM of the organisation may, therefore, be influenced positively.

Numerous authors (Chiva et al., 2014; Eris & Ozmen, 2012; Jansen et al., 2009; Jung et al., 2003; Mortensen, Bloch, & Others, 2005; Sheng & Chien, 2016) report a positive and enabling influence of organisational learning on innovation. There are also similarities between innovation and organisational learning supporting these views; innovation would typically utilise tools such as rapid experimentation or prototyping as part of the learning process (Ismail-Saville, 2017), whilst dynamic capabilities also utilise such tools as resources to gather new learning, thereby enabling accelerated learning through small failures and real-time feedback (Eisenhardt & Martin, 2000). Learning approaches such as agile, via cycles (sprints) and continuous incremental learning within these cycles, allows people to learn how to become more efficient and effective (Layman, Cornwell, & Williams, 2006). It also provides the opportunity to adjust work styles between cycles if new learning as required. In essence, the shorter these cycles, the faster and more effective learning becomes (Layman et al., 2006; Younger, 2016).

Vey et al. (2017) argue that insufficient sharing of knowledge is a typical barrier when implementing a strong culture of innovation. In essence, learning creates the foundation for innovation; as learning takes place, it increases the organisations capacity to innovate, while concurrently increasing overall performance (Eris & Ozmen, 2012). It may, therefore, be argued that there may be a positive correlation and interdependency between organisational learning and innovation, where innovation builds on the learning that exists in the organisation today and through the process creates new learning or knowledge for the organisation.

Competitive pressures have forced organisations to adapt to interconnected and complex ecosystems by changing their value creation processes to an “open model” through various types of collaboration, promoting the exchange or sharing of information with partners (Tsou & Hsu, 2015). Without the ability to effectively disseminate and leverage this information through mature organisational learning processes and work methods such as scrum and design thinking (Vey et al., 2017) the organisation would be unable to capitalise on this information and turn it into value. In the digital context, Tsou & Hsu (2015) describes organisational readiness for digital resources, or digital readiness in terms of both reach and richness of the organisational processes and knowledge.

The literature reviewed (Chiva et al., 2014; Ismail-Saville, 2017; Meihami & Meihami, 2014; Tsou & Hsu, 2015; Vey et al., 2017; Younger, 2016) therefore, suggests that through mature organisational learning processes, the knowledge required to enhance the level of DM within the organisation is acquired. The literature also suggests that, through organisational learning, the reach and richness of existing digital capabilities are enhanced as a platform to build new digital capabilities, thereby influencing the level of DM.

In this section, the interdependent nature between innovation and organisational learning was highlighted. Innovation leverages existing knowledge and creates new learning through the innovation outcomes. It was also proposed that through mature organisational processes the knowledge required to influence DM successfully is also acquired. In the next section, digital innovation, a concept pertinent to this study is discussed in detail. Digital innovation is also linked to the DC framework through current literature.

2.6 Digital Innovation

In this section, the definition of digital innovation is understood as per the current literature.

Innovation is defined by Mortensen et al. (2005) as the implementation of new and enhanced product or process enhancements, marketing or organisational processes into the workplace or its external relations. Ismail-Saville (2017) on the other hand, defines innovation in terms of the intentional creation, investment and diffusion of economically useful knowledge which is not necessarily restricted to activities which can be seen as

radical or at the technical frontier. For the purposes of this study, the definition of Huang et al. (2017) is supported as it closely aligns with the principles of RBV and DC, and defines digital innovation as the recombination of digital elements in an integrated architecture in order to create value for users of a service. Digital innovation describes how organisations “recombine, reconfigure, or design new digital artefacts”(Woodard et al., 2013, p. 2) in response to opportunities or threats. Piccoli and Ives (2005) argue that organisations who do not constantly create value through digital innovation will not be able to maintain their competitive advantage. The above literature, therefore, establishes the link between digital innovation and DC's as per Teece and Eisenhardt (Eisenhardt & Martin, 2000; Teece et al., 1997).

The current literature pertaining the concepts of ambidexterity and dynamism, as well as the relationships between these concepts, DC and innovation and is explored in more detail in the next section. The potential relationships between these concepts and DM are also established.

2.6.1 Innovation, Dynamism and Ambidexterity as a Dynamic Capability

Ambidexterity refers to the ability of the organisation to leverage existing markets, products and resources while at the same time creating those new products or services that will ensure it stays successful in the future, through the process of innovation and experimentation (Sinha, 2016). It is about simultaneously balancing the need for increased efficiencies or enhanced products in existing markets (exploitation), with the need to create new and unique offerings (exploration) that will deliver value to future customers (Benner & Tushman, 2015; Chang, 2016; Jurksiene & Pundziene, 2016; Parida, Lahti, & Wincent, 2016). Ambidexterity is therefore viewed as critical in enabling both long and short-term organisational performance and sustainability (O'Reilly & Tushman, 2007; Zacher & Rosing, 2015).

From an organisational structure perspective, choices to create this balance between exploitation and exploration related innovation ventures include structurally separating the teams responsible for these functions (structural ambidexterity), creating an environment where resources juggle between efficiency and innovation activities (contextual ambidexterity), or the organisation attempts to do exploration and exploitation at different times and independently (punctuated ambidexterity) (Guttel, Konlechner, & Trede, 2015; Parida et al., 2016) . While this is important to understand

in the context of digital leadership decisions, the DBS and RBV and DC, these elements will not be measured directly in this study as the focus is on the nature of the relationship between innovation and DM and not between these elements and DM. However, it allows for a perspective on how structural ambidexterity could be leveraged as part of the DBS in the effort to enhance DM.

The productivity dilemma refers to the conflicting goals of achieving alignment in the short term, with adaptability in the long term (Benner & Tushman, 2003) and implies, within the context of ambidexterity, that if the focus is on efficient procedures through incremental innovation, the organisational structure and capabilities aligned to these efficient procedures are not changed easily in order to meet future demand.

Managing the balance between the organisation's exploitation and exploration related innovation activities is crucial (Chen, Yang, Dou, & Wang, 2017; Guttel et al., 2015; O'Reilly & Tushman, 2007; Sinha, 2016; Stettner & Lavie, 2014; Zacher & Rosing, 2015). If the focus is more on incremental innovation aligned activities (exploitation), the organisation's current value offering is at risk of becoming obsolete, as factors such as markets, technology or customer needs could change at any time (World Economic Forum, 2016). This is also described as the innovator's dilemma (O'Reilly & Tushman, 2007), which refers to the scenario where activities related to radical innovations are avoided in favour of incremental related activities, in an attempt to meet the needs of an organisations existing customer base (Guttel et al., 2015). If the focus is more towards radical innovation (explorative), the organisation might not be able to survive or perform in the present, as its ability to do so could be impacted as key resources are tied up in exploration-related activities (Sinha, 2016). Managing this balance requires the alignment and coordination of strategy, resources, organisational structure and capabilities; as well as the ability to detect and respond to changes in the organisation's external environment (Guttel et al., 2015).

Next, Ambidexterity is discussed using the lens of the DC view.

As per the literature reviewed (Eisenhardt & Martin, 2000; Lin & Wu, 2014; Peteraf, 1993; Teece et al., 1997), DC refers to the organisations ability to continuously generate new capabilities or competencies, aligned with its strategy, with the aim to stay aligned with changing business environments and achieving competitive advantage. The concept of core competence, however, refers to the activities a company can do well, and while it is described as the operational capabilities (Wilden, Gudergan, Nielsen, & Lings, 2013) of the organisation which, while valuable as sources of competitive advantage, are not

DC, as these operational capabilities do not necessarily enable the organisation, and mostly hinders it. “In organizational terms, dynamic capabilities are at the heart of the ability of a business to be ambidextrous—to compete simultaneously in both mature and emerging markets—to explore and exploit”(O’Reilly & Tushman, 2007, p. 12).

The above literature, therefore, suggests that being ambidextrous is not seen as a DC, but rather that through developing explorative and exploitative DC the organisation will achieve ambidexterity. According to O’Reilly and Tushman (2013), for the different forms of ambidexterity, different types of dynamic capabilities would be required, and the type of ambidexterity would be determined by the organisation and its strategic context, as well as the availability of resources and capabilities (O’Reilly & Tushman, 2013). According to Jurksiene and Pundziene (2016), DC ensures organisational alignment to the rapidly changing environment through capabilities that would either adapt, absorb or modify depending on the circumstances. They further state that ambidexterity enables exploration and exploitation to take place concurrently while ensuring the organisation has the capabilities in place to learn, optimise and balance. DC’s, therefore, includes activities such as product enhancements, new product innovations, joint ventures or alliances as well as organisational learning (O’Reilly & Tushman, 2007).

The literature reviewed (Benner & Tushman, 2003; Chen et al., 2017; Jurksiene & Pundziene, 2016; O’Reilly & Tushman, 2007; Parida et al., 2016; Sinha, 2016; Stettner & Lavie, 2014; World Economic Forum, 2016) suggests that in the context of DM, it may therefore be argued that innovation ambidexterity may have a positive influence on the level of DM of the organisation. Exploitative digital innovation may enhance the level of mastery of a specific digital skill or technology, for example, allowing the organisation to increase their level of DM from those perspectives. Explorative digital innovation may also support the organisation to create and establish new digital capabilities required for the products or services needed in the future. These views are supported by Berghaus and Beck (2016) , who states that “Digital transformation is a technology-induced change on many levels in the organization that includes both the exploitation of digital technologies to improve existing processes, and the exploration of digital innovation, which can potentially transform the business model”(Berghaus & Back, 2016, p. 3). It may also be argued that increasing the level of DM through explorative activities, may result in smaller, incremental increases in the level of DM, whereas exploitative activities may lead to non-linear or exponential growth in the level of DM depending on the context, which could thus be perceived as self-disruption.

Next, the current literature pertaining dynamism is explored, and the relationship between dynamism, ambidexterity and the rate of organisational change is discussed.

Environmental dynamism or turbulence refers to the degree of change and unpredictability within the organisation's external environment (Dess & Beard, 1984). Rapidly changing technology capabilities such as we have recently seen in cloud services, artificial intelligence and robotics, for example, industry structure changes, new entrants and demand uncertainties are all typical characteristics of dynamic environments (Schilke, 2014). Organisations are more likely to understand their critical variables in stable environments, which makes them better at predicting and adapting to changes while concurrently maintaining a balance between exploitation and exploration related innovation events (Parida et al., 2016). For organisations which are in industries with high environmental dynamism, the view is that they should focus on either exploitation or exploration, and not attempt to do both as, according to Parida et al. (2016), exploration could mitigate the impact of the “rapid obsolescence of products or services”(p1150) within a dynamic environment, while exploitation would ensure efficiencies and a steady income, allowing the organisation to weather the storm in the short term, in anticipation of the environment becoming less dynamic (Parida et al., 2016).

The literature reviewed above suggests that ambidexterity inherently implies that the organisation would experience some level of change or transformation in its attempt to attain a balance between exploitation and exploration, or as a response to high environmental dynamism. While the constant change could enhance organisational flexibility, the rate of organisational change needs to be managed (Babalola, Stouten, & Euwema, 2016). A high rate of change could lead to anxiety, change fatigue and increased costs related to coordination of said change (Chen et al., 2017). Core competencies could also become core rigidities (Benner & Tushman, 2003) leading to organisational inertia, which also inhibits change agility. Expanding on the views of Weber and Monge (2017), it can also be further argued that the level of change required at a meso level (organisation level), for example, specific digital capabilities, would be determined and driven by the response required to macro level environmental dynamism, for example, fundamental changes in technology. This would also require corresponding changes at the meso level of the organisation, such as specific structural or cultural changes required to enable the effective use of these digital capabilities. As a result, organisations facing high levels of environmental dynamism would have to find a balance between the potentially radical transformational change required due to dynamism and the actual rate of change they can manage, which may be constrained

by the limitations of existing capabilities, or in the digital context, the existing level of digital capabilities the organisation can leverage.

The concepts of relative ambidexterity and relevant digital maturity is explored next.

D'Souza, Sigdya and Struckell (2017) propose a relative ambidexterity framework, which is a representation of the ambidexterity capabilities of the organisation from an explorative and exploitative perspective, relevant to the explorative and exploitative capabilities of a typical organisation in the relevant referent group. This framework allows for determining several alternative competitive positions the organisation could follow to meet its performance objectives, and for each of those positions, it has an associated "required mix" of exploration and exploitation related activities. As part of strategy formulation or review processes, the organisation can, therefore, map its current position and decide to continue as-is or select an alternative mix of explorative and exploitative activities. Similarly, various authors (Gassmann et al., 2014; Remane, Hanelt, & Wiesb, 2017; World Economic Forum, 2016) support the view that digital maturity needs to be viewed within, or relevant to the organisational context and the industries and markets it decides to operate within. It can, therefore, be argued, and in line with the concept of relevant ambidexterity, that it is important for the organisation to have an understanding of its 'relevant digital capabilities' (RDC) or 'relevant digital maturity' (RDM), which would represent the organisations existing digital capabilities or existing digital, relevant to referent organisations. With this context, the organisation would be able to decide if the current mix of digital innovation activities will create the digital capabilities required to remain competitive, or whether the mix should be revised.

In this section, the importance of organisational innovation ambidexterity as a means to ensure the organisation stays relevant in the present and the future was discussed. It was proposed that innovation may have a positive influence on the DM of the organisation through both explorative and exploitative digital innovation initiatives. The concepts of relevant digital capabilities and relevant digital maturity was also proposed. In the next section, the literature pertaining the concept of digital innovation and the relationship between innovation and DM is discussed based on current literature. Digital innovation is also discussed in the context of the DBS, as a DC and its potential to influence DM is explored.

2.6.2 Digital innovation and digital maturity

Fichman et al. (2014) defines digital innovation in terms of product, process or business model changes enabled by IT, and in line with Teece, defines business model innovation as a new means of generating and capturing value enabled by IT. Digitally maturing organisations have a strong focus on innovation and are over twice as likely to be investing in innovation and innovation related capabilities than companies with a low level of DM (Kane et al., 2015).

These digital capabilities, in turn, are “the sources of business value creation and capture”(Bharadwaj et al., 2013) for the DBS. The DBS aligned view of digital innovation is supported by Zimmerman, Gardiner, and Wallis (2015), who states that organisations with strong digital innovation strategies are better positioned to differentiate themselves and grow market share, while those that do not may risk losing market share to disruptors.

Digitally mature companies not only build digital innovations, but they also drive enterprise-wide transformation (Westerman et al., 2012). According to Huang et al. (2017), digital innovation is imperative to the scaling of digital ventures through the mechanisms of instant release, data-driven operations and swift transformation. These radical organisational changes, therefore, rewires the organisation for digital innovation (Sia et al., 2016).

The literature reviewed (Bharadwaj et al., 2013; Fichman et al., 2014; Huang et al., 2017; Kane et al., 2015; Westerman et al., 2012; Zimmerman et al., 2015) suggests digital innovation is concerned with the creation of new or enhanced digital capabilities as part of a defined DBS, and that digital innovation is a core competency for digitally mature companies to both grow and protect market share as well as defend against disruption. It was also established in section 2.6.1 that innovation is a DC and it may, therefore, be argued that digital innovation is also one of the processes that fit under the DC view, and there may also be a positive correlation between the DBS and digital innovation, as both are concerned with exploiting digital capabilities as sources of value creation with sustained competitive advantage as the objective (Catlin et al., 2015; Desmet et al., 2015; Kane et al., 2015; Sebastian et al., 2017; Sia et al., 2016) . This argument can be extended further by adding that there may, therefore, be a positive correlation between digital innovation and DM, as the manipulation or enhancement of these digital capabilities as an outcome of digital innovation may influence the DM of the organisation.

2.7 Conclusion

An understanding of the potential relationships between the constructs of digital innovation, digital leadership, organisational learning on digital maturity was gained through the literature reviewed in this chapter. This study aimed to establish the nature of the relationships between the constructs of digital innovation, digital leadership, organisational learning on digital maturity, as well as to establish the extent to which these attributes both individually and cumulatively influence the level of digital maturity within an organisation.

Through the literature reviewed pertaining DC and RBV (Eisenhardt & Martin, 2000; Lin & Wu, 2014; Nyberg et al., 2014; Teece et al., 1997), as well as the innovation (D'souza, Sigdyaal, & Struckell, 2017; Fichman et al., 2014; Huang et al., 2017; Ismail-Saville, 2017; Zacher & Rosing, 2015) and organisational learning constructs (Chiva et al., 2014; Lin & Wu, 2014; Sheng & Chien, 2016; Vey et al., 2017), it was established that innovation and organisational learning are both DC. It was also argued that digital leadership might have a positive influence on both innovation and organisational learning, through leadership styles and behaviours conducive to the organisational culture required for both innovation and organisational learning, and that therefore digital leadership may also indirectly have a positive influence on the level of DM. A positive correlation between innovation and organisational learning was also proposed.

For the purposes of this research project, digital maturity was also defined as the outcome of digital business strategy aspects concerned with the enhancement of the digital capabilities of an organisation.

The literature reviewed established that DM is an outcome of the process of digital transformation (Berghaus & Back, 2016; Gassmann et al., 2014; Henriette, Feki, & Boughzala, 2015; Parviainen et al., 2017), which is in turn guided by the DBS. The DBS is influenced by the existing level of DM (Desmet et al., 2015; Hess et al., 2016; Sebastian et al., 2017); also, referred to as digital readiness (Tsou & Hsu, 2015) based on existing digital capabilities, organisational ambidexterity and dynamism. It was also argued, and supported by recent authors, that the path to increased DM would not necessarily be linear, (Berghaus & Back, 2016; Remane et al., 2017) as ambidexterity theory (Baškarada, Watson, & Cromarty, 2016; Chen et al., 2017; D'souza et al., 2017; Sinha, 2016; Weber & Monge, 2017) suggests that explorative innovation activities would

create new digital capabilities which may result in organisational self-disruption. In doing so, the organisation would be enabled to grow their level of digital maturity exponentially.

It was also proposed that the organisation's DM should be viewed in relation to the organisation's context and industry as per the notion of relative DM (RDM), by building on the concept of the relative ambidexterity framework (D'souza et al., 2017). This suggests that DM is perceived relative to the digital capabilities employed by incumbents or introduced by disruptors. Industry leaders or disruptors may, through their "industry unique" set of digital capabilities and organisational ambidexterity, continuously redefine the RDM for incumbents, allowing RDM to be a potential input or tool for the DBS formulation and review processes. Understanding the organisation's RDM may also assist with prioritising the digital capabilities the organisation may want to emulate to remain relevant, sustainable as an incumbent, or the digital capabilities it may want to create or introduce to be disruptive and differentiated as an industry leader or pioneer as part of their DBS.

Considering the outcomes proposed by building on the literature reviewed, the research questions raised in chapter three have been articulated succinctly by building on the arguments as set out in the first two chapters. These research questions will be empirically tested in the remainder of this research study utilising the methodology outlined in chapter four.

Chapter 3: Research Questions

This research study aimed to gain a deeper understanding of the proposed constructs that influence the level of DM in organisations, to gain an improved understanding of the relationship between the factors and to establish new insights into how organisations should structure their digital strategies.

Also, the research aimed to establish further the extent to which these components individually and cumulatively influence the level of DM within an organisation.

Broadly this research aimed to answer the following overarching research question:

What is the overall effect organisational learning and digital innovation as dynamic capabilities, and digital leadership on the level of digital maturity of the organisation?

This overarching research question attempted to understand the cumulative effect of all three of the selected digital components on the level of digital maturity of the organisation. The sub-questions are stated below.

Sub-Research question 1: What is the relationship between digital leadership and the level of digital maturity of an organisation?

In the literature review section (Bennis, 2013; El Sawy et al., 2016; Kane et al., 2016; von Krogh et al., 2012), digital leadership has been described in terms of doing the right things to enable successful digitisation within the organisation. Digitisation is enabled via the execution of the DBS leveraging DC such as innovation and organisational learning, leading to increased 'levels' of digitisation, learning and innovation which may positively impact the level of digital maturity within the organisation.

Sub-Research question 2: What is the relationship between innovation and the level of digital maturity of an organisation?

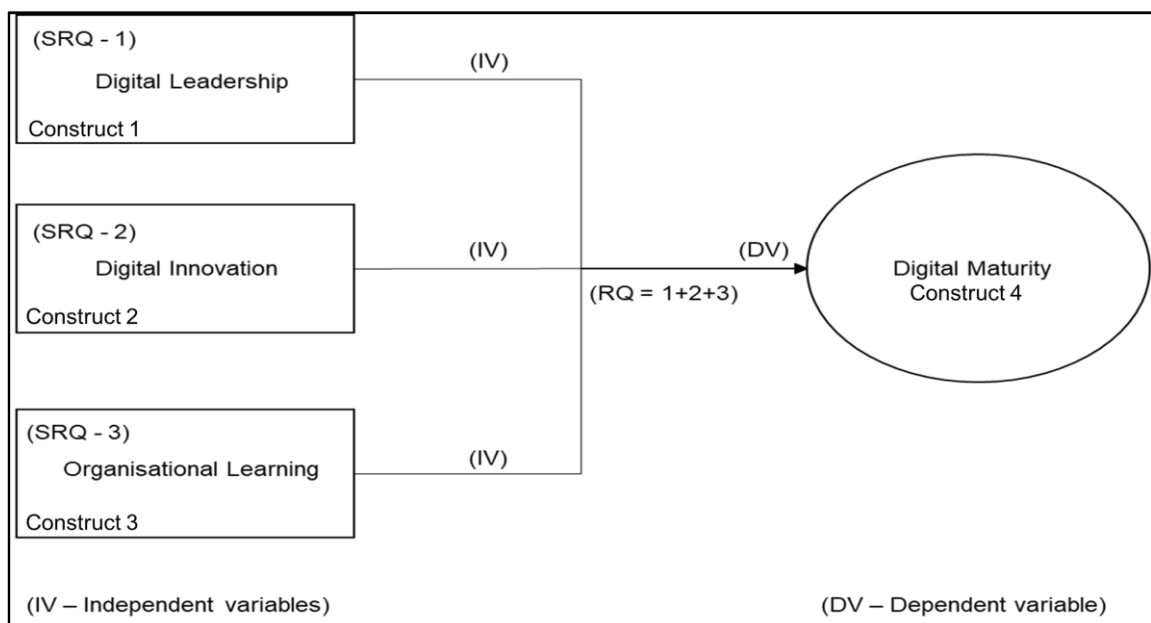
In the literature review section (Bharadwaj et al., 2013; Catlin et al., 2015; Gottschalk, 2009; Kane et al., 2015), innovation was linked to the DC framework. It was also

established that digitally maturing organisations have a strong focus on digital innovation and its related capabilities, as new ways of creating and capturing value enabled by IT.

Sub-Research question 3: What is the relationship between organisational learning and the level of digital maturity of an organisation?

While organisations need to ensure they have relevant skills, they also need to put processes in place to ensure the skills they have stays relevant. A significant factor that distinguishes digitally mature companies from other organisations is the focus on development and training of digitally savvy talent (Kane et al., 2015), with the most mature companies providing their employees with the “resources or opportunities”(p.41) to attain the relevant skills, enabling them to exploit digital trends. It was, therefore, important to understand how Organisational Learning would predict the level of DM in an organisation.

Figure 1: Relationship diagram depicting independent and dependent variables



Chapter 4: Research Methodology

The purpose of this research was to understand the relationships between digital innovation, organisational learning and digital leadership on DM. The research also aimed to determine which of these constructs have a relationship with DM. The survey method where primary data was collected formed the basis of the chosen methodology for this research study (Zikmund, Babin, Carr, & Griffin, 2009).

This section explains all the parameters involved in the research methodology for this study which includes choice of methodology, population, unit of analysis, sampling method and size, measurement instrument, data gathering process, and analysis approach. The research methodology selected was used as the mechanism for understanding the overarching research question.

4.1 Choice of methodology

The research philosophy employed was positivism, and the research approach was deductive, as the aim of the research was to examine the potential cause and effect relationships between the constructs of digital innovation, digital leadership, organisational learning on the level DM of the organisation. A deductive approach leverages existing and well documented theoretical propositions as a base from which to define the research questions tested in this study for relevance within a specific context (Saunders & Lewis, 2012). Positivism allows for these research questions to be tested in a structured and repeatable manner to confirm if the outcomes meet the expectations and where it does not, the theory is adjusted to better predict the outcomes (Saunders & Lewis, 2012). Positivism is appropriate for this study due to the structured and measured approach followed to answering the research questions. In positivism, the explanations must demonstrate causality and is generalised through statistical probability. Disadvantages of positivism include the assumption that the observer is independent and that human interests are irrelevant.

A quantitative study was conducted. Quantitative research is utilised in response to relational questions of variables within research, and in the context of the current research, these variables are digital maturity, innovation, leadership and organisational learning. Quantitative research builds on existing literature and is specific in its surveying

and experimentation (Williams, 2007). Quantitative research creates meaning through objectivity uncovered in the data collected. Advantages of quantitative research methods include the removal of unwanted variations in the outcome that would be attributed to factors other than those related to the manipulation of the experiment, such as researcher bias (Zikmund et al., 2009). Quantitative research also provides for greater control over the research, as it allows for and may explain some of the error variance providing “a purer measure of the experimental manipulation”(Field, 2009, p. 418). Zikmund et al. (2009) report that quantitative research further allows for the results to be replicated in other studies, with the aim of producing the similar results and conclusions, which is called intersubjective certifiability. Quantitative research is further less subjective than qualitative research as qualitative research depends on the observer's interpretation of the results to create meaning, and is, therefore, less researcher dependent (Zikmund et al., 2009). Disadvantages to quantitative research include not being able to understand and explain why the results and therefore the relationships as measured exists.

The research approach was descriptive and deductive, as defined by (Saunders & Lewis, 2012). It is descriptive as it attempted to understand and describe the nature of the relationships between the constructs of digital innovation, digital leadership and organisational learning on the DM of the organisation, and how they may cumulatively influence the DM of the organisation. This would provide an understanding of the positive or negative nature of the relationships these constructs may have with DM and consequently provide an indication of whether these constructs should be leveraged by organisations to influence their DM successfully. The research approach is deductive as it attempted to explain the causal relationships between these variables. The research approach selected enabled this study to attempt to explain the relationships that exist between DM, digital innovation, organisational learning and digital leadership and how these relationships may influence the level of DM, which will allow for an understanding of the overall effect organisational learning and digital innovation as dynamic capabilities, and digital leadership would have on the digital maturity of the organisation. Similar studies have used this approach (Berghaus & Back, 2016; Kane et al., 2015; Remane et al., 2017; Westerman et al., 2012; World Economic Forum, 2016), as per the literature reviewed in Chapter 2.

The research strategy utilised the survey method in the form of an online questionnaire. Similar studies (Berghaus & Back, 2016; Catlin et al., 2015; Kane et al., 2016; Woodard et al., 2013) also utilised this quantitative approach. As per Zikmund et al. (2009), one of the drawbacks of a survey is that the data collected may not be as detailed as with other

methods, however, the advantage of online surveys is that it can be easily distributed. The survey type selected should ensure minimal response bias and a good rate of return from the sample population. (Creswell, 2005). A low response rate reduces the possibility that the sample may accurately represent the population (Zikmund et al., 2009) and therefore would impose additional limitations to the findings. The researcher utilised techniques proposed by (Zikmund et al., 2009) to improve the response rate, which included personalised email invitations to each potential participant as well as reminders to participate. As per Saunders and Lewis (2012), studies using web-based methods reported higher response rates than traditional paper-based methods.

Therefore, as the above was the only method, the research choice was mono-method. It was deemed appropriate given the time constraints as well as the research questions that this study sought to understand (Saunders & Lewis, 2012). A disadvantage of this method is that the researcher could not probe respondents through open-ended questions, which would have allowed for further insights into their responses (Zikmund et al., 2009).

4.2 Population

The target population of this study included all organisations which, through the process of digitisation, employed digital innovation, digital leadership and organisational learning to enhance digital capabilities. In the absence of these constructs, the researcher would not have been able to measure the influence on DM. A screening question (Question 6, Appendix 1) was introduced to ensure the respondents represents the target population (Zikmund et al., 2009) and thereby excluded any non-valid response from being utilised in the statistical analysis. The assumption was made that the target population utilises IT systems within the organisation, whether internally, or as a platform to engage with or sell products to customers, or both.

4.3 Unit of analysis

DM is a cumulative factor within the context of the organisation. Therefore the unit of analysis in this study was the organisation.

4.4 Sampling method and size

The population that was identified for this study included all organisations which, through the process of digitisation, employed digital innovation, digital leadership and organisational learning to enhance digital capabilities. This means that the population size is considerable, however, no list is known to the researcher which contains all organisations that would or could have been targeted and as such the total size of the population is unknown. In such a case Saunders and Lewis (2012) suggest that a non-probability sampling technique is followed since a sample cannot be taken at random. Zikmund et al. (2009) describe this type of sampling as arbitrary as the researcher is influenced by his or her judgement. Within the context of non-probability sampling, a combination of purposive (judgement) and snowball sampling methods (Saunders & Lewis, 2012) was employed for this research study. One advantage of snowball sampling is the cost saving related to acquiring more respondents. These were employed by targeting information technology professional through personal contact and vendor relationships. A disadvantage of snowball sampling is that bias may be introduced into the study as there is a high probability that referrer would suggest someone with similar views (Zikmund et al., 2009).

Knofczynski and Munfrom (2008) report that when three independent variables, which in the context of this study is innovation, leadership and organisational learning, are being investigated the sample size should be at least 127 responses for a “Good prediction level”(Knofczynski & Mundfrom, 2008, p. 440). This study, therefore, aimed to generate a sample of at least 127 respondents to achieve good prediction levels when using three independent variables in a multiple regression analysis. The desired target of respondents was 200 to allow for potential issues such as incomplete data. The researcher managed to obtain 157 survey responses. It was also not possible to determine and report on the response rate due to the use of snowball sampling.

4.5 Measurement instrument

This study utilised a quantitative research methodology, and as per Zikmund et al. (2009), this approach is appropriate in testing research questions. Measurement instruments in the form of questionnaires for leadership, innovation, DM and learning were identified as per (After Digital, 2016; Antonakis, Avolio, & Sivasubramaniam, 2003;

Hansen & Birkinshaw, 2007; Templeton, Lewis, & Snyder, 2002). These were adapted for the purposes of the questionnaire which was administered, as per Appendix 1.

4.6 Data gathering process

Primary data was collected in the form of a structured survey (Zikmund et al., 2009), utilising a self-administering online questionnaire. Quantitative research relies on approaches such as surveys and gathers data through instruments which provide statistical data (Creswell, 2005). The survey method was also utilised by the authors in the literature reviewed (Bharadwaj et al., 2013; Catlin et al., 2015; Kane et al., 2015, 2016; Mortensen et al., 2005). The survey method, therefore, enabled the measuring of innovation, digital leadership, organisational learning on DM through the gathering of data, which allowed this research study to examine and understand the relationships between these constructs and how they may influence the level of DM within the organisation.

Pre-testing of the questionnaire was done with a sample of 20 respondents to ensure any problems with the questionnaire could be identified and rectified by the researcher. No issues were identified in the pre-testing phase which required changes to be made to the questionnaire.

The questionnaire was designed based on the questions identified in the measurement instrument section. The questionnaire, as per Appendix 1, was standardised and simplified using fixed alternatives utilising a Likert scale. As per Zikmund et al. (2009), Likert scales is a measure of attitudes allowing respondents to rate how strongly they agree or disagree with a statement towards some object and is a simple method to administer. Using Likert scales further aided the researcher in the coding, interpretation and analysis of the survey results and removed any unnecessary steps which may introduce errors (Zikmund et al., 2009).

The first five questions of the survey were intended to gather descriptive information for the sample obtained and covered biographic, demographic and employment details. A qualifying question in the form of question six was administered to validate each respondent's relevance to the study. From the 157 responses received, five did not match the criteria set by this qualifying question, and these responses were excluded in further analysis.

Given the method of data collection, the response rate was difficult to ascertain as the researcher did not know how many respondents may have forwarded the survey on to others.

Section A of the questionnaire measured the digital maturity construct. Sub-components measured within this construct included culture, the organisation, technology and insights. Sections B and C of the questionnaire measured the Innovation and Leadership constructs respectively. Section D of the questionnaire measured the organisational learning construct.

It was important for the researcher to be aware of errors and biases that may have occurred such as non-response bias, subject bias, low response rates and extremity bias (Zikmund et al., 2009) in the completion of an online survey. Subject bias refers to respondents providing unreliable information as they are concerned this may portray them in a bad way, which may affect the outcome of the study. This was mitigated by ensuring all respondents understood upfront that the survey would be anonymous and by ensuring that no data was captured that would allow respondents to be identified.

With low response rates, the study would not have an accurate representation of the population, and the findings may therefore not be relevant. The researcher attempted to mitigate this by reaching out to each potential respondent individually via an email which requested and encouraged them to complete as well as forward the survey to other potential respondents.

Extremity bias refers to individuals responding using extremes, for example, the opposite ends of the scale, which could also have skewed the outcome of the analysis. The wording of the questions in the questionnaire was reviewed to ensure that it does not introduce or lead to extremity bias.

Additional errors could include subject errors, observer errors and observer bias, all of which could influence the reliability of the research findings (Saunders & Lewis, 2012). Subject errors refer to measurements happening at different times, which may result in significantly different results. The researcher attempted to mitigate subject errors by limiting the time the online survey was available for completion, which was over a period of three weeks.

Researchers may also interpret the results in different ways, which may cause observer bias errors, therefore biasing conclusions and findings. To mitigate observer bias, the researcher positioned how the literature and constructs are interpreted and defined as

part of this study to set and create a common understanding against which results are interpreted within the context of this study.

Researchers may frame questions in different ways, which may cause observer errors, therefore biasing the results. Saunders and Lewis (2012) and Zikmund et al. (2009), highlights the importance of pre-testing questionnaires with a trial group of respondents to iron out any potential issues with the survey design. It also aids in identifying any reliability concerns regarding bias or ambiguity which can be addressed. As part of this study, a pilot questionnaire was completed by 15 individuals to identify possible issues with the questionnaire design. Feedback received from the pilot questionnaire indicated that the estimated duration to complete the survey was deemed acceptable, that the questions were easy to understand and that there were no challenges with the Likert scale used. Given that no changes were requested, the questionnaire was used, with no changes.

4.7 Analysis approach

Three crucial stages had to be completed before the data was analysed (Zikmund et al., 2009). These were the editing, coding and filing of the data while checking for errors in each of these stages. Editing is concerned with “checking the completeness, consistency, and legibility of data and making the data ready for coding and transfer to storage”(Zikmund et al., 2009, p. 463).

The final survey results were downloaded in MS Excel format from Survey Monkey, which was utilised as the online platform to host and administer the survey form. The data was then copied from MS Excel into SPSS. Sixteen responses with missing or incomplete data of more than 50 percent (Hair, Black, Babin, & Anderson, 2010) was removed from the data set in SPSS, with 136 valid responses remaining.

Coding uses numeric values to represent different groups of data. Coding variables always represent categories and are measured at a nominal value (Field, 2009). Coding was applied on the data set in SPSS as per the codebook exported in Appendix 2. Of the 74 questions in the questionnaire, 46 questions also had to be reverse coded into new variables in SPSS to align the coding scheme with the instrument requirements (Field, 2009).

4.7.1 Reliability and Validity

Saunders & Lewis (2012) defines reliability as “the extent to which data collection methods and analysis procedures will produce consistent findings”(Saunders & Lewis, 2012, p. 128); while validity is described as “the extent to which data collection method or methods accurately measure what they were intended to measure and the research findings are really about what they profess to be about”(Saunders & Lewis, 2012, p. 127). As the research approach was to combine the constructs identified in the literature review into a single study, it was important to ensure that the research instrument produced as part of this study, the structured online questionnaire, produced reliable results consistently.

Cronbach’s alpha allows for an understanding of reliability (Zikmund et al., 2009). A high level of reliability (above 0.7) implies the measuring instrument is consistently measuring as expected, low reliability (below 0.3) could imply it measures something else or nothing at all (Field, 2009). Cronbach’s Alpha was performed at the construct level (Appendix 3). All the constructs measured above the benchmark of 0.7, and subsequently, for each of the constructs reliability has been established.

Table 1: Cronbach’s Alpha results

Construct	Cronbach’s Alpha
Digital maturity	0.95
Innovation	0.89
Leadership	0.92
Organisational learning	0.73

Confirmatory factor analysis (CFA) was conducted next. As per Zikmund et al. (2009), CFA is a “good tool for assessing construct validity because it provides a test of how well the researcher’s ‘theory’ about the factor structure fits the actual observations”(p.593). Confirmatory Factor Analysis was utilised to confirm the validity of the research instrument by ensuring that DM, organisational learning, digital innovation and digital leadership were identifiable constructs as measured by the questionnaire.

4.7.2 Factor Analysis

Factor Analysis (FA) is a data reduction technique which allows the researcher to capture variance from many variables within the constructs and reduce them to single components (Zikmund et al., 2009) or factors, often also referred to as latent variables. Through the reduction of data into a subset of factors, “factor analysis achieves parsimony by explaining the maximum amount of common variance in a correlation matrix using the smallest number of explanatory constructs”(Field, 2009, p. 629).

As a precursor to FA, the Kaiser–Meyer–Olkin test and Bartlett’s Test of Sphericity was utilised to confirm that the data is indeed factorizable. The Kaiser–Meyer–Olkin measures of sampling adequacy (KMO) method is an index which indicates whether linear relationships exist between these variables (Field, 2009), and therefore whether it would be appropriate to run a factor analysis. The KMO statistic varies between one and zero, with values greater than 0.5 seen as acceptable (Kaiser, 1974). KMO results (Appendix 4) for all constructs were greater than 0.8, classifications of ‘meritorious’ to ‘marvellous’ according to (Kaiser, 1974).

Bartlett’s Test of Sphericity examines whether there is a significant relationship between the variables (Field, 2009) and is significant when the value of p is less than 0.05. The Bartlett’s Test of Sphericity results was found to be statistically significant across all the constructs tested, each with a p-value of less than 0.05 (Appendix 4). Table 2 summarises the individual KMO and Bartlett’s Test of Sphericity results for each construct.

Table 2: KMO and Bartlett’s Test of Sphericity results

Construct	KMO	Bartlett's Test (<i>Sig</i>)
Digital maturity	0,93	0.00
Innovation	0,89	0.00
Leadership	0.91	0.00
Organisational learning	0.80	0.00

The suitability of Principle Component Analysis (PCA) was assessed prior to analysis. Inspection of the correlation matrix results for each construct tested showed that all variables had at least one correlation coefficient greater than 0.3. Principal component analysis was run separately on the 28 questions measuring the Digital maturity construct, the ten questions measuring the Innovation construct, the ten questions measuring the Leadership construct and the twenty questions measuring the Organisational learning construct.

For the Digital Maturity construct, PCA results revealed four components that had eigenvalues greater than one and which explained 47.7%, 5.6%, 5.4% and 4.2% of the total variance, respectively (Appendix 5). The four-component solution explained 63.0% of the total variance. The survey questions loading to the four components in the DM construct had a strong loading of digital competence items on component 1, insights items on component 2, organisation and culture items on component 3 and digital strategy items on component 4, as per the table in Appendix 5.1. A Varimax orthogonal rotation was employed to aid interpretability (Appendix 5.1).

For the Innovation construct, PCA results revealed a single component which had eigenvalues greater than one and which explained 100% of the total variance (Appendix 5). The one component solution explained 52.3% of the total variance. This component was named innovation, as per the table in Appendix 5.2. A Varimax orthogonal rotation was employed to aid interpretability (Appendix 5.2).

For the Leadership construct, PCA results also revealed a single component which had eigenvalues greater than one and which explained 100% of the total variance (Appendix 5). The one component solution explained 59.6% of the total variance. This component was named leadership, as per the table in Appendix 5.3. A Varimax orthogonal rotation was employed to aid interpretability (Appendix 5.3).

For Organisational learning, PCA results revealed five components that had eigenvalues greater than one and which explained 29.6%, 11.7%, 8.3%, 6.2% and 5.1% of the total variance, respectively (Appendix 5). The five component solution explained 61.1% of the total variance. The survey questions loading to the five components in the organisational learning construct had a strong loading of knowledge sharing items on component 1, access to information items on component 2, knowledge management items on component 3, learning culture items on component 4 and performance items on component 5, as per the table in Appendix 5.4. A Varimax orthogonal rotation was employed to aid interpretability (Appendix 5.4).

Using IBM SPSS, new variables were created by calculating the average of all the questions loading on to each component and labelled accordingly for each of the factors identified, which allowed the researcher to summarise the survey information associated with a construct into a smaller number of variables. Reducing the information into fewer variables aligns to the rule of parsimony which suggests “that an explanation involving fewer components is better than one involving more” (Zikmund et al., 2009, p. 595). No constructs loaded on to more than one component, and the tables depicting how the various questions loaded against the constructs can be found in Appendix 5.

4.7.3 Descriptive analysis

Descriptive statistics were used to summarise the basic attributes of the data gathered for this study. The mean, or average, describes the central tendency of a distribution, which is essentially the centre of the distribution and is used to summarise data (Field, 2009). The mean is calculated as the average value across a dataset. Standard deviation provides a more accurate estimate of dispersion or variability, as it accounts for outliers (Zikmund et al., 2009). Low standard deviation suggests the data points are close to the mean; whereas high standard deviation suggests the data points are widely dispersed. Both the mean and standard deviation was used to describe the basic attributes of the data gathered.

4.7.4 Correlation analysis

Covariance is the simplest way to determine whether two variables are associated and is usually tested with regression analysis (Zikmund et al., 2009). Assuming there is a relationship between digital leadership, organisational learning, digital innovation and DM, deviations from the mean of one variable would result in the other variable deviating in the same or directly opposite way (Field, 2009). Covariance analysis enabled this research project to attempt to answer research questions, which enquired into the respective relationships digital innovation, digital leadership and organisational learning has on the level of DM within the organisation. Standardised covariance, or the Pearson correlation coefficient, would also provide a value between negative one and one. Positive coefficient values would indicate a positive correlated, and negative values would indicate the inverse. A zero coefficient would indicate that there is no linear

relationship at all. With a positive correlation, increases in a variable will lead to increases in another. In a negative correlation, increases in one variable will lead to a decrease in another (Field, 2009).

As part of the statistical data analysis, a correlation analysis was performed against innovation, leadership and organisational learning as independent variables to establish and understand the nature of their relationships with DM, the dependent variable; allowing for the strength of the relationship between these variables to be studied. A correlation analysis needs interval data for both variables measured and assumes normality to test significance. As per the above literature, this relationship could be either non-existent, positive or negative in nature and the results of the test will also confirm whether the nature of this relationship is statistically meaningful (Field, 2009). The above results had to be interpreted with caution, as they do not provide an indication of the direction of causality. There was also the third variable problem which had to be considered, where “there may be other measured or unmeasured variables that are affecting the result”(Field, 2009, p. 173).

Correlation analysis has the following assumptions, which was tested for as part of the analysis:

- The two variables tested needs to have a linear relationship
- There should be no significant outliers.
- Normally distributed (if a vertical line was drawn through the centre of the distribution it should look the same on both sides). Where the variables were found to not be normally distributed the researcher decided to run a Pearson's correlation nonetheless as the test is somewhat robust to deviations from normality (Havlicek & Peterson, 1976).

The correlation analysis results can be found in Chapter 5, sections 5.4, 5.5 and 5.6 respectively.

4.7.5 Regression analysis

“Regression analysis attempts to predict the values of a continuous, interval-scaled dependent variable from specific values of the independent variable”(Zikmund et al., 2009, p. 564). Multiple linear regression analysis predicts the outcome variable value based on several predictor variables (Field, 2009). It essentially estimates the relationships between variables and gives a view of the percentage variability in the

dependent variable which could be explained by the independent variables. Results are explained by referring to a standardised regression coefficient (β), which provides a standard metric for the comparison of regression results regardless of the original scale range (Zikmund et al., 2009). The significance of the slope of the regression line is determined from the t-statistic which determines if the regression equation is usable.

As part of the data analysis phase of this research project, multiple regression tests were performed using IBM SPSS version 24, and the output was analysed. DM was the dependent variable and digital innovation; organisational learning and digital leadership were the independent variables.

Multiple regression testing has the following assumptions, which was tested for as part of the analysis:

- Two or more independent variables and one dependent variable
- Independence of observations. "For any two observations the residual terms should be uncorrelated"(Field, 2009, p. 220);
- Linearity: The dependent variable has a linear relationship with each of the independent variables, as well as with the independent variables collectively
- Homoscedasticity. "The residuals at each level of the predictor(s) should have the same variance"(Field, 2009, p. 220);
- No multicollinearity. "No perfect linear relationship between two or more of the predictors"(Field, 2009, p. 220), this means they have a high correlation;
- There are no major outliers, leverage points or influential points;
- Normally distributed (if a vertical line was drawn through the centre of the distribution it should look the same on both sides).
-

The multiple regression results for the assumptions mentioned above can be found in Chapter 5.7 and Appendix 9. Testing was done at 95%, with an alpha of 0.05.

4.8 Limitations

The following limitations have been identified:

Research experience: The experience of the researcher plays a significant role in conducting non-probability sampling. To this extent, the researcher may not have had an adequate level of experience required in this field.

Research theory: The research only focuses on the three constructs identified from theory and the nature of their relationships with DM. Other constructs may exist.

Research design: The approach selected was of a quantitative research design. A self-administered, structured online questionnaire was utilised with only the questions provided by the researcher based on the measurement instruments selected.

Online questionnaire: As the questionnaire was in an online format, only respondents with access to both email and internet were able to complete this survey.

Chapter 5: Results

5.1 Introduction

This chapter reveals the results of the survey. Descriptive statistics provide context of the respondent population sampled after which the results of the statistical analysis outlined in Chapter 4 is also provided. These outcomes are presented within the framework of the research questions stated in Chapter 3 and align to the four constructs identified in this research project.

As mentioned in Chapter 4, $n=157$ respondents participated in the survey, of which 136 responses were used in the subsequent analysis. Twenty-one responses did not meet the completeness requirement or the criteria set by the qualifying question and therefore had to be excluded.

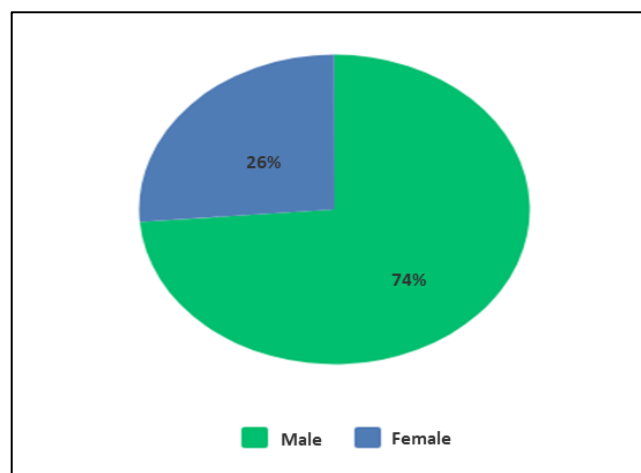
5.2 Description of the sample obtained

5.2.1 Respondent Demographics

5.2.1.1 Gender of respondents

The split between male and female respondents is depicted in Figure 2. Male respondents represented 74 percent, while female respondents constituted 26 percent of the sample obtained.

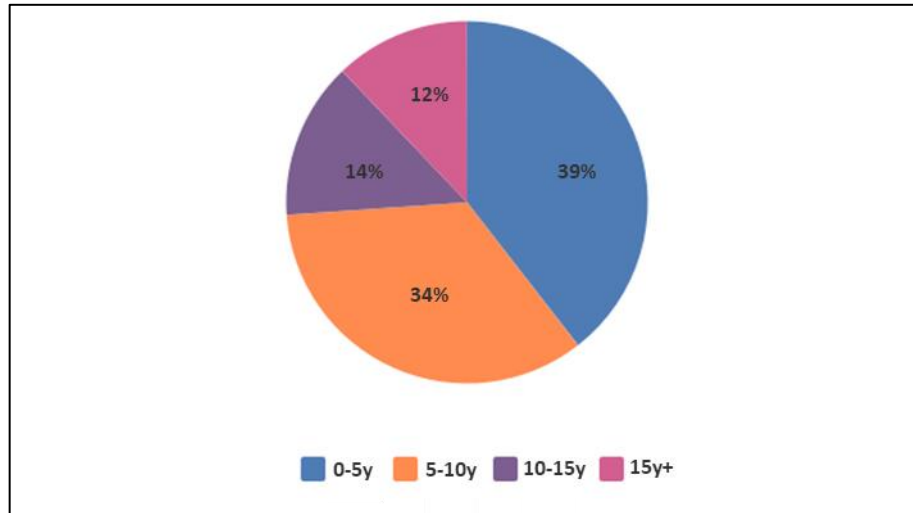
Figure 2: Respondent Gender



5.2.1.2 Tenure within the organisation

Figure 3 provides context regarding how long respondents have been employed at their current organisations. 39 percent of respondents reported a tenure of five years or less, followed by the group that reported a tenure of between five and ten years.

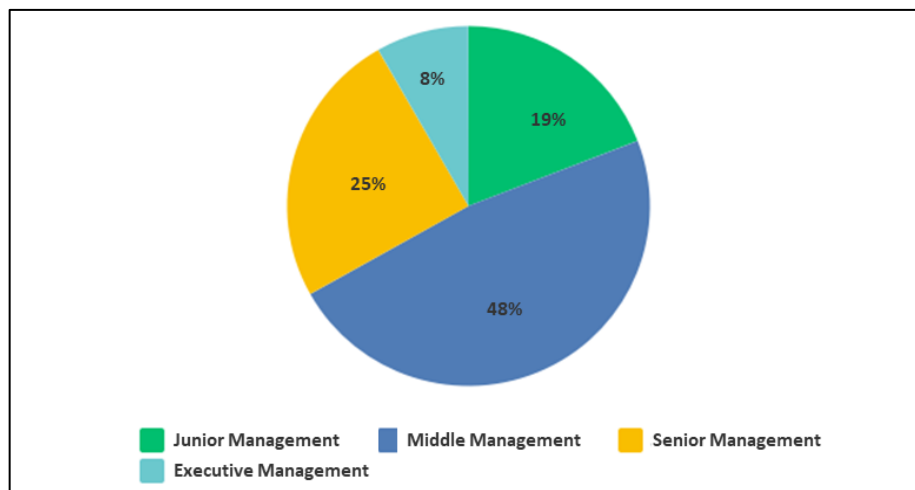
Figure 3: Respondent tenure



5.2.1.3 Seniority of respondents regarding role

At 48 percent, the majority of respondents formed part of the middle management layer within their respective organisations as per Figure 4. The executive management group formed part of the smallest number of respondents at eight percent.

Figure 4: Seniority within the organisation



5.2.2 Organisational Demographics

5.2.2.1 Industry

The survey also established the industries respondents represent, as per Table 3 below. Finance & Financial Services Industries represented 69 percent of respondents, followed by Telecommunications, Technology, Internet & Electronics which represented 23% of respondents.

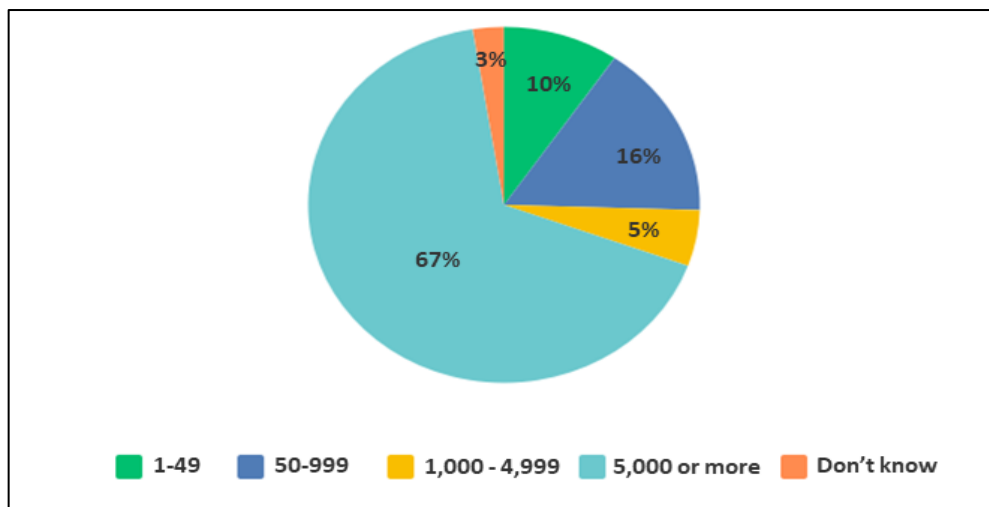
Table 3: Industry Results

Industry	Percentage
Finance & Financial Services	69%
Food & Beverages	1%
Government	1%
Healthcare & Pharmaceuticals	4%
Retail & Consumer Durables	1%
Telecommunications, Technology, Internet & Electronics	23%
Transportation & Delivery	1%

5.2.2.2 Number of employees

As the results in Figure 5 shows, 67 percent of respondents represented organisations with 5,000 or more employees. Five percent of respondents had more than 1,000 employees in their organisations, while sixteen percent of the sample covered smaller organisations from 50 employees upwards to 999 employees.

Figure 5: Approximate total number of employees



5.3 Descriptive statistics for the digital maturity construct

The digital maturity construct consists of five variables which were created based on the outcome of Factor Analysis (Appendix 5). These variables represent (1) digital competence of the organisation, (2) digital insights, and how these are leveraged to guide and measure the organisation's digital strategy, (3) the digital culture of the organisation and (4) the digital strategy of the organisation.

Table 4: Digital Maturity – Mean and Standard Deviation

Factor	Mean	Std. Deviation
Digital competence	2,896	0,606
Insights	2,858	0,633
Digital culture	2,882	0,645
Digital strategy	3,603	0,431

Table 4 depicts the mean and standard deviations for the factors within the digital maturity construct. On average, the mean score for Digital Maturity across these constructs to be at 3.1, indicating that most responses tended to be towards "somewhat agree". This suggests that most respondents rated their organisations to be at an average level of digital maturity across all of these factors. There also appears to be

minimal variance in the data which implies most respondents tended to have very similar views and this may be due to the sample which is predominantly represented by two industry categories constituting 92 percent of respondents. As per Andy Field (2009), a small standard deviation relative to the mean indicates data points close to the mean. Across the four digital maturity factors, the standard deviation was found to be small at 0.6.

5.4 Results for Sub Research Question 1

In this section, the results for Sub-Research Question 1 will be provided. This research question attempted to understand the nature of the relationship between leadership and the level of digital maturity of an organisation.

This research question involves Leadership as construct 1 and Digital Maturity as construct 4 (Figure 1).

5.4.1 Descriptive Analysis for Sub Research Question 1

Table 5 below depicts the mean and standard deviations for the single factor within the leadership construct. The mean score for the leadership factor was 3.6, indicating that most responses tended to be towards “sometimes” and “often” according to the five-point Likert scale.

This suggests that most respondents rated their organisations to have an average level of digital leadership capabilities and that they mostly or often display the leadership behaviours which was measured. As per Andy Field (2009), a small standard deviation relative to the mean indicates data points close to the mean. The standard deviation for the leadership factor was also found to be small at 0.8.

Table 5: Leadership – Mean and Standard Deviation

Factor	Mean	Std. Deviation
Leadership	3,589	0,761

5.4.2 Correlation analysis

A Pearson's leadership digital maturity correlation was run to assess the relationship between leadership and digital maturity. The results of the correlation (Appendix 6) is summarised as per Table 6.

Table 6: Correlation results – Leadership and digital maturity factors

Correlations		Leadership	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,557	31%
	Sig. (2-tailed)	0,000	
	N	135	
DM Factor 2 - Insights	Pearson Correlation	0,570	32%
	Sig. (2-tailed)	0,000	
	N	135	
DM Factor 3 - Digital Culture	Pearson Correlation	0,661	44%
	Sig. (2-tailed)	0,000	
	N	135	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,212	4%
	Sig. (2-tailed)	0,014	
	N	135	

Initial analyses showed the relationship to be linear but that not all of the variables were normally distributed (Appendix 6), as assessed by Shapiro-Wilk's test ($p < .05$). The researcher decided to run a Pearson's correlation nonetheless as the test is somewhat robust to deviations from normality (Havlicek & Peterson, 1976).

There also were outliers which the researcher decided to retain, as it was established that these were not related to data entry or measurement error, and they most likely represented genuine data points.

There was a strong positive correlation between leadership and digital competence, $r(133) = .557$, $p < 0.05$, with leadership explaining 31 percent of the variability in the digital competence factor (Table 6).

There was a strong positive correlation between leadership and digital insights, $r(133) = .570$, $p < 0.05$, with leadership explaining 32 percent of the variability in the digital insights factor (Table 6).

There was a strong positive correlation between leadership and digital organisation and culture, $r(133) = .661$, $p < 0.05$, with leadership explaining 44 percent of the variability in the digital organisation and culture factor (Table 6).

There was a small positive correlation between leadership and digital strategy, $r(133) = .212$, $p < 0.05$, with leadership explaining four percent of the variability in the digital strategy factor (Table 6).

5.5 Results for Sub Research Question 2

In this section, the results for Sub-Research Question 2 will be provided. This research question attempted to understand the nature of the relationship between innovation and the level of digital maturity of an organisation.

This research question involves Innovation as construct 2 and Digital Maturity as construct 4 (Figure 1).

5.5.1 Descriptive Analysis for Sub Research Question 2

Table 7 depicts the mean and standard deviations for the single factor within the innovation construct. The mean score for the Innovation factor was 3.6, indicating that most responses tended to be towards “unsure” or “sometimes” and “often” or “agree” according to the five-point Likert scales used to measure this construct.

This suggests that most respondents rated their organisations to be at or display an average level of innovation capabilities as measured. As per Andy Field (2009), a small standard deviation relative to the mean indicates data points close to the mean. The standard deviation for the leadership factor was also found to be small at 0.7.

Table 7: Innovation – Mean and Standard Deviation

Factor	Mean	Std. Deviation
Innovation	3,594	0,679

5.5.2 Correlation analysis

A Pearson's leadership digital maturity correlation was run to assess the relationship between leadership and digital maturity. The results of the correlation (Appendix 7) is summarised as per Table 8.

Table 8: Correlation analysis – Innovation and digital maturity factors

Correlations		Innovation	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,648	42%
	Sig. (2-tailed)	0,000	
	N	136	
DM Factor 2 - Insights	Pearson Correlation	0,671	45%
	Sig. (2-tailed)	0,000	
	N	136	
DM Factor 3 - Digital Culture	Pearson Correlation	0,715	51%
	Sig. (2-tailed)	0,000	
	N	136	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,343	12%
	Sig. (2-tailed)	0,000	
	N	136	

Initial analyses showed the relationship to be linear but that not all of the variables were normally distributed (Appendix 7), as assessed by Shapiro-Wilk's test ($p < .05$). The researcher decided to run a Pearson's correlation nonetheless as the test is somewhat robust to deviations from normality (Havlicek & Peterson, 1976).

There was a strong positive correlation between innovation and digital competence, $r(134) = .648$, $p < 0.05$, with innovation explaining 42 percent of the variability in the digital competence factor (Table 8).

There was a strong positive correlation between innovation and digital insights, $r(134) = .671$, $p < 0.05$, with innovation explaining 45 percent of the variability in the digital insights factor (Table 8).

There was a strong positive correlation between innovation and digital organisation and culture, $r(134) = .715$, $p < 0.05$, with innovation explaining 51 percent of the variability in the digital organisation and culture factor (Table 8).

There was a moderate positive correlation between innovation and digital strategy, $r(134) = .343$, $p < 0.05$, with innovation explaining 12 percent of the variability in the digital strategy factor (Table 8).

5.6 Results for Sub Research Question 3

In this section, the results for Sub-Research Question 3 will be provided. This research question attempted to understand the nature of the relationship between organisational learning and the level of digital maturity of an organisation.

This research question involves Organisational learning as construct 2 and Digital Maturity as construct 4 (Figure 1).

5.6.1 Descriptive Analysis for Sub Research Question 3

Table 9 depicts the mean and standard deviations for the factors within the organisational learning construct. On average, the mean score for organisational learning across these constructs to be at 3.3, indicating that most responses tended to be towards “neither disagree or agree” and “agree” according to the five-point Likert scales used to measure this construct. This suggests that most respondents rated their organisations as having an average level of organisational learning capabilities across all of these constructs. As per Andy Field (2009), a small standard deviation relative to the mean indicates data points close to the mean. Across the five organisational learning factors, the standard deviation was found to be small at 0.7.

Table 9: Organisational learning - Mean and Standard Deviation

Factor	Mean	Std. Deviation
Knowledge Sharing	4,023	0,579
Information Access	3,271	0,733
Knowledge Management	3,385	0,771
Learning Culture	2,879	0,790
Performance	3,169	0,850

5.6.2 Correlation analysis

A Pearson's organisational learning digital maturity correlation was run to assess the relationship between organisational learning and digital maturity. The results of the correlation (Appendix 8) will be discussed in detail in the sections below.

Initial analyses showed the relationship to be linear but that not all of the variables were normally distributed (Appendix 8), as assessed by Shapiro-Wilk's test ($p < .05$). The researcher decided to run a Pearson's correlation nonetheless as the test is somewhat robust to deviations from normality (Havlicek & Peterson, 1976).

5.6.2.1 Correlation results for the Knowledge Sharing OL factor and the DM factors

The results of the correlation for the Knowledge Sharing OL factor and the DM factors (Appendix 8) is summarised as per Table 10.

Table 10: Correlation results – Knowledge Sharing OL factor and the DM factors

Correlations		OL1 - Knowledge Sharing	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,208	4%
	Sig. (2-tailed)	0,016	

	N	133	
DM Factor 2 - Insights	Pearson Correlation	0,338	11%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 3 - Digital Culture	Pearson Correlation	0,271	7%
	Sig. (2-tailed)	0,002	
	N	133	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,246	6%
	Sig. (2-tailed)	0,004	
	N	133	

There was a small positive correlation between knowledge sharing and digital competence, $r(131) = .208$, $p < 0.05$, with knowledge sharing explaining four percent of the variability in the digital competence factor (Table 10).

There was a moderate positive correlation between knowledge sharing and digital insights, $r(131) = .338$, $p < 0.05$, with knowledge sharing explaining 11 percent of the variability in the digital insights factor (Table 10).

There was a small positive correlation between knowledge sharing and digital organisation and culture, $r(131) = .271$, $p < 0.05$, with knowledge sharing explaining seven percent of the variability in the digital organisation and culture factor (Table 10).

There was a small positive correlation between knowledge sharing and digital strategy, $r(131) = .246$, $p < 0.05$, with knowledge sharing explaining six percent of the variability in the digital strategy factor (Table 10).

5.6.2.2 Correlation results for the Information Access OL factor and the DM factors

The results of the correlation for the Information Access OL factor and the DM factors (Appendix 8) is summarised as per Table 11.

Table 11: Correlation results – Information Access OL factor and the DM factors

Correlations		OL2 - Information Access	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,409	17%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 2 - Insights	Pearson Correlation	0,424	18%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 3 - Digital Culture	Pearson Correlation	0,461	21%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,177	3%
	Sig. (2-tailed)	0,041	
	N	133	

There was a moderate positive correlation between information access and digital competence, $r(131) = .409$, $p < 0.05$, with information access explaining seventeen percent of the variability in the digital competence factor (Table 11).

There was a moderate positive correlation between information access and digital insights, $r(131) = .424$, $p < 0.05$, with information access explaining eighteen percent of the variability in the digital insights factor (Table 11).

There was a moderate positive correlation between information access and digital organisation and culture, $r(131) = .461$, $p < 0.05$, with information access explaining 21 percent of the variability in the digital organisation and culture factor (Table 11).

There was a small positive correlation between information access and digital strategy, $r(131) = .177$, $p < 0.05$, with information access explaining three percent of the variability in the digital strategy factor (Table 11).

5.6.2.3 Correlation results for the Knowledge Management OL factor and the DM factors

The results of the correlation for the Knowledge Management OL factor and the DM factors (Appendix 8) is summarised as per Table 12.

Table 12: Correlation results – Knowledge Management OL factor and the DM factors

Correlations		OL3 Knowledge Management	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,235	6%
	Sig. (2-tailed)	0,006	
	N	133	
DM Factor 2 - Insights	Pearson Correlation	0,298	9%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 3 - Digital Culture	Pearson Correlation	0,295	9%
	Sig. (2-tailed)	0,001	
	N	133	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,029	0,1%
	Sig. (2-tailed)	0,737	
	N	133	

There was a small positive correlation between knowledge management and digital competence, $r(131) = .235$, $p < 0.05$, with knowledge management explaining six percent of the variability in the digital competence factor (Table 12).

There was a small positive correlation between knowledge management and digital insights, $r(131) = .298$, $p < 0.05$, with knowledge management explaining nine percent of the variability in the digital insights factor (Table 12).

There was a small positive correlation between knowledge management and digital organisation and culture, $r(131) = .295$, $p < 0.05$, with knowledge management explaining nine percent of the variability in the digital organisation and culture factor (Table 12).

There was a small positive correlation between knowledge management and digital strategy, $r(131) = .029$, $p > 0.05$, with knowledge management explaining 0.1 percent of the variability in the digital strategy factor (Table 12). There is, therefore, no statistically significant correlation between these two variables.

5.6.2.4 Correlation results for the Learning Culture OL factor and the DM factors

The results of the correlation for the Learning Culture OL factor and the DM factors (Appendix 8) is summarised as per Table 13.

Table 13: Correlation results – Learning Culture OL factor and the DM factors

Correlations		OL4 - Learning Culture	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	-0,531	28%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 2 - Insights	Pearson Correlation	-0,524	27%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 3 - Digital Culture	Pearson Correlation	-0,615	38%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 4 - Digital Strategy	Pearson Correlation	-0,304	9%
	Sig. (2-tailed)	0,000	
	N	133	

There was a strong negative correlation between learning culture and digital competence, $r(131) = -.531$, $p < 0.05$, with learning culture explaining 28 percent of the variability in the digital competence factor (Table 13).

There was a strong negative correlation between learning culture and digital insights, $r(131) = -.524$, $p < 0.05$, with learning culture explaining 27 percent of the variability in the digital insights factor (Table 13).

There was a strong negative correlation between learning culture and digital organisation and culture, $r(131) = -.615$, $p < 0.05$, with learning culture explaining 38 percent of the variability in the digital organisation and culture factor (Table 13).

There was a moderate negative correlation between learning culture and digital strategy, $r(131) = -.304$, $p < 0.05$, with learning culture explaining nine percent of the variability in the digital strategy factor (Table 13).

5.6.2.5 Correlation results for the Performance OL factor and the DM factors

The results of the correlation for the Performance OL factor and the DM factors (Appendix 8) is summarised as per Table 14.

Table 14: Correlation results – Performance OL factor and the DM factors

Correlations		OL5 - Performance	Variability
DM Factor 1 - Digital Competence	Pearson Correlation	0,403	16%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 2 - Insights	Pearson Correlation	0,519	27%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 3 - Digital Culture	Pearson Correlation	0,449	20%
	Sig. (2-tailed)	0,000	
	N	133	
DM Factor 4 - Digital Strategy	Pearson Correlation	0,170	3%
	Sig. (2-tailed)	0,050	
	N	133	

There was a moderate positive correlation between performance and digital competence, $r(131) = .403$, $p < 0.05$, with performance explaining 16 percent of the variability in the digital competence factor (Table 14).

There was a strong positive correlation between performance and digital insights, $r(131) = .519$, $p < 0.05$, with performance explaining 27 percent of the variability in the digital insights factor (Table 14).

There was a moderate positive correlation between performance and digital organisation and culture, $r(131) = .449$, $p < 0.05$, with performance explaining 20 percent of the variability in the digital organisation and culture factor (Table 14).

There was a small positive correlation between performance and digital strategy, $r(131) = .170$, $p > 0.05$, with performance explaining three percent of the variability in the digital strategy factor (Table 14). There is, therefore, no statistically significant correlation between these two variables.

5.7 Overarching research question – Cumulative effect of all the components on the level of digital maturity

In this section, the results of the overarching research question will be provided. This research question attempted to understand the overall effect organisational learning and digital Innovation as dynamic capabilities, and digital leadership has on the level of digital maturity of the organisation.

This research question involves the factors of Innovation, Leadership and organisational learning as independent variables and the factors of digital maturity as dependent variables. As there are four factors as identified within the digital maturity construct (Appendix 5) separate regression tests were administered against each of these factors as the dependent variable.

5.7.1 Multiple regression results with digital competence as the DV

A multiple regression was run to predict digital competence from leadership, innovation and organisational learning factors. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.216 (Table 15).

Table 15: Model summary with digital competence as the dependent variable

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.697 ^a	0,486	0,457	0,44533	2,216
a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation					
b. Dependent Variable: DM1 - Digital Competence					

There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There was one case of studentized deleted residuals greater than ± 3 standard deviations, two leverage values greater than 0.2, and no values for Cook's distance above 1. After careful inspection, the researcher decided not to exclude any of the cases identified.

The multiple regression model statistically significantly predicted digital competence $F(7,125) = 16.884$, $p < 0.05$, adj. $R^2 = .46$. Only three of the seven variables added statistically significantly to the model, $p < .05$. Regression coefficients and standard errors can be found in Table 16 (below).

Table 16: Summary of multiple regression analysis with digital competence as the DV

Variable	B	SE(b)	Beta
Intercept	1,590	0,506	
Innovation	0,357	0,091	0,091*
Leadership	0,097	0,075	0,075
OL1 - Knowledge Sharing	-0,169	0,084	0,084*
OL2 - Information Access	0,058	0,071	0,071
OL3 - Knowledge Management	0,042	0,058	0,058
OL4 - Culture	-0,130	0,066	0,066
OL5 - Performance	0,125	0,060	0,060*

Note. B = Under standardized regression coefficient; SE(b) = Standard error of the coefficient; Beta = standardized coefficient. * $p < 0.05$

predicted (Digital Competence) = 1,590 + (0,357 * Innovation) + (0,097 * Leadership) - (0,169 * Knowledge Sharing) + (0,058 * Information Access) + (0,042 * Knowledge Management) - (0,13 * Learning Culture) + (0,125 * Performance)

5.7.2 Multiple regression results with digital insights as the DV

A multiple regression was run to predict digital insights from leadership, innovation and organisational learning factors. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.941 (Table 17).

Table 17: Model summary with digital insights as the dependent variable

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.736 ^a	0,541	0,516	0,43908	1,941

There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ± 3 standard deviations, two leverage values greater than 0.2, and no values for Cook's distance above 1. After careful inspection, the researcher decided not to exclude any of the cases identified.

The multiple regression model statistically significantly predicted digital competence $F(7,125) = 21,064$, $p < 0.05$, adj. $R^2 = .52$. Only two of the seven variables added statistically significantly to the model, $p < .05$. Regression coefficients and standard errors can be found in Table 18 (below).

Table 18: Summary of multiple regression analysis with digital insights as the DV

Variable	B	SE(b)	Beta
Intercept	0,904	0,498	
Innovation	0,369	0,089	0,089*
Leadership	0,092	0,074	0,074
OL1 - Knowledge Sharing	-0,047	0,083	0,083
OL2 - Information Access	-0,016	0,070	0,070
OL3 - Knowledge Management	0,065	0,057	0,057
OL4 - Culture	-0,115	0,065	0,065
OL5 - Performance	0,207	0,059	0,059*

Note. B = Under standardized regression coefficient; SE(b) = Standard error of the coefficient; Beta = standardized coefficient. *p<0.05

predicted (Digital Insights) = 0,904 + (0,369 * Innovation) + (0,092 * Leadership) - (0,047 * Knowledge Sharing) - (0,016 * Information Access) + (0,065 * Knowledge Management) - (0,115 * Learning Culture) + (0,207 * Performance)

5.7.3 Multiple regression results with digital organisation and culture as the DV

A multiple regression was run to predict digital competence from leadership, innovation and organisational learning factors. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.991 (Table 19).

Table 19: Model summary with digital organisation and culture as the dependent variable

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.788 ^a	0,620	0,599	0,40695	1,991

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

b. Dependent Variable: DM3 - Digital Culture

There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There was one case of studentized deleted residuals greater than ± 3 standard deviations, two leverage values greater than 0.2, and no values for Cook's distance above 1. After careful inspection, the researcher decided not to exclude any of the cases identified.

The multiple regression model statistically significantly predicted digital competence $F(7,125) = 29.159$, $p < 0.05$, adj. $R^2 = .59$. Only four of the seven variables added statistically significantly to the model, $p < .05$. Regression coefficients and standard errors can be found in Table 20 (below).

Table 20: Summary of multiple regression analysis with digital organisation and culture as the DV

Variable	B	SE(b)	Beta
Intercept	1,260	0,462	
Innovation	0,349	0,083	0,083*
Leadership	0,189	0,068	0,068*
OL1 - Knowledge Sharing	-0,143	0,077	0,077
OL2 - Information Access	0,044	0,065	0,065
OL3 - Knowledge Management	0,066	0,053	0,053
OL4 - Culture	-0,172	0,061	0,061*
OL5 - Performance	0,127	0,055	0,055*

Note. B = Under standardized regression coefficient; SE(b) = Standard error of the coefficient; Beta = standardized coefficient. * $p < 0.05$

Predicted (Digital Org and Culture) = $1,260 + (0,349 * \text{Innovation}) + (0,189 * \text{Leadership}) - (0,143 * \text{Knowledge Sharing}) + (0,044 * \text{Information Access}) + (0,066 * \text{Knowledge Management}) - (0,172 * \text{Learning Culture}) + (0,127 * \text{Performance})$

5.7.4 Multiple regression results with digital strategy as the DV

A multiple regression was run to predict digital competence from leadership, innovation and organisational learning factors. There was linearity as assessed by partial regression

plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.874 (Table 21).

Table 21: Model summary with digital strategy as the dependent variable

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.390 ^a	0,152	0,105	0,40298	1,874

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

b. Dependent Variable: DM4 - Digital Strategy

There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There was one case of studentized deleted residuals greater than ± 3 standard deviations, two leverage values greater than 0.2, and no values for Cook's distance above 1. After careful inspection, the researcher decided not to exclude any of the cases identified.

The multiple regression model statistically significantly predicted digital competence $F(7,125) = 3.206$, $p < 0.05$, adj. $R^2 = .105$. Not one of the seven variables added statistically significantly to the model, $p < .05$. Regression coefficients and standard errors can be found in Table 22 (below).

Table 22: Summary of multiple regression analysis with digital strategy as the DV

Variable	B	SE(b)	Beta
Intercept	3,182	0,457	
Innovation	0,132	0,082	0,082
Leadership	-0,024	0,068	0,068
OL1 - Knowledge Sharing	0,136	0,076	0,076
OL2 - Information Access	-0,010	0,064	0,064
OL3 - Knowledge Management	-0,056	0,053	0,053
OL4 - Culture	-0,098	0,060	0,060
OL5 - Performance	0,000	0,054	0,054

Note. B = Under standardized regression coefficient; SE(b) = Standard error of the coefficient; Beta = standardized coefficient. * $p < 0.05$

5.8 Summary of findings

Sub-Research question 1: What is the relationship between digital leadership and the level of digital maturity of an organisation?

Correlation analysis results indicated a strong positive correlation between the leadership factor and the digital competence, digital insights and digital organisation and culture factors of the DM construct. A small positive correlation between the leadership and digital strategy factors were indicated. These relationships were statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between the leadership and digital maturity factors.

Sub-Research question 2: What is the relationship between innovation and the level of digital maturity of an organisation?

Correlation analysis results indicated a strong positive correlation between the innovation factor and the digital competence, digital insights and digital organisation and culture factors of the DM construct. A moderate positive correlation between the innovation and digital strategy factors were indicated.

These relationships were statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between the innovation and digital maturity factors.

Sub-Research question 3: What is the relationship between organisational learning and the level of digital maturity of an organisation?

Correlation analysis results indicated mostly positive correlations between the organisational learning and the digital maturity factors. Negative correlations were indicated between the Learning culture OL factor and all of the DM factors.

Two correlation results also indicated no statistical significance at $p > .05$, which was between the OL knowledge management and digital strategy factors as well as the OL performance and digital strategy factors, and therefore the null hypothesis for these correlation results cannot be rejected. The remainder of the correlation results were statistically significant at $p < .05$. The null hypothesis can thus be rejected for these factors as there is a positive statistically significant relationship between them.

The findings for the first three sub-research questions are summarised as per Table 23 below.

Table 23: Summary of Pearson correlation results for the first three sub-research questions

Digital maturity factor	Innovation	Leadership	OL1 - Knowledge Sharing	OL2 - Information Access	OL3 - Knowledge Management	OL4 - Culture	OL5 - Performance
Digital Competence	Strong +	Strong +	Small +	Moderate +	Small +	Strong -	Moderate +
Digital Insights	Strong +	Strong +	Moderate +	Moderate +	Small +	Strong -	Strong +
Digital Org and Culture	Strong +	Strong +	Small +	Moderate +	Small +	Strong -	Moderate +
Digital Strategy	Moderate +	Small +	Small +	Small +	Small +**	Moderate -	Small +**

Note. ** There is no statistically significant correlation between these two variables, $p > 0.05$.

Over-arching research question: *What is the overall effect organisational learning and digital Innovation as dynamic capabilities, and digital leadership on the level of digital maturity of the organisation?*

Multivariate linear regression analysis was conducted to analyse the cumulative effect of all seven of the factor simultaneously to predict the factors of digital maturity. Although the models were statistically significant at $p < .05$, not all the factors related to Leadership, Innovation and Organisational learning were statistically significant in predicting the level of digital maturity as represented by the four DM factors (Table 24).

Table 24: Summary of multiple regression covariance findings

Digital maturity factor	Innovation	Leadership	OL1 - Knowledge Sharing	OL2 - Information Access	OL3 - Knowledge Management	OL4 - Culture	OL5 - Performance
Digital Competence	0,357**	NS	-0,169**	NS	NS	NS	0,125**
Digital Insights	0,369**	NS	NS	NS	NS	NS	0,207**
Digital Org and Culture	0,349**	0,189	NS	NS	NS	-0,172**	0,127**
Digital Strategy	NS	NS	NS	NS	NS	NS	NS
<i>Cumulative covariance</i>	<i>1,075</i>	<i>0,189</i>	<i>-0,169</i>	<i>-</i>	<i>-</i>	<i>-0,172</i>	<i>0,459</i>

Note. ** = Significant, NS = Not significant.

Thus, the null hypothesis cannot be rejected as only two of the seven factors are statistically significant to cumulatively determine the level of DM.

Chapter 6: Discussion of Results

6.1 Introduction

In this chapter, the findings related to each of the research questions are discussed in detail. Sub-research question one attempted to understand the nature of the relationship between digital leadership and the digital maturity of an organisation. Sub-research question two attempted to understand the nature of the relationship between innovation and the digital maturity of an organisation. Sub-research question three attempted to understand the nature of the relationship between organisational learning and the digital maturity of an organisation. Finally, the overarching research question attempted to understand the overall effect organisational learning and digital innovation as dynamic capabilities, and digital leadership would have on the digital maturity of the organisation.

This chapter's structure will group the specific results for each research question at the construct level and then discuss these results in the context of the literature reviewed.

This chapter aims to expand on the current literature (Catlin et al., 2015; Chanas & Hess, 2016; Kane et al., 2015; Sebastian et al., 2017) related to digital maturity and the relationships between digital maturity and leadership, innovation and organisational learning. In this chapter, the simultaneous influence these constructs may have on digital maturity will also be evaluated.

The literature reviewed indicated numerous views as to what constitutes DM (Catlin et al., 2015; Deloitte Digital, 2015; Gottschalk, 2009; Westerman et al., 2012). What these authors all have in common is that their perspectives and models rely on processes or activities aligned to the principles of DC and the RBV (Eisenhardt & Martin, 2000; Peteraf, 1993; Teece et al., 1997). These processes or activities are used to manipulate digital resources through the execution of the DBS (Catlin et al., 2015; Kane et al., 2015; Sebastian et al., 2017), the expected outcome of which is an increase in the DM of the organisation. This allows organisations to effectively respond and adapt to the exponential growth in digital technologies, the risk of disruption and other digital threats which may be present in their external environment.

Based on the literature reviewed, a definition for DM was proposed for this study, which is the outcome of digital business strategy aspects concerned with the enhancement of the digital capabilities of an organisation.

For this study, the DM construct was reduced to four sub-constructs through factor analysis as per section 4.7.2. Both the leadership and innovation constructs were reduced to one sub-construct each through factor analysis. The organisational learning construct was reduced to five sub-constructs. Table 25 below provides a summary view of the attributes identified against each of the constructs and what the attribute represents in the context of this study.

Table 25: Overview of attributes identified

Construct	Attribute name	Attribute details
Digital maturity	Competence	What digital skills and resources the organisation has access to.
		Effectiveness of planning and execution of change programmes.
		Whether leadership behaviour and actions are supportive of digital initiatives.
		Whether alignment of above exists with the organisation's goals.
	Insights	How modern architecture, tools and customer insights feed back into the DBS, measurements and design and development activities.
	Organisation and culture	How culture and structure support collaboration, resource allocation and the measurement thereof
	Strategy	All aspects which influence and supports the digital facets of the DBS
Leadership	Leadership	Representative of all attributes of leadership.
Innovation	Innovation	Representative of all attributes of innovation.

Organisational learning	Knowledge sharing	Identification and acquiring of talent Use of electronic data, information systems and tools are utilised for both decision-making and timely communication
	Knowledge management	Measured the formal data management processes of the organisation
		How expert skills are developed and managed
	Culture	Employee resistance to new ways of working
		How information disseminates both formally and informally
		Whether the organisation culture promotes knowledge sharing
		Whether the culture allows the organisation to react quickly to technological change
	Information access	How easy is it for employees to gain access to information?
		Do employees know where to get access to data they do not have?
		How data is used to the benefit of the company.
	Performance	Measured the collection of and data on all facets of performance within the organisation.
		Measured to what extent financial performance and gain influenced decisions to acquire sub-units.

The competence attribute of the DM construct represented the digital skills and resources of the organisation and the effectiveness of the planning and execution processes driving the digital change programmes, supported by the right digital leadership behaviours. The competence attribute of DM also represented the alignment of the above to the organisation's digital goals.

The insights DM attribute represented how modern architectures, digital tools, customer insights and lessons learned are fed back into aspects such as the DBS, measuring success and digital design and development.

The organisation and culture DM attribute represented how the organisation structure enables innovation, and effective communication supports collaboration, allocates resources and how they are measured.

The strategy attribute represented all the aspects which influence and supports the digital facets of the DBS.

6.2 Digital leadership

In this section, the correlation and regression results pertaining the digital leadership construct is discussed within the context of the literature reviewed in Chapter 2.

Table 26 below provides a summary of the Pearson correlation analysis results for the attribute (Table 25) pertaining to the leadership construct. The descriptive results for this construct as per section 5.4.1 suggested that most respondents rated their organisations to have an average level of digital leadership capabilities and that they mostly display the digital leadership behaviours which were measured.

Table 26: Summary of the Pearson correlation results for leadership and DM

Digital maturity attribute	Result
Digital Competence	Strong +
Digital Insights	Strong +
Digital Org and Culture	Strong +
Digital Strategy	Small +

Note. All the results were statistically significant, $p < 0.05$.

6.2.1 Leadership and the competence DM attribute

The competence attribute of the DM construct measured the digital skills and resources of the organisation and the effectiveness of the planning and execution processes driving

the digital change programmes, supported by the right digital leadership behaviours. Competence also represented the alignment of the above to the organisation's digital goals. The results in Table 26 indicates a statistically positive strong relationship between the leadership attribute and the competence DM attribute.

This finding is supported by the the literature reviewed in the context of digital competence (Bryant, 2003; Davison & Ou, 2017; Fitzgerald et al., 2013; Singh, 2008; Williams & Sullivan, 2011), as digital leaders are expected to be actively involved in strategic planning and execution activities and in building an understanding as to how digital technologies could be used or combined to create value for the organisation (Davison & Ou, 2017). Digital leaders enable digital transformation through their digital vision which, when shared with the organisation will ensure significant buy-in from employees (Fitzgerald et al., 2013). As per Teece (2007), leadership's role is that of ensuring decisions are made and that goals, values and expectations are communicated while ensuring employees are motivated. The positive nature of this finding is further supported by Bryant (2003) who found that leadership is critical to the flow of knowledge within the organisation through their vision, employee motivation and by ensuring systems and structure are in place at all levels of the organisation. Digital leaders achieve this by employing a combination of both transactional and transformational leadership styles (Bryant, 2003; Singh, 2008; Williams & Sullivan, 2011).

The literature reviewed is hence in agreement that leadership, while not necessarily a DC, would have a positive influence on DM through the competence attribute (Table 25) which aligns with the findings in this section. The strong positive nature of this relationship indicates that a focus on leadership effectiveness when executing change, growing and developing talent, including digital leadership talent and ensuring these activities are aligned with the overall organisation goals will lead to an increase in digital competence and therefore the DM of the organisation. The digital leader's role is to be enabling, supportive and to create an environment for digital initiatives to succeed.

6.2.2 Leadership and the insights DM attribute

The digital insights DM attribute measured how modern architectures, digital tools, customer insights and lessons learned are fed back into aspects such as the DBS, measuring success and digital design and development. The results in Table 26

indicates a statistically positive strong relationship between the leadership attribute and the digital insights DM attribute (Table 25).

The literature reviewed in the context of digital insights (Bennis, 2013; Davison & Ou, 2017; El Sawy et al., 2016; Kane et al., 2016) revealed that the concept of digital leadership focuses on the digital context when thinking of business strategy and models, IT, talent, opportunities and other relevant digital capabilities as unique sources of value creation (Davison & Ou, 2017; El Sawy et al., 2016). Digital leaders need to have an understanding of technology (Kane et al., 2016) as without these digital perspectives leaders are unable to effectively leverage digital capabilities, which places the organisation at a significant disadvantage (Bennis, 2013). This role is typically fulfilled by the chief digital officer (CDO) or chief information officer (CIO), as discussed in Chapter 2, and requires the digital leader to have both a technical background as well as an understanding of marketing, finance and other aspects of the organisation. Through the understanding as to how these digital capabilities should be leveraged effectively, and subsequently formalising the execution of these insights through the DBS, the organisation will be able to increase their DM.

The findings in this section, therefore, aligns with the literature reviewed (Bennis, 2013; Davison & Ou, 2017; El Sawy et al., 2016; Kane et al., 2016) regarding the strong positive nature of this relationship and indicates that digital insights are key inputs when defining and prioritising digital transformation activities as part of the DBS, which is concerned with defining and executing the prioritised digital agenda of the organisation. As a result, activities within the context of the digital insights attribute should be prioritised by digital leaders in their efforts to increase the DM of their organisations.

6.2.3 Leadership and the organisation and culture DM attribute

The organisation and culture DM attribute measured how the organisation culture and structure enables innovation and effective communication supports collaboration, allocates resources and how they are measured. The results in Table 26 indicates a statistically positive strong relationship between the leadership attribute and the digital org and culture DM attribute (Table 25).

The literature reviewed (Antonakis & House, 2014; Dinh et al., 2014; El Sawy et al., 2016; Fitzgerald et al., 2013; Kane et al., 2016; Parris & Peachey, 2013; Vey et al., 2017) in the context of digital organisation and culture supports the concept of a culture of change

and innovation that is required during digital transformation (Vey et al., 2017). This digital culture was found to be one of several factors critical for successful digital transformation (El Sawy et al., 2016), more so than the actual digital technology choices the organisation makes. This digital culture will enable and drive digital efforts within the organisation (Kane et al., 2016), which in turn will positively influence the organisations DM.

Effective digital leadership enables digital transformation through the digital leader's transformative vision (Kane et al., 2016), which also ensures effective decision-making, organisational buy-in and alignment on the goals and objectives set out as part of this vision (Fitzgerald et al., 2013). The literature reviewed also found that digital leadership would have a positive influence on both innovation and organisational learning, through leadership styles and behaviours (Antonakis & House, 2014; Dinh et al., 2014; Parris & Peachey, 2013) conducive to creating the organisational culture required for both innovation and organisational learning (Bass, 1990; Bryant, 2003; Singh, 2008; von Krogh et al., 2012; Williams & Sullivan, 2011), and as a result digital leadership would indirectly have a positive influence on the organisations DM.

The positive and strong nature of this relationship indicates that digital leaders should focus on behaviours, activities, embedding ways of working and creating new capabilities aimed at enhancing the organisation's digital culture, which would lead to an increase in DM. Examples of the leadership behaviours and activities that would support the above would be to encourage collaboration and generating consensus through high-quality interpersonal relationships with a diverse set of stakeholders, managing power relationships, encouraging the social behaviours required, fostering trust and creating shared, dispersed or distributed leadership models to enable the conditions required for collective learning.

6.2.4 Leadership and the strategy DM attribute

The digital strategy DM attribute measured all the aspects which influence and supports the digital facets of the DBS. The results in Table 26 indicates a statistically positive small relationship between the leadership factor and the digital strategy DM factor.

The literature reviewed in the context of digital strategy supports this finding and positions the DBS as a part of the overall corporate strategy, which is delivered through leveraging digital resources to create differentiated value (Bharadwaj et al., 2013; Hess et al., 2016; Sebastian et al., 2017). The DBS would enable, through the process of

digitisation the conversion of existing products and services to their digital equivalents or, through the process of digital transformation redefine roles or ways of working through the increased adoption of digital technologies (Chaniyas & Hess, 2016; Gassmann et al., 2014; Parviainen et al., 2017). This increased adoption of digital capabilities would lead to an increase of DM for the organisation.

The literature reviewed also found that the DBS for an organisation should be unique, in that it should be difficult for the competitors to imitate, and that the DBS would provide direction to the digital leaders executing these digital initiatives, which also allows them to measure and adjust as need be against these digital objectives (Sebastian et al., 2017). The DBS, therefore, requires the development of capabilities, which include leadership capabilities (Sia et al., 2016).

The literature reviewed agreed that the choices made as part of the DBS would have a substantial influence on the DM of the organisation. The DBS should, therefore, be viewed as an organisational roadmap that may lead to an increased level of DM, using waypoints to measure progress along the way. Digital leaders should also play an active role in defining, prioritising and executing activities defined as part of the DBS, in addition to creating the context from a digital perspective, or digital insights as an input to the DBS process. The findings in section 6.2.2 support this view, which found that digital insights as an input to the DBS is a crucial driver of increased DM and would be supported by the digital strategy activities specific to the findings in this section.

6.2.5 Conclusion: Sub-Research Question 1

This research question sought to establish the nature of the relationship between digital leadership and the digital maturity of the organisation. The findings as discussed in section 6.2 in the context of the literature reviewed shows this relationship to be strong and positive at the construct level.

Leaders provide digital insights as key inputs as part of the process that defines the digital strategy. Digital leaders also play an active role in determining, prioritising and executing activities defined as part of the DBS, in addition to creating the context from a digital perspective. Leaders also shape the expected behaviours and embed the ways of working required to create the digital culture needed. Digital leaders must also ensure that the change initiatives identified as part of the DBS are executed effectively and that

the digital talent and leadership skills required by the organisation is developed in line with the organisation's objectives.

6.3 Innovation

In this section, the correlation results pertaining the innovation construct is discussed within the context of the literature reviewed in Chapter 2.

Table 27 below provides a summary of the correlation analysis results for the attribute pertaining to the innovation construct. The descriptive results for this construct as per section 5.5.1 suggested that most respondents rated their organisations to have an average level of innovation capabilities as measured.

Table 27: Summary of the Pearson correlation results for innovation and DM

Digital maturity attribute	Result
Digital Competence	Strong +
Digital Insights	Strong +
Digital Org and Culture	Strong +
Digital Strategy	Moderate +

Note. All the results were statistically significant, $p < 0.05$.

6.3.1 Innovation and the competence DM attribute

The competence attribute of the DM construct (Table 25) measured the digital skills and resources of the organisation and the effectiveness of the planning and execution processes driving the digital change programmes, supported by the right leadership behaviours. The competence DM attribute also represented the alignment of the above to the organisation's digital goals. The results in Table 27 indicates that a statistically positive strong relationship exists between the innovation attribute and the digital competence DM attribute.

This finding supports the literature reviewed in the context of digital competence, which found that through the process of innovation, economically useful knowledge is created and diffused (Ismail-Saville, 2017) throughout the organisation. It was found that digitally mature organisations invest more in digital innovation related capabilities (Berghaus &

Back, 2016; Kane et al., 2015) which in turn can be exploited as sources of business value creation (Bharadwaj et al., 2013). Transactional leadership behaviours support innovation by ensuring alignment and tracking against goals (Bryant, 2003).

The strong positive nature of this relationship indicates that a focus on enhanced digital innovation related capabilities will lead to an increase in digital competence and therefore the DM of the organisation.

6.3.2 Innovation and the insights DM attribute

The digital insights DM attribute (Table 25) measured how modern architectures, digital tools, customer insights and lessons learned are fed back into aspects such as the DBS, measuring success and digital design and development. The results in Table 27 indicates that a statistically positive strong relationship exists between the innovation attribute and the digital insights DM attribute.

This finding supports the literature reviewed in the context of digital insights, which describes digital innovation as a process which creates new value through the re-configuration of digital artefacts into an architecture that is both layered and modular in nature, resulting in new or enhanced digital products or services (Huang et al., 2017; Woodard et al., 2013) by either stacking (layering) or grouping (modular) digital functionality or capabilities in new or unique ways. The concepts of relevant digital maturity (RDM) and relevant digital capabilities (RDC) was also proposed in this study by building on relative ambidexterity theory (D'souza et al., 2017), through which the organisation would be able to decide if the current mix of digital innovation activities will create the digital capabilities required to remain competitive within, or relevant to the organisational context and the industries and markets it decides to operate within (Gassmann et al., 2014; Remane et al., 2017; World Economic Forum, 2016), or whether the mix of innovation activities should be revised based on the insights provided by RDC and RDM.

The strong positive nature of this relationship indicates that a focus on increased digital innovation related capabilities will lead to an increase in digital insights and therefore the DM of the organisation.

6.3.3 Innovation and the organisation and culture DM attribute

The organisation and culture DM attribute (Table 25) measured how the organisation culture and structure enables innovation and effective communication, supports collaboration, allocates resources and how they are measured. The results in Table 27 indicates that a statistically positive strong relationship exists between the innovation attribute and the digital org and culture DM attribute.

This finding supports the literature reviewed in the context of digital org and culture, which defines digital innovation in terms of product, process or business model changes enabled by IT (Fichman et al., 2014), and in line with Teece, defines business model innovation as a new means of generating and capturing value enabled by IT. Innovation is also influenced positively by a transformational leadership style, which enables a culture where experimentation and creativity are encouraged (Ismail-Saville, 2017; Jansen et al., 2009; Jung et al., 2003; von Krogh et al., 2012).

Innovation ambidexterity refers to how the organisation simultaneously balances resources and for both exploitative and explorative innovation activities, as both are seen as critical (Chen et al., 2017; Guttel et al., 2015; O'Reilly & Tushman, 2007; Sinha, 2016; Stettner & Lavie, 2014; Zacher & Rosing, 2015) for enabling both long and short-term sustainability (O'Reilly & Tushman, 2007; Zacher & Rosing, 2015). From an organisational structure, resource allocation and process perspective, ambidexterity is achieved through the alignment and coordination of strategy, resources, organisational structure and capabilities (Guttel et al., 2015; Jurksiene & Pundziene, 2016; Parida et al., 2016). The literature reviewed found that a mix of explorative and exploitative innovation activities will lead to enhanced digital capabilities and therefore an increase in the DM for the organisation.

The strong positive nature of this relationship indicates that a focus on increased digital innovation related capabilities will lead to an increase in digital org and culture capabilities and therefore an increase in the overall DM of an organisation.

6.3.4 Innovation and the strategy DM attribute

The strategy DM attribute measured all the aspects which influence and supports the digital facets of the DBS. The results in Table 27 indicates that a statistically positive

moderate relationship exists between the innovation attribute and the strategy DM attribute.

This finding supports the literature reviewed in the context of digital strategy, which found that organisations who do not continually create value through digital innovation (Piccoli & Ives, 2005) will not be able to maintain their competitive advantage. High environmental dynamism (Dess & Beard, 1984) driven by characteristics such as rapid changes in technology (Schilke, 2014) requires the organisation to have the ability to detect and respond to changes in the external environment (Guttel et al., 2015) through activities defined in the DBS, which will through the process of digital transformation lead to an increase in the DM for the organisation. Managing the balance between exploitation and exploration related activities as part of the DBS will ensure that the organisation remains relevant in the future should current value offerings become obsolete due to factors such as markets, technology or changing customer needs (World Economic Forum, 2016). Ambidexterity will also allow the organisation to stay relevant in the present by ensuring key resources are focused on serving the customer needs of today (Sinha, 2016).

D'Souza et al. (2017) found that the organisation has to reflect on their relative ambidexterity as part of the planning and execution activities related to the DBS, which represents the ambidexterity capabilities they currently have relevant to the explorative and exploitive capabilities of a typical organisation in their relevant referent group. Having this insight will allow several alternative competitive positions to be proposed and once a way forward is selected, will guide the planning and execution activities for the DBS. The selection process will also be influenced by the insights provided through the understanding of the organisation's relevant digital capabilities and relevant digital maturity, which are concepts proposed by this study and represents the current level of DM of the organisation that can be leveraged to create the next iteration of digital capabilities, and an increased level of DM.

The moderate positive nature of this relationship indicates that a focus on increased digital innovation related capabilities will lead to an increase in the maturity of digital strategy capabilities and therefore an increase in the overall DM of the organisation.

6.3.5 Conclusion: Sub-Research Question 2

This research question sought to establish the nature of the relationship between innovation and the digital maturity of the organisation. The findings as discussed in section 6.3 in the context of the literature reviewed shows that this relationship to be predominantly strong and positive at the construct level.

A focus on innovation initiatives that would create enhanced digital capabilities for the organisation has been found to be a key driver for DM. Through the process of implementing and leveraging these enhanced capabilities, the organisation gains more digital insights, which can be used for decision making or to influence and improve the DBS. The changes required within the organisation to adopt these new digital capabilities, whether through skills, structure, process or ways of working, to enhance the organisation and culture aspects of DM.

6.4 Organisational learning

In this section, the correlation results pertaining the organisational learning construct is discussed within the context of the literature reviewed in Chapter 2.

Table 28 below provides a summary of the correlation results for the factors pertaining to the organisational learning construct. The descriptive results for this construct as per section 5.6.1 suggested that most respondents rated their organisations as having an average level of organisational learning capabilities as measured across these constructs.

Table 28: Summary of the correlation results for the organisational learning and DM attributes

Digital maturity attribute	OL1 - Knowledge Sharing	OL2 - Information Access	OL3 - Knowledge Management	OL4 - Culture	OL5 - Performance
Digital Competence	Small +	Moderate +	Small +	Strong -	Moderate +
Digital Insights	Moderate +	Moderate +	Small +	Strong -	Strong +
Digital Org and Culture	Small +	Moderate +	Small +	Strong -	Moderate +
Digital Strategy	Small +	Small +	Small +**	Moderate -	Small +**

Note. ** There is no statistically significant correlation between these two variables, $p > 0.05$.

The OL construct was reduced to five attributes through factor analysis as per section 4.7.2. It is, therefore, necessary to clarify which aspects of OL these attributes represented as measured in this study, which is explained in detail in the sections to follow.

6.4.1 Knowledge sharing and DM

In the context of this study, the knowledge sharing OL attribute (Table 25) measured how the organisation identifies and acquire talent, and how electronic data, information systems and tools are utilised for both decision-making and timely communication.

The descriptive results as per Table 9 in Chapter 5 suggested that most respondents rated their organisations to have an above average level of knowledge sharing capabilities. The summarised correlation analysis results in Table 28 indicates that a statistically positive, predominantly small relationship exists between the knowledge sharing attribute and the attributes representing the DM construct. Although this result shows a weaker relationship compared to most of the other OL attributes that were tested in the study, the relationship is still statistically significant.

The findings align with the views of the literature reviewed (Eisenhardt & Martin, 2000; Ismail-Saville, 2017; Layman et al., 2006; Younger, 2016) in the context of knowledge sharing, which supports the positive nature. Tools and ways of working such as rapid experimentation or prototyping (Ismail-Saville, 2017) are utilised to create and share

knowledge through experimentation, gathering customer feedback and other pertinent insights. This enables accelerated learning through frequent small failures. Real-time feedback will then inform subsequent decisions made (Eisenhardt & Martin, 2000). Rapid learning approaches also allow people to learn how to become more efficient, effective and to adapt to new ways of work (Layman et al., 2006; Younger, 2016). The findings is also consistent with the notion that it is crucial to identify and develop both management capabilities and combinations of technological, organisational and functional skills that are not readily copied (Teece et al., 1997), which is expected to have a positive influence on the DM of the organisation through the creation of new digital capabilities. The findings indicate that activities aimed at enhancing knowledge sharing capabilities within the organisation will, therefore, lead to an increase in the DM of the organisation.

6.4.2 Knowledge management and DM

In the context of this study, the knowledge management OL attribute (Table 25) measured the formal data management processes of the organisation, as well as how the required mix of expert skill sets are managed and developed internally.

The descriptive results as per Table 9 in Chapter 5 suggested that most respondents rated their organisations to have an average level of knowledge management capabilities. The summarised correlation analysis results in Table 28 indicates a statistically positive, small relationship between the knowledge management attribute and all attributes representing the DM construct except for the relationship with the digital strategy construct, which was not statistically significant.

The literature reviewed (Chiva et al., 2014; Lin & Wu, 2014; Meihami & Meihami, 2014; Tsou & Hsu, 2015) found OL was the outcome of knowledge management, and describes OL as the processes the organisation would leverage to adapt thought processes, rules, internal procedures or data in the pursuit to preserve or increase organisational performance through improved behaviours and practices (Chiva et al., 2014; Meihami & Meihami, 2014). The literature reviewed also highlighted the importance of organisational learning capability, which are the processes that creates unique competitive advantage for the organisation in the form of capabilities that can be leveraged as part of the organisation's strategy, or in the digital context, the DBS (Eisenhardt & Martin, 2000; Lin & Wu, 2014). The literature also suggested that through organisational learning, the reach and richness of existing digital capabilities are

enhanced as a platform to build new digital capabilities (Tsou & Hsu, 2015), thereby increasing the DM of an organisation.

While the findings in this section support the literature reviewed as to the expected positive nature of the relationship between knowledge management and DM, it also indicates that the influence knowledge management capabilities would have on the digital maturity of the organisation is of a predominantly weak nature. This suggests that knowledge management is an enabler or a platform to support those activities and capabilities aimed at enhancing DM. As the organisation improves its knowledge management capabilities the quality, efficiency and effectiveness of DM outcomes are improved through these enhanced knowledge management capabilities.

6.4.3 Culture and Information access attributes and DM

In the context of this study, the access to information OL attribute (Table 25) measured how easily employees have access to current and archived data for decision making; if they know where and how to get access to data if they do not have it and how this data can be used to the benefit of the company. The learning culture OL attribute (Table 25) measured the extent of employee resistance when adopting new ways of working, how information regarding recent developments disseminates through the organisation in a formal or informal manner, whether the organisation culture motivates information to be shared openly or whether it is privately held, and whether the organisation can react to technological change quickly or not due to their culture.

The descriptive results as per Table 9 in Chapter 5 suggested that most respondents rated their organisations to have a slightly higher than average level of access to information, and a below average level of organisational learning culture as measured by the attributes. The summarised correlation analysis results in Table 28 indicates a statistically significant moderate and positive relationship between the information access attribute and all attributes representing the DM construct. The results in Table 28 also indicates a statistically strong negative relationship between the culture OL attribute and all attributes representing the DM construct.

The literature reviewed regarding the access to information and culture OL attributes (Catlin et al., 2015; Kane et al., 2015, 2016; Tsou & Hsu, 2015; Vey et al., 2017) found that increasingly organisations are moving towards open systems models which promote

a culture of exchanging and sharing of information both internally and externally in the context of a bigger ecosystem (Tsou & Hsu, 2015). Insufficient or a lack of sharing of knowledge has also been found to be a typical barrier in the implementation of a strong culture of learning as an enabler for innovation and other DC's (Vey et al., 2017). Various authors (Catlin et al., 2015; Kane et al., 2015; Vey et al., 2017) has argued that a culture of change and innovation is required in times of digital transformation as a more traditional organisation culture could pose barriers to the agility and flexibility needed to support the transformation process. Learning culture will, therefore, be supportive of and drive the various stages of DM within the organisation (Kane et al., 2016).

The strong and negative relationship between the culture OL attribute and DM does not support the literature reviewed above. When considering the learning culture OL descriptive results reported earlier in this section, which reported a below average rating for learning culture from most respondents, the findings suggest most organisations assessed as part of this study may not have the learning culture required to support digital transformation activities. Within this context, the findings in this section may consequently align with that of current literature, where learning culture has been found as an enabler or platform for activities concerned with enhancing DM. The strong nature of the relationship between learning culture and DM indicates there needs to be a focus on activities which would enhance the learning culture of the organisation. These could include initiatives to promote and encourage the sharing of knowledge and conscious effort to remove structural, process and behavioural barriers to new ways of working which would enable the organisation to react quickly to technological change.

The average descriptive result for the access to information attribute also suggests that the organisations sampled as part of this study may not have adequate access to information measures in place, which may provide further insights to the finding regarding the nature of the relationship between DM and the culture OL attribute. The moderate and positive relationship found between the access to information OL attribute and DM is however supportive of the literature reviewed. The moderate and positive nature of the relationship also suggests that DM will benefit from a culture where the sharing of information is encouraged and promoted, which will result in more people having access to, or knowing where to get access to information pertinent to their function and subsequently utilising this information to the benefit of the organisation.

6.4.4 Performance and DM

In the context of this study, the performance OL attribute (Table 25) measured the collection of and data on all facets of performance within the organisation and to which extend financial gain or performance plays a role in the organisation's decisions in acquiring subunits.

The descriptive results as per Table 9 in Chapter 5 suggested that most respondents rated their organisations as having an average level of performance related capabilities. The summarised correlation analysis results in Table 28 indicates a statistically significant, positive moderate to strong relationship between the OL performance access attribute and all attributes representing the DM construct, apart from the digital strategy DM attribute for which the findings were still positive but not statistically significant.

The literature reviewed (Catlin et al., 2015; Chanas & Hess, 2016; Eris & Ozmen, 2012; Gottschalk, 2009; Sebastian et al., 2017) also found a positive relationship, as organisational learning increases both the organisations capacity to innovate and overall performance (Eris & Ozmen, 2012). The organisation's digital strategy provides direction to executives leading digital initiatives but also enables them to measure progress and adjust as need be (Sebastian et al., 2017). Culture and leadership, for example, are key digital benchmark variables which should be measured as part of the strategy (Gottschalk, 2009). Catlin et al. (2015) also highlight the importance of the alignment of the organisation's DBS with key performance indicators, organisation culture and structures, strategies for developing talent and the allocation of funding.

The findings for the performance attribute thus align with those of the literature reviewed. The overall moderate to strong positive nature of the relationship indicates there needs to be a strong focus on capabilities that will ensure the measurement of performance related to digital objectives within the DBS, which will lead to increased DM for the organisation. The literature reviewed above also suggests that performance is an output of the DBS planning process where performance measures, such as KPI's, are planned for and aligned to the expected digital transformation outcomes identified such as digital capabilities, culture, structural changes and talent required, during the formulation of the DBS. Performance as an output of strategy would explain the small and statistically insignificant nature of the relationship between the performance OL attribute and the digital strategy DM attribute.

6.4.5 Conclusion: Sub-Research Question 3

This research question sought to establish the nature of the relationship between organisational learning and the digital maturity of the organisation. The findings as discussed in section 6.4 in the context of the literature reviewed shows that this relationship to be predominantly moderate and positive at the construct level on the condition that the organisational learning culture which exists within the organisation is supportive of digital transformation activities, in the absence of which the culture OL attribute would have a strong and negative influence on DM.

DM will benefit from a culture where the sharing of information is encouraged and promoted, which will result in more people having access to, or knowing where to get access to information pertinent to their function and subsequently utilising this information to the benefit of the organisation. As the organisation improves its knowledge management capabilities the quality, efficiency and effectiveness of DM outcomes are expected to be improved through these enhanced knowledge management capabilities. From a learning perspective, it is also crucial for the organisation to identify and develop both management capabilities and combinations of technological, organisational and functional skills that are not readily copied, which is expected to have a positive influence on the DM of the organisation through the creation of new digital capabilities.

6.5 What is the cumulative effect of all the components on the digital maturity of the organisation?

The overarching research question aimed to understand the simultaneous influence of innovation, leadership and organisational learning on the organisation's digital maturity. The results in Table 29 below shows that not all the attributes tested for innovation, leadership and organisational learning had a statistically significant influence on the DM attributes.

Table 29: Summary of the regression results for all attributes

Digital maturity attributes	Innovation	Leadership	OL1 - Knowledge Sharing	OL2 - Information Access	OL3 - Knowledge Management	OL4 - Culture	OL5 - Performance
Digital Competence	Sig.+	NS	Sig.-	NS	NS	NS	Sig.+
Digital Insights	Sig.+	NS	NS	NS	NS	NS	Sig.+
Digital Org and Culture	Sig.+	Sig.+	NS	NS	NS	Sig.-	Sig.+
Digital Strategy	NS	NS	NS	NS	NS	NS	NS

Note: Sig. = Significant, NS = Not significant, + = Positive covariance, – = Negative covariance.

Both the innovation and performance OL attributes are statistically significant and positively influencing across all the DM attributes, except for the digital strategy DM attribute where the results were not significant. The leadership attribute only has a significant and positive influence over the digital organisation and culture DM attribute. The knowledge sharing OL attribute showed a statistically negative influence on the digital competence DM attribute. The learning culture OL attribute only has a statistically significant and negative influence on the digital org and culture DM attribute, in congruence with the results found and discussed in section 6.4.3. The knowledge sharing OL attribute showed a statistically significant and negative influence on the digital competence DM attribute, which diverges from the results found and literature reviewed in section 6.4.1, where the relationship was found to be significant and small but positive. Both the access to information and knowledge management OL attributes has no statistically significant influence over any of the DM attributes.

The results from the sub research questions as discussed earlier in this chapter (sections 6.2, 6.3 and 6.4) established the existence of mostly positive and statistically significant relationships between the attributes of innovation, leadership, organisational learning and those of the DM construct. The results in this section however indicates that when the effect of these attributes are considered simultaneously in relation to DM only the innovation, leadership, OL performance, OL culture and OL knowledge sharing attributes (as defined in the context of this study) are the key attributes that should be considered and leveraged to maximise the resulting influence on an organisation's DM. The five

attributes identified are therefore found to be significant predictors of DM. The insignificant findings against remaining attributes may be contributed to the indirect but supportive role that these attributes contribute perform within the ecosystem that enables enhanced DM, as discussed throughout this chapter.

Chapter 7: Conclusion

This chapter consolidates the findings of this study and contextualises the result in terms of the aim of the study identified. Chapter 1 introduced the value of this study in both business and academic contexts, and this chapter makes recommendations to management in addition to identifying key areas for future research.

7.1 Principal findings

The objectives of this study were to understand the influence leadership in the digital age, digital innovation and organisational learning had on the DM of the organisation.

Through the sub research questions, the individual relationships between the attributes of the various constructs and DM were understood. The cumulative influence, as per the overarching research question was also established. The results obtained in chapter 5 of this study indicate that the researcher was able to meet the objectives as set forth for this study, thereby contributing to the insights concerning DM through empirical research.

7.1.1 The nature of the relationship between digital leadership and digital maturity of an organisation

Leadership was found to have a strong and positive influence on DM in this study.

Leadership styles, specifically a combination of transactional and transformational leadership styles (Bryant, 2003; Williams & Sullivan, 2011), behaviours and digital leadership development related activities drives enhanced digital competencies (Davison & Ou, 2017; Fitzgerald et al., 2013) within the organisation which positively influences DM. Digital competencies are concerned with both the development of digital skills (El Sawy et al., 2016) and effectiveness of planning and execution. Leaders who have an understanding of technology and keep up to date with digital trends would enhance the digital insights aspects of DM within the organisation (Kane et al., 2016) by feeding this knowledge and awareness back into aspects such as the DBS and digital design and development activities. This also allows digital capabilities to be leveraged effectively within the organisation. Choices made as part of the DBS is expected to have

a substantial influence on an organisation's DM outcomes (Bharadwaj et al., 2013; Sebastian et al., 2017), and the role of leadership within this strategy process is to ensure tangible strategic measures are derived and that transformation management takes place, examples of which are distributed roles and responsibilities and the availability and regular assessment of KPI's (Chanas & Hess, 2016).

Leadership is also critical to creating the digital organisational culture aspects required for enhanced DM, requiring digital leaders to focus on behaviours, activities and embedding ways of working and the digital skills required to create and maintain this digital culture (Antonakis & House, 2014; Parris & Peachey, 2013; Vey et al., 2017). Fostering collaboration, trust and encouraging the social behaviours required as part of embedding the ways of working to create the culture aspired to are some ways digital leaders can achieve this. Creating this digital culture also speaks to digital leaders consciously changing the 'organisational mindset' regarding digital change, which implies organisations are constantly and iteratively re-inventing themselves and the roles people play, thereby reducing the fear and potential resistance associated with change (Kane et al., 2015).

7.1.2 The nature of the relationship between digital innovation and the digital maturity of an organisation

Innovation was also found to have a strong and positive influence on DM as part of this study.

Piccoli and Ives (2005) found that organisations who do not continually create value through digital innovation will struggle to maintain their competitive advantage and limit their ability to detect and respond to changes in the external environment (Guttel et al., 2015; Schilke, 2014). Investment in digital innovation related capabilities enhance the digital competence DM aspects of the organisation. These digital capabilities can then be further exploited as new sources of value creation. The learnings through the process of gaining these new digital capabilities would also enhance the digital insights DM aspects, allowing for the reconfiguration of digital artefacts in new and unique ways. An understanding of the organisation's relevant digital maturity and relevant digital capabilities as proposed in this study would further enhance the digital insights aspects of DM, which would subsequently be leveraged as part of the DBS (D'souza et al., 2017). Managing the balance between explorative and exploitative innovation, or organisational

ambidexterity, as part of the DBS is seen as critical and would ensure the organisation stays relevant in the present as well as the future (World Economic Forum, 2016; Zacher & Rosing, 2015). Achieving innovation ambidexterity will also influence the digital organisation and culture factor of DM through the alignment and coordination of resources, organisational structures, ways of working, behaviours and capabilities needed to enable the required mix of ambidexterity required (Fichman et al., 2014; Jurksiene & Pundziene, 2016; Parida et al., 2016).

7.1.3 The nature of the relationship between organisational learning and the digital maturity of an organisation

The findings regarding the relationship between organisational learning and DM yielded mixed results as part of this study.

Within the context of OL, the learning culture factor as defined and measured was found to have a strong negative influence on all factors of DM. This finding contradicted the literature reviewed, which found this relationship to be positive (Catlin et al., 2015; Kane et al., 2015; Vey et al., 2017), and which also suggested that a more traditional organisation culture would be a barrier to the agility and flexibility needed to support the transformation process. Most respondents in this study rated their learning culture to be below average (Table 9 Chapter 5) which suggests the majority of the organisations assessed as part of this study did not have the organisational learning culture required to support digital transformation activities. Within this context, it was argued that the findings in this study regarding learning culture, in fact, support existing literature, as a collaborative and flexible learning culture is expected to enhance DM and a more traditional and inflexible organisation learning culture is expected to have a negative influence on DM.

Performance and access to information in the context of OL was also found to have a significant and positive influence on DM. Performance objectives or KPI's defined within the DBS allows the organisation to track, measure and adjust (Sebastian et al., 2017) against the progress of digital initiatives. Existing digital performance data would also be used as a digital insight or input to the DBS review and decision-making processes. Culture and leadership are seen as two vital digital benchmarks which need to be measured as part of the organisation's digital strategy (Gottschalk, 2009).

Vey et al. (2017) found that access to information is critical, as insufficient sharing of knowledge is a typical barrier in establishing a strong learning culture, which also enables innovation. More organisations are also adopting an open systems models where information is shared both internally and externally within a greater ecosystem (Tsou & Hsu, 2015) which would, in the digital context lead to enhanced digital competencies and insights and therefore DM.

Both knowledge management and knowledge sharing aspects in the context of OL was found to have a positive albeit small influence on DM. Knowledge is created and shared through experimentation and gathering feedback from customers and other relevant insights, by leveraging tools and ways of working such as rapid experimentation (Ismail-Saville, 2017). This feedback allows people to learn how to become more efficient and effective and how to adapt to new ways of working (Younger, 2016). Through knowledge management, the organisation creates organisational learning capability which are the processes that creates unique competitive advantage for the organisation in the form of capabilities that can be leveraged as part of the organisation's strategy, or in the digital context, the DBS (Eisenhardt & Martin, 2000; Lin & Wu, 2014). The weak nature of these relationships may be attributed to the indirect manner in which the literature reviewed suggest these two factors influence DM.

7.1.4 The cumulative effect of organisational learning, digital innovation and digital leadership on the DM of the organisation

While initial findings as per the sub research questions indicated most of the factors identified within the constructs of innovation, leadership and organisational learning influenced DM in some manner, when considered cumulatively only five factors were found to influence DM significantly. The innovation, leadership, OL performance, OL culture and OL knowledge sharing factors (as defined in the context of this study) were found to be the primary factors influencing DM.

Innovation and OL performance positively influenced all aspects of DM except digital strategy. Leadership was found to positively, and OL culture was found to negatively influence the digital organisational and culture aspect of DM. The knowledge sharing OL factor was found to influence the digital competence aspect of DM negatively.

7.2 Implications and recommendations for management

Several implications and recommendations for management have been identified through this research.

Firstly, the identification of the factors of innovation, leadership and organisational learning which cumulatively and significantly influence DM is of particular importance, as Kane et al. (2016) found that while organisations are anticipating disruption of their industries by digital trends, few were preparing for and responding to it. Responding to digital trends requires organisations to develop integrated digital strategies to create digital capabilities where structure, people, culture and activities are aligned to goals. Understanding how to best leverage the factors of innovation, leadership and organisational learning to influence DM enables business leaders to focus and prioritise potentially scarce resources against activities that would deliver the best results.

Secondly, innovation and innovation ambidexterity remain a key priority for organisations to pursue to both compete and stay relevant in the present and the future. Managers should focus on digital innovation as a means to significantly influence DM, as digital innovation was found to be a key driver for enhanced DM.

Thirdly, the importance of leadership and organisational learning culture was validated in this study, which is seen as enablers for the digital culture required for DM. Managers should encourage both internal and external collaboration, the sharing of knowledge and drive the behaviours needed to create the culture and ways of working required. Managers should also remain cognizant of how existing organisational culture, structures and processes may be a barrier to the digital organisation and culture aspects of DM, and address the remediation of these challenges through activities defined as part of the DBS.

Finally, the findings confirmed how crucial it is for managers to create and regularly review performance metrics as part of the DBS. Performance metrics provides managers with information on how initiatives are tracking against expected outcomes and allows them to adjust where necessary. It also provides real-time insights and learning which managers can use as inputs to the DBS to influence decisions to enhance or pivot activities based on the current information in hand.

7.3 Limitations of the research

7.3.1 Sampling bias

A combination of purposive and snowball sampling was used due to the unknown size of the population, as suggested by Sanders and Lewis (2012). A disadvantage of snowball sampling is that bias may be introduced into the study as there is a high probability that referrer would suggest someone with similar views (Zikmund et al., 2009). This is also highlighted by the results in section 5.3, as there appears to be minimal variance in the data describing the DM construct, which implies most respondents tended to have very similar views. The findings in section 6.4.3 also suggest that most of the organisations measured as part of this study may have had similar organisational learning cultures which were not supportive of the digital culture required for enhanced DM.

7.3.2 Research design

The sample was predominantly represented by two broad industry categories constituting 92 percent of respondents. Finance and financial services represented 69 percent of the sample and telecommunications, technology, internet & electronics 23 percent of the sample. This suggests the industry categories used in the online questionnaire administered may have been too broad and could have been broken down into smaller industries providing for better insights at an industry level. This issue was not evident when the results of the pilot questionnaire were assessed.

7.3.3 Research experience

The experience of the researcher plays a significant role in conducting non-probability sampling. To this extent, the researcher may not have had an adequate level of experience required in this field.

7.3.4 Research theory

The research only focuses on the three constructs identified from theory and the nature of their relationships with DM. Other constructs may exist.

7.4 Suggestions for future research

Through this study, the researcher identified five factors which cumulatively and significantly influences DM. To this extent, further research can elaborate by including additional factors that were not identified as part of this study and considering them cumulatively with the factors of this study to create further insights as to how DM can be influenced.

The design of this study was cross-sectional in nature, meaning that it measured digital maturity at a particular point in time. A longitudinal study could be performed to consider how digital maturity changes over time as interventions aligned to the factors identified is implemented, such as performance measures and KPI's.

This study considered several measurement instruments for the digital maturity construct. Further research can utilise other DM instruments to replicate the results of this study which could provide further insights in how innovation, leadership and organisational learning influences digital maturity.

The concepts of relevant digital maturity and relevant digital capabilities were proposed in this study. Further research could expand on these concepts and include them into existing or new digital maturity models or frameworks.

Reference List

- After Digital. (2016). Digital Maturity Questionnaire. Retrieved from <https://afterdigital.co.uk/wp-content/uploads/2016/12/DigitalMaturityQuestionnaire-AfterDigital.pdf>
- Antonakis, J., Avolio, B. J., & Sivasubramaniam, N. (2003). Context and leadership: An examination of the nine-factor full-range leadership theory using the Multifactor Leadership Questionnaire. *The Leadership Quarterly*, 14(3), 261–295.
- Antonakis, J., & House, R. J. (2014). Instrumental leadership: Measurement and extension of transformational-transactional leadership theory. *Leadership Quarterly*, 25(4), 746–771.
- Babalola, M. T., Stouten, J., & Euwema, M. (2016). Frequent change and turnover intention: The moderating role of ethical leadership. *Journal of Business Ethics*, 134(2), 311–322. doi:10.1007/s10551-014-2433-z
- Baškarada, S., Watson, J., & Cromarty, J. (2016). Leadership and organizational ambidexterity. *Journal of Management Development*, 35(6), 778–788. doi:10.1108/JMD-01-2016-0004
- Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, 18(3), 19–32.
- Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, 28(2), 238–256. doi:10.5465/AMR.2003.9416096
- Benner, M. J., & Tushman, M. L. (2015). 2013 Decade award invited article reflections on the 2013 Decade Award - “exploitation, exploration, and process management: The productivity dilemma revisited” ten years later. *Academy of Management*

Review, 40(4), 497–514. doi:10.5465/amr.2015.0042

- Bennis, W. (2013). Leadership in a digital world: Embracing transparency and adaptive capacity. *MIS Quarterly*, 37(2), 635–637.
- Berghaus, S., & Back, A. (2016). Stages in digital business transformation; In *Mediterranean Conference on Information Systems (MCIS) Proceedings*. Retrieved from <http://aisel.aisnet.org/mcis2016%0Ahttp://aisel.aisnet.org/mcis2016>
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482.
- Bryant, S. E. (2003). The role of transformational and transactional leadership in creating, sharing and exploiting organizational knowledge. *Journal of Leadership & Organizational Studies*, 9(4), 32.
- Catlin, T., Scanlan, J., & Willmott, P. (2015). Raising your digital quotient. *McKinsey Quarterly*. Retrieved from http://www.cfs.purdue.edu/richardfeinberg/csr_406_e-retailing/a_a_a_a_syllabus_fall_2015/internet_of_things/mckinsey/Raising_your_Digital_Quotient.pdf
- Chang, Y.-Y. (2016). High-performance work systems, joint impact of transformational leadership, an empowerment climate and organizational ambidexterity: Cross level evidence. *Journal of Organizational Change Management*, 29(3), 424–444. doi:10.1108/JOCM-09-2015-0150
- Chanas, S., & Hess, T. (2016). How digital are we? Maturity models for the assessment of a company's status in the digital transformation. *LMU Munich. Institute for Information Systems and New Media*. Retrieved from http://www.wim.bwl.uni-muenchen.de/download/epub/mreport_2016_2.pdf
- Chen, M., Yang, Z., Dou, W., & Wang, F. (2017). Flying or dying? Organizational change, customer participation, and innovation ambidexterity in emerging economies. *Asia*

Pacific Journal of Management. doi:10.1007/s10490-017-9520-5

- Chiva, R., Ghauri, P., & Alegre, J. (2014). Organizational learning, innovation and internationalization: A complex system model. *British Journal of Management*, 25(4), 687–705.
- Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). New Jersey: Merrill Prentice Hall.
- D'souza, D. E., Sigdya, P., & Struckell, El. (2017). Relative ambidexterity: A measure and a versatile framework. *Academy of Management Perspectives*, 31(2), 124–136. doi:10.5465/amp.2016.0020
- Davison, R. M., & Ou, C. X. J. (2017). Digital work in a digitally challenged organization. *Information and Management*, 54(1), 129–137.
- Deloitte Digital. (2015). Digital maturity: How digital are you. Retrieved from <https://eu.deloittedigital.com/en/content/digital-maturity>
- Desmet, D., Duncan, E., Scanlan, J., & Singer, M. (2015). Six building blocks for creating a high-performing digital enterprise. *McKinsey Digital*. Retrieved from <https://www.mckinsey.com/business-functions/organization/our-insights/six-building-blocks-for-creating-a-high-performing-digital-enterprise>
- Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, 29(1), 52–73.
- Dinh, J. E., Lord, R. G., Gardner, W. L., Meuser, J. D., Liden, R. C., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *Leadership Quarterly*, 25(1), 36–62.
- Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin*, 108(2), 233–256.

- Earl, M. J. (2000). Evolving the e-Business. *Business Strategy Review*, 11(2), 33–38.
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities : What are they ? *Strategic Management Journal*, 21, 1105–1121.
- El Sawy, O. A., Amsinck, H., Kræmmergaard, P., & Vinther, A. L. (2016). How lego built the foundations and enterprise capabilities for digital leadership. *MIS Quarterly Executive*, 15(2), 141–166.
- Eris, E. D., & Ozmen, O. N. T. (2012). The effect of market orientation learning orientation and innovativeness on firm performance: a research from Turkish logistics sector. *International Journal of Economic Sciences and Applied Research*, 5(1), 77–108.
- Fichman, R. G., Dos Santos, B., & Zheng, Z. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS Quarterly*, 38(2), 329–353.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: SAGE.
- Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2013). *Embracing digital technology: A new strategic imperative*. MIT Sloan Management Review. Retrieved from https://back.www.dk.capgemin.com/resource-file-access/resource/pdf/embracing_digital_technology_a_new_strategic_imperative.pdf
- Gassmann, O., Frankenberger, K., & Csik, M. (2014). The St. Gallen business model navigator [Working paper]. *Pearson*. doi:10.1007/978-3-319-01056-4_7
- Gottschalk, P. (2009). Maturity levels for interoperability in digital government. *Government Information Quarterly*, 26(1), 75–81.
- Guttel, W. H., Konlechner, S. W., & Trede, J. K. (2015). Standardized individuality versus individualized standardization: the role of the context in structurally ambidextrous organizations. *Review of Managerial Science*, 9(2), 261–284. doi:10.1007/s11846-

014-0156-2

- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). New Jersey: Pearson Prentice Hall.
- Hansen, M., & Birkinshaw, J. (2007). The innovation value chain. *Harvard Business Review*, 85(June), 127–148.
- Havlicek, L. L., & Peterson, N. L. (1976). Robustness of the Pearson correlation against violation of assumption. *Perceptual and Motor Skills*, 43(3f), 1319–1334. doi:10.2466/pms.1976.43.3f.1319
- Henriette, E., Feki, M., & Boughzala, I. (2015). The shape of digital transformation: A systematic literature review. *Mediterranean Conference on Information Systems (MCIS) Proceedings*, (October), 1–13. Retrieved from http://aisel.aisnet.org/mcis2015/10/?utm_source=aisel.aisnet.org%2Fmcis2015%2F10&utm_medium=PDF&utm_campaign=PDFCoverPages
- Hess, T., Benlian, A., Matt, C., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, 15(2), 123–139.
- Huang, J., Henfridsson, O., Liu, M. J., & Newell, S. (2017). Growing on steroids: Rapidly scaling the user base of digital ventures through digital innovation. *MIS Quarterly*, 41(1), 301–314.
- Ismail-Saville, T. (2017). Innovation and design [Powerpoint slides]. Retrieved from https://gibs.blackboard.com/bbcswebdav/pid-96308-dt-content-rid-349854_1/courses/16ACMBAP009GIB844_R/V2 MBA 2017 Session 2 Innovation Final.pdf
- Jansen, J. J. P., Vera, D., & Crossan, M. (2009). Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *Leadership Quarterly*, 20(1), 5–18.

- Jing, F. F., & Avery, G. C. (2008). Missing links in understanding the relationship between leadership and organizational performance. *International Business & Economics Research Journal*, 7(5), 67–78. doi:10.19030/iber.v7i5.3256
- Jung, D. I., Chow, C., & Wu, A. (2003). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *Leadership Quarterly*, 14(4–5), 525–544.
- Jurksiene, L., & Pundziene, A. (2016). The relationship between dynamic capabilities and firm competitive advantage. *European Business Review*, 28(4), 431–448. doi:10.1108/EBR-09-2015-0088
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36.
- Kane, G. C., Palmer, D., Phillips, A., & Kiron, D. (2015). Is your business ready for a digital future ? *MIT Sloan Management Review*, 56(4), 37–44.
- Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2016). *Aligning the organization for its digital future. MITSloan Management Review and Deloitte University Press*.
- Knofczynski, G. T., & Mundfrom, D. (2008). Sample sizes when using multiple linear regression for prediction. *Educational and Psychological Measurement*, 68(3), 431–442. doi:10.1177/0013164407310131
- Layman, L., Cornwell, T., & Williams, L. (2006). Personality types, learning styles, and an agile approach to software engineering education. In *Proceedings of the 37th SIGCSE technical symposium on Computer science education - SIGCSE '06* (Vol. 38, pp. 428–432). doi:10.1145/1121341.1121474
- Lin, Y., & Wu, L. Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research*, 67(3), 407–413.

- Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small- to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, 32(5), 646–672.
- Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*, 14(1), 81–95.
- Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information System Reserach*, 2(3), 173–191.
- Meihami, B., & Meihami, H. (2014). Knowledge Management a way to gain a competitive advantage in firms (evidence of manufacturing companies). *International Letters of Social and Humanist Sciences*, 14, 80–91.
- Mortensen, P. S., Bloch, C. W., & Others. (2005). *Oslo Manual-guidelines for collecting and interpreting innovation data*. Communities (3rd ed.).
- Nyberg, A. J., Moliterno, T. P., Hale, D., & Lepak, D. P. (2014). Resource-based perspectives on unit-level human capital: A review and integration. *Journal of Management*, 40(1), 316–346. doi:10.1177/0149206312458703
- O'Reilly, C., & Tushman, M. L. (2007). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Journal of Management*, 1904(1963), 185–206. doi:10.1080/01933928108411685
- O'Reilly, C., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present and future. *The Academy of Management Perspectives*, 27(4), 324–338. doi:10.5465/amp.2013.0025
- Parida, V., Lahti, T., & Wincent, J. (2016). Exploration and exploitation and firm performance variability: A study of ambidexterity in entrepreneurial firms. *International Entrepreneurship and Management Journal*, 12(4), 1147–1164.

doi:10.1007/s11365-016-0387-6

- Parris, D. L., & Peachey, J. W. (2013). A systematic literature review of servant leadership theory in organizational contexts. *Journal of Business Ethics*, 113(3), 377–393.
- Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. *International Journal of Information Systems and Project Management*, 5(1), 63–77. Retrieved from <http://www.sciencesphere.org/ijispm/archive/ijispm-0501.pdf#page=67>
- Peteraf, M. A. (1993). The Cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14(3), 179–191.
- Piccoli, G., & Ives, B. (2005). IT-Dependent strategic initiatives and sustained competitive advantage: A review and synthesis of the literature. *MIS Quarterly*, 29(4), 747–776.
- Ployhart, R. E., Nyberg, A. J., Reilly, G., & Maltarich, M. A. (2014). Human capital is dead; Long live human capital resources! *Journal of Management*, 40(2), 371–398. doi:10.1177/0149206313512152
- Remane, G., Hanelt, A., & Wiesb, F. (2017). Digital maturity in traditional industries – an exploratory analysis. In *Proceedings of 25th European Conference on Information Systems (ECIS 2017)* (pp. 1–18). Retrieved from https://www.researchgate.net/publication/316687803_DIGITAL_MATURITY_IN_TRADITIONAL_INDUSTRIES_-_AN_EXPLORATORY_ANALYSIS
- Saunders, M., & Lewis, P. (2012). *Doing research in business and management*. Harlow: Pearson.
- Schilke, O. (2014). On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strategic*

- Management Journal*, 35(1), 179–203. doi:10.1002/smj.2099
- Sebastian, I. M., Beath, C. M., & Ross, J. W. (2017). How to develop a great digital strategy. *MIT Sloan Management Review*, 58(2), 7–9.
- Sheng, M. L., & Chien, I. (2016). Rethinking organizational learning orientation on radical and incremental innovation in high-tech firms. *Journal of Business Research*, 69(6), 2302–2308.
- Sia, K. S., Soh, C., & Weill, P. (2016). *How DBS Bank pursued a digital business strategy. MIS Quarterly Executive* (Vol. 15).
- Sierra, J. C. V., & Banzato, C. (2016). Implications of theory and research on strategic leadership : A critical review. *Revista Ibero-Americana de Estratégia*, 15(3), 120–131.
- Singh, S. K. (2008). Role of leadership in knowledge management: a study. *Journal of Knowledge Management*, 12(4), 3–15.
- Sinha, S. (2016). Managing an ambidextrous organization: balancing innovation and efficiency. *Strategic Direction*, 32(10), 35–37. doi:10.1108/SD-05-2016-0061
- Stettner, U., & Lavie, D. (2014). Ambidexterity under scrutiny: Exploration and exploitation via internal organization, alliances, and acquisitions. *Strategic Management Journal*, 35(1), 1903–1929. doi:10.1002/smj
- Subba Rao, S., Metts, G., & Mora Monge, C. A. (2003). Electronic commerce development in small and medium sized enterprises. *Business Process Management Journal*, 9(1), 11–32.
- Teece, D. J., & Pisano, G. (1994). The dynamic capabilities of firms: An introduction [Working paper: 94-103]. *International Institute for Applied Systems Analysis*. Retrieved from <http://pure.iiasa.ac.at/4109/>

- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Templeton, G. F., Lewis, B. R., & Snyder, C. A. (2002). Development of a measure for the organizational learning construct. *Journal of Management Information Systems*, 19(2), 175–218. doi:10.1080/07421222.2002.11045727
- Tsou, H. T., & Hsu, S. H. Y. (2015). Performance effects of technology-organization-environment openness, service co-production, and digital-resource readiness: The case of the IT industry. *International Journal of Information Management*, 35(1), 1–14. doi:10.1016/j.ijinfomgt.2014.09.001
- Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186–204.
- Vey, K., Fandel-Meyer, T., Zipp, J. S., & Schneider, C. (2017). Learning & development in times of digital transformation: Facilitating a culture of change and innovation. *International Journal of Advanced Corporate Learning (iJAC)*, 10(1), 22.
- von Krogh, G., Nonaka, I., & Rechsteiner, L. (2012). Leadership in organizational knowledge creation: A review and framework. *Journal of Management Studies*, 49(1), 240–277.
- Weber, M. S., & Monge, P. R. (2017). Industries in turmoil: Driving transformation during periods of disruption. *Communication Research*, 44(2), 147–176. doi:10.1177/0093650213514601
- Westerman, G., Tannou, M., Bonnet, D., Ferraris, P., & McAfee, A. (2012). The digital advantage: How digital leaders outperform their peers in every industry. *Capgemini Consulting and The MIT Center for Digital Business*. Retrieved from https://www.capgemini.com/wp-content/uploads/2017/07/The_Digital_Advantage__How_Digital_Leaders_Outper

orm_their_Peers_in_Every_Industry.pdf

- Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic capabilities and performance: Strategy, structure and environment. *Long Range Planning*, 46, 72–96.
- Williams, C. (2007). Research Methods. *Journal of Business & Economic Research*, 5(3), 65–72. doi:10.1093/fampract/cmi221
- Williams, P., & Sullivan, H. (2011). Lessons in leadership for learning and knowledge management in multi-organisational settings. *The International Journal of Leadership in Public Services*, 7(1), 6–20. doi:10.5042/ijlps.2011.0089
- Woodard, C. J., Ramasubbu, N., Tschang, F. T., & Sambamurthy, V. (2013). Design capital and design moves: The logic of digital business strategy. *MIS Quarterly*, 37(2), 537–564.
- World Economic Forum. (2016). Digital transformation of industries : Digital enterprise [White paper]. Retrieved from <http://reports.weforum.org/digital-transformation-of-industries/wp-content/blogs.dir/94/mp/files/pages/files/digital-enterprise-narrative-final-january-2016.pdf>
- Yang, J. Te. (2007). Knowledge sharing: Investigating appropriate leadership roles and collaborative culture. *Tourism Management*, 28(2), 530–543.
- Younger, J. (2016). How learning and development are becoming more agile. *Harvard Business Review*, (November).
- Zacher, H., & Rosing, K. (2015). Ambidextrous leadership and team innovation. *Leadership & Organization Development Journal*, 36(1), 54–68. doi:10.1108/LODJ-11-2012-0141
- Zikmund, B., Babin, B., Carr, G., & Griffin, M. (2009). *Business Research Methods* (8th ed.). Mason: Cengage Learning.

Zimmerman, T., Gardiner, S., & Wallis, J. (2015). A guide to self-disruption: Driving growth through enterprise innovation strategies in the digital age. *Accenture*. Retrieved from https://www.accenture.com/t20150715T220830Z__w__/sg-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_17/Accenture-ACN-Self-Disruption-Enterprise-Innovation-Strategies-Digital-Age.pdf?lang=en

Appendices

Appendix 1: Research Questionnaire

Questionnaire

Please provide some background w.r.t your organisation and your role:

Gender

[Male] [Female]

What is the primary industry or line of business of your organisation?

Advertising & Marketing

Agriculture

Airlines & Aerospace (including Defense)

Automotive

Business Support & Logistics

Construction, Machinery, and Homes

Education

Entertainment & Leisure

Finance & Financial Services

Food & Beverages

Government

Healthcare & Pharmaceuticals

Insurance

Manufacturing

Nonprofit

Retail & Consumer Durables

Real Estate

Telecommunications, Technology, Internet & Electronics

Transportation & Delivery

Utilities, Energy, and Extraction

I am currently not employed

What is the approximate total number of employees within your organisation?

[1 – 49] - 1

[50 – 999] - 2

[1,000 - 4,999] - 3

[5,000 or more] - 4

[Don't know] - 0

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

[0-5] - 0

[5-10] - 1

[10-15] - 2

[15+] - 3

Seniority on terms of role.

[Junior Management] - 0

[Middle Management] - 1

[Senior Management] - 2

[Executive Management] - 3

[Qualifying question]

Does your organisation currently utilise and evolve digital capabilities as part of its operations, or as a platform to deliver and enhance products and services to your end customers?

[Yes] – Move to section A.

[No] – Skip to end.

Section A: Digital Maturity

Instructions: The following questions pertain to your company's digital maturity. Please respond to each question using the following scale:

[Completely agree] [Somewhat agree] [Somewhat disagree] [Completely disagree]

3

2

1

0

Culture

We believe that our competitive strategy depends on digital

Our board and our C-level executives back our digital strategy

We have the right leaders to execute on our digital strategy day-to-day

We invest in targeted digital education and training at all levels of our organization

We clearly communicate our digital vision both internally and externally

We take measured risks in order to enable innovation

We prioritize overall customer experience over the performance of any individual channel

Organisation

Our organization structure prioritizes customer journeys over functional silos

We dedicate appropriate resources to digital strategy, governance, and execution

The staff supporting our critical digital functions are best in class

We have digital skills embedded throughout our organization

Our organization model encourages cross-functional collaboration

We have defined and repeatable processes for managing digital programs

Our vendor partners deliver value that enhances our digital competencies

Technology

Our technology budget is fluid to allow for shifting priorities

Our marketing and technology resources work together to co-create our digital technology road map

We have a flexible, iterative, and collaborative approach to technology development

We leverage modern architectures (APIs, cloud, etc.) to promote speed and flexibility

We measure our technology teams by business outcomes not just system up-time

We use customer experience assets, like personas and journey maps, to steer our technology design

We use digital tools to promote employee innovation, collaboration, and mobility

Insights

We have clear and quantifiable goals for measuring the success of our digital strategy

Every employee understands how her performances ties to corporate digital goals

We use customer-centric metrics like Net Promoter Score or lifetime value to measure success

We measure how channels work together to accomplish a desired outcome

Customer insight actively steers our digital strategy

Customer insights inform digital design and development

We feed lessons learned from digital programs back into our strategy

Section B: Innovation

Instructions: The following questions pertain to innovation within your company. Please respond to each question.

Our organisation has a high rate of new service/product introductions

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

How does the number of new products introduced compare to that of your competitors?

[A lot less than] [less than] [the same] [more than] [many more than]

1 2 3 4 5

Our organisation has increased the number of services offered during the past two years

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

Our organisation is primarily influenced by the potential of untapped opportunity

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

Customers are invited and encouraged to provide feedback to the organisation in order to get new ideas for products and services

[Always] [Often] [Sometimes] [Seldomly] [Never]

5 4 3 2 1

In our organisation, there is a strong relationship between the number of new ideas and the number of new ideas implemented

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

Our organisation is continually pursuing new opportunities

[Always] [Often] [Sometimes] [Seldomly] [Never]

5 4 3 2 1

Our organisation places strong emphasis on new and innovative products and services

[Always] [Often] [Sometimes] [Seldomly] [Never]

5 4 3 2 1

Employee are continually being encouraged to do things in new and different ways.

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

Our organisation places a strong emphasis on continuous improvements in product or service delivery

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]
5 4 3 2 1

Section C: Leadership

Instructions: The following questions pertain to leadership in your company. Please respond to each question.

Our leader takes calculated risks with regard to exploring and seizing growth opportunities.

[Always] [Often] [Sometimes] [Seldomly] [Never]
5 4 3 2 1

Our leader can be described as charismatic

[Definitely] [Perhaps] [Sometimes] [Not really] [Never]
5 4 3 2 1

Our senior executives solve problems by brainstorming together.

[Always] [Often] [Sometimes] [Seldomly] [Never]
5 4 3 2 1

Our leader continually examines potential new market opportunities

[Always] [Often] [Sometimes] [Seldomly] [Never]
5 4 3 2 1

Our leader never appears to tire or lose enthusiasm for the organisation

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]
5 4 3 2 1

Our leader has a great ability to persuade others to achieve a certain goal.

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]
5 4 3 2 1

Our leader DOES NOT encourage open discussion with all employees

[Always] [Often] [Sometimes] [Seldomly] [Never]
1 2 3 4 5

Our leader has instilled an entrepreneurial philosophy in all employees in the organisation

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]
5 4 3 2 1

Our leader can be described as visionary and flexible.

[Strongly agree] [Agree] [Unsure] [Disagree] [Strongly disagree]

5 4 3 2 1

Our leader's enthusiasm rubs off on all employees within the organisation

[Always] [Often] [Sometimes] [Seldomly] [Never]

5 4 3 2 1

Section D: Organisational Learning

Instructions: The following questions pertain to your company's local operations and employees. Please respond to each question using the following scale:

[Strongly disagree] [Disagree] [Neither agree nor disagree] [Agree] [Strongly agree]

1 2 3 4 5

The following questions relate to your company's local operations:

The company develops experts from within

The company stores detailed information for guiding operations

There is a formal data management function in the company

The company is slow to react to technological change

The company maintains a certain mix of skills among its pool of employees

The company hires highly specialized or knowledgeable personnel

The company makes extensive use of electronic storage (such as, databases, data warehousing, scanned documents)

The company collects data on all facets of performance

The company acquires sub-units (such as, organizations, functions, departments) based on short-term financial gain

When internal capabilities are deficient, we acquire them from the outside

The following questions relate to your company's local employees:

Employees use electronic means to communicate

Employees have a large variety of communications tools (telephone, e-mail, Internet, and so on) from which to choose

Our employees resist changing to new ways of doing things

Employees learn about the company's recent developments through informal means (such as news stories and gossip)

Employees retrieve archived information when making decisions

Employees make extensive use of IS to support their work

Employees are keenly aware of where their knowledge can serve the company

Employees keep information (such as, numbers, plans, ideas) away from other employees

When employees need specific information, they know who will have it

Employees are encouraged to communicate clearly

Appendix 2: Coding

The code book from SPSS as exported is as per below:

Variable Information			
Variable	Position	Label	Measurement Level
Q1	1	Q1	Nominal
Q2	2	Q2	Nominal
Q3	3	Q3	Ordinal
Q4	4	Q4	Ordinal
Q5	5	Q5	Ordinal
Q6	6	Q6	Nominal
Q7_ Recoded	7	Q7_ Recoded	Nominal
Q8_ Recoded	8	Q8_ Recoded	Nominal
Q9_ Recoded	9	Q9_ Recoded	Nominal
Q10_ Recoded	10	Q10_ Recoded	Nominal
Q11_ Recoded	11	Q11_ Recoded	Nominal
Q12_ Recoded	12	Q12_ Recoded	Nominal
Q13_ Recoded	13	Q13_ Recoded	Nominal
Q14_ Recoded	14	Q14_ Recoded	Nominal
Q15_ Recoded	15	Q15_ Recoded	Nominal
Q16_ Recoded	16	Q16_ Recoded	Nominal
Q17_ Recoded	17	Q17_ Recoded	Nominal
Q18_ Recoded	18	Q18_ Recoded	Nominal
Q19_ Recoded	19	Q19_ Recoded	Nominal
Q20_ Recoded	20	Q20_ Recoded	Nominal
Q21_ Recoded	21	Q21_ Recoded	Nominal
Q22_ Recoded	22	Q22_ Recoded	Nominal
Q23_ Recoded	23	Q23_ Recoded	Nominal
Q24_ Recoded	24	Q24_ Recoded	Nominal
Q25_ Recoded	25	Q25_ Recoded	Nominal
Q26_ Recoded	26	Q26_ Recoded	Nominal
Q27_ Recoded	27	Q27_ Recoded	Nominal
Q28_ Recoded	28	Q28_ Recoded	Nominal
Q29_ Recoded	29	Q29_ Recoded	Nominal
Q30_ Recoded	30	Q30_ Recoded	Nominal
Q31_ Recoded	31	Q31_ Recoded	Nominal
Q32_ Recoded	32	Q32_ Recoded	Nominal
Q33_ Recoded	33	Q33_ Recoded	Nominal
Q34_ Recoded	34	Q34_ Recoded	Nominal
Q35_ Recoded	35	Q35_ Recoded	Nominal
Q36	36	Q36	Nominal
Q37_ Recoded	37	Q37_ Recoded	Nominal
Q38_ Recoded	38	Q38_ Recoded	Nominal
Q39_ Recoded	39	Q39_ Recoded	Nominal
Q40_ Recoded	40	Q40_ Recoded	Nominal

Q41_Recoded	41	Q41_Recoded	Nominal
Q42_Recoded	42	Q42_Recoded	Nominal
Q43_Recoded	43	Q43_Recoded	Nominal
Q44_Recoded	44	Q44_Recoded	Nominal
Q45_Recoded	45	Q45_Recoded	Nominal
Q46_Recoded	46	Q46_Recoded	Nominal
Q47_Recoded	47	Q47_Recoded	Nominal
Q48_Recoded	48	Q48_Recoded	Nominal
Q49_Recoded	49	Q49_Recoded	Nominal
Q50_Recoded	50	Q50_Recoded	Nominal
Q51	51	Q51	Nominal
Q52_Recoded	52	Q52_Recoded	Nominal
Q53_Recoded	53	Q53_Recoded	Nominal
Q54_Recoded	54	Q54_Recoded	Nominal
Q55	55	Q55	Nominal
Q56	56	Q56	Nominal
Q57	57	Q57	Nominal
Q58	58	Q58	Nominal
Q59	59	Q59	Nominal
Q60	60	Q60	Nominal
Q61	61	Q61	Nominal
Q62	62	Q62	Nominal
Q63	63	Q63	Nominal
Q64	64	Q64	Nominal
Q65	65	Q65	Nominal
Q66	66	Q66	Nominal
Q67	67	Q67	Nominal
Q68	68	Q68	Nominal
Q69	69	Q69	Nominal
Q70	70	Q70	Nominal
Q71	71	Q71	Nominal
Q72	72	Q72	Nominal
Q73	73	Q73	Nominal
Q74	74	Q74	Nominal
DM1_DigitalCompetence	75	DM1 - Digital Competence	Scale
DM2_Insights	76	DM2 - Insights	Scale
DM3_DigitalCulture	77	DM3 - Digital Culture	Scale
DM4_DigitalStrategy	78	DM4 - Digital Strategy	Scale
Innovation	79	Innovation	Scale
Leadership	80	Leadership	Scale
OL1_KnowledgeSharing	81	OL1 - Knowledge Sharing	Scale
OL2_InformationAccess	82	OL2 - Information Acces	Scale
OL3_KnowledgeManagement	83	OL3 - Knowledge Management	Scale
OL4_Culture	84	OL4 - Culture	Scale
OL5_Performance	85	OL5 - Performance	Scale

Variable Values		
Value		Label
Q1	1	Male
	2	Female
Q2	1	Advertising & Marketing
	2	Agriculture
	3	Airlines & Aerospace (including Defense)
	4	Automotive
	5	Business Support & Logistics
	6	Construction, Machinery, and Homes
	7	Education
	8	Entertainment & Leisure

	9	Finance & Financial Services
	10	Food & Beverages
	11	Government
	12	Healthcare & Pharmaceuticals
	13	Insurance
	14	Manufacturing
	15	Nonprofit
	16	Retail & Consumer Durables
	17	Real Estate
	18	Telecommunications, Technology, Internet & Electronics
	19	Transportation & Delivery
Q3	20	Utilities, Energy, and Extraction
	21	I am currently not employed
	1	1 – 49
	2	50 – 999
	3	1,000 - 4,999
	4	5,000 or more
	5	Don't know
Q4	1	0-5
	2	5-10
	3	10-15
	4	15+
Q5	1	Junior Management
	2	Middle Management
	3	Senior Management
	4	Executive Management
Q6	1	Yes
	2	No
Q7_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q8_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q9_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q10_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q11_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q12_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q13_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q14_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q15_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree

Q16_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q17_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q18_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q19_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q20_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q21_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q22_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q23_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q24_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q25_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q26_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q27_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q28_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q29_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q30_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q31_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree

Q32_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q33_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q34_Recoded	1	Completely disagree
	2	Somewhat disagree
	3	Somewhat agree
	4	Completely agree
Q35_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q36	1	A lot less than
	2	Less than
	3	The same
	4	More than
	5	Many more than
Q37_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q38_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q39_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q40_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q41_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q42_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q43_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q44_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q45_Recoded	1	Never
	2	Seldomly

	3	Sometimes
	4	Often
	5	Always
Q46_Recoded	1	Never
	2	Not really
	3	Sometimes
	4	Perhaps
	5	Definitely
Q47_Recoded	1	Never
	2	Seldomly
	3	Sometimes
	4	Often
	5	Always
Q48_Recoded	1	Never
	2	Seldomly
	3	Sometimes
	4	Often
	5	Always
Q49_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q50_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q51	1	Always
	2	Often
	3	Sometimes
	4	Seldomly
	5	Never
Q52_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q53_Recoded	1	Strongly disagree
	2	Disagree
	3	Unsure
	4	Agree
	5	Strongly agree
Q54_Recoded	1	Never
	2	Seldomly
	3	Sometimes
	4	Often
	5	Always
Q55	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q56	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q57	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q58	1	Strongly disagree

	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q59	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q60	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q61	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q62	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q63	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q64	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q65	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q66	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q67	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q68	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q69	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q70	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree

Q71	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q72	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q73	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree
Q74	1	Strongly disagree
	2	Disagree
	3	Neither agree nor disagree
	4	Agree
	5	Strongly agree

Appendix 3: Cronbach's Alpha results at the construct level

Digital Maturity:

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,958	0,958	28

Innovation:

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,895	0,897	10

Leadership:

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,921	0,923	10

Organisational Learning:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0,730	0,753	20

Appendix 4: KMO and Bartlett's Test of Sphericity results

Digital Maturity:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,937
Bartlett's Test of Sphericity	Approx. Chi-Square	2481,066
	df	378
	Sig.	0,000

Innovation:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,891
Bartlett's Test of Sphericity	Approx. Chi-Square	629,456
	df	45
	Sig.	0,000

Leadership:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,911
Bartlett's Test of Sphericity	Approx. Chi-Square	843,239
	df	45
	Sig.	0,000

Organisational Learning:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,808
Bartlett's Test of Sphericity	Approx. Chi-Square	973,872
	df	190
	Sig.	0,000

Appendix 5: Factor analysis results

5.1 Digital maturity factor analysis results

Factor analysis yielded four components

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
Q7_Recoded	0,003	0,138	0,141	0,669
Q8_Recoded	0,279	0,072	0,080	0,749
Q9_Recoded	0,598	0,174	0,176	0,448
Q10_Recoded	0,687	0,084	0,219	0,236
Q11_Recoded	0,368	0,273	0,508	0,386
Q12_Recoded	0,292	0,125	0,646	0,172
Q13_Recoded	-0,023	0,267	0,635	0,347
Q14_Recoded	0,277	0,341	0,590	0,264
Q15_Recoded	0,372	0,163	0,597	0,320
Q16_Recoded	0,686	0,271	0,270	0,199
Q17_Recoded	0,747	0,205	0,262	0,019
Q18_Recoded	0,411	0,261	0,686	-0,180
Q19_Recoded	0,652	0,358	0,273	0,050
Q20_Recoded	0,595	0,335	0,176	0,120
Q21_Recoded	0,415	0,134	0,519	-0,055
Q22_Recoded	0,274	0,395	0,550	0,269
Q23_Recoded	0,577	0,246	0,455	0,248
Q24_Recoded	0,350	0,632	0,010	0,396
Q25_Recoded	0,439	0,364	0,546	0,020
Q26_Recoded	0,237	0,695	0,245	0,142
Q27_Recoded	0,471	0,553	0,357	-0,080
Q28_Recoded	0,378	0,527	0,412	0,097
Q29_Recoded	0,613	0,461	0,353	0,110
Q30_Recoded	0,269	0,659	0,056	-0,012
Q31_Recoded	0,340	0,543	0,591	-0,024
Q32_Recoded	0,099	0,770	0,360	0,198
Q33_Recoded	0,113	0,753	0,328	0,241
Q34_Recoded	0,263	0,610	0,468	0,127

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

These items were grouped and labelled as new variables as per below:

Factor	Question #	Question Text	Percentage of Construct

Digital competence	9	We have the right leaders to execute on our digital strategy day-to-day	29%
	10	We invest in targeted digital education and training at all levels of our organization	
	16	The staff supporting our critical digital functions are best in class	
	17	We have digital skills embedded throughout our organization	
	19	We have defined and repeatable processes for managing digital programs	
	20	Our vendor partners deliver value that enhances our digital competencies	
	23	We have a flexible, iterative, and collaborative approach to technology development	
	29	Every employee understands how his or her performances ties to corporate digital goals	
Insights	24	We leverage modern architectures (APIs, cloud, machine learning, big data etc.) to promote speed and flexibility	29%
	26	We use customer experience assets, like personas and journey maps, to steer our technology design	
	27	We use digital tools to promote employee innovation, collaboration, and mobility	
	28	We have clear and quantifiable goals for measuring the success of our digital strategy	
	30	We use customer-centric metrics like Net Promoter Score or lifetime value to measure success	
	32	Customer insight actively steers our digital strategy	
	33	Customer insights inform digital design and development	
	34	We feed lessons learned from digital programs back into our strategy	

Organisation and Culture	11	We clearly communicate our digital vision both internally and externally	36%
	12	We take measured risks in order to enable innovation	
	13	We prioritize overall customer experience over the performance of any individual channel	
	14	Our organization structure prioritizes customer journeys over functional silos	
	15	We dedicate appropriate resources to digital strategy, governance, and execution	
	18	Our organization model encourages cross-functional collaboration	
	21	Our technology budget is fluid to allow for shifting priorities	
	22	Our marketing and technology resources work together to co-create our digital technology road map	
	25	We measure our technology teams by business outcomes not just system up-time	
	31	We measure how channels work together to accomplish a desired outcome	
Digital strategy	7	We believe that our competitive strategy depends on digital	7%
	8	Our board and our C-level executives back our digital strategy	

5.2 Innovation factor analysis results

Factor analysis yielded one component.

Component Matrix ^a	
	Component
	1
Q35_Recoded	0,751
Q36	0,682
Q37_Recoded	0,659
Q38_Recoded	0,707

Q39_Recoded	0,628
Q40_Recoded	0,768
Q41_Recoded	0,792
Q42_Recoded	0,823
Q43_Recoded	0,627
Q44_Recoded	0,769

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,238	52,376	52,376	5,238	52,376	52,376
2	0,881	8,815	61,191			
3	0,784	7,844	69,035			
4	0,626	6,261	75,296			
5	0,590	5,903	81,198			
6	0,567	5,675	86,873			
7	0,429	4,290	91,163			
8	0,363	3,626	94,789			
9	0,299	2,993	97,782			
10	0,222	2,218	100,000			

Extraction Method: Principal Component Analysis.

These items were combined in to a single variable and labelled Innovation.

5.3 Leadership factor analysis results

Factor analysis yielded one component.

Component Matrix ^a	
	Component
	1
Q35_Recoded	0,751
Q36	0,682
Q37_Recoded	0,659
Q38_Recoded	0,707
Q39_Recoded	0,628
Q40_Recoded	0,768
Q41_Recoded	0,792
Q42_Recoded	0,823
Q43_Recoded	0,627

Q44 Recoded	0,769
Extraction Method: Principal Component Analysis. a. 1 components extracted.	

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,967	59,671	59,671	5,967	59,671	59,671
2	0,786	7,856	67,528			
3	0,684	6,844	74,372			
4	0,631	6,313	80,685			
5	0,503	5,031	85,716			
6	0,414	4,138	89,854			
7	0,323	3,231	93,085			
8	0,292	2,918	96,003			
9	0,244	2,438	98,441			
10	0,156	1,559	100,000			

These items were combined in to a single variable and labelled Leadership.

5.4 Organisational learning factor analysis results

Factor analysis yielded 5 components

Rotated Component Matrix ^a					
	Component				
	1	2	3	4	5
Q55	0,056	0,268	0,700	0,011	-0,154
Q56	0,039	0,054	0,826	-0,192	0,269
Q57	0,263	-0,036	0,792	0,056	0,182
Q58	-0,288	-0,446	-0,102	0,451	-0,031
Q59	0,043	0,429	0,573	-0,101	-0,007
Q60	0,501	0,381	0,214	-0,208	-0,040
Q61	0,586	-0,069	0,132	0,343	0,227
Q62	0,436	0,327	0,273	-0,220	0,477
Q63	0,144	0,170	0,045	0,055	0,754
Q64	0,577	0,272	0,139	0,229	-0,275
Q65	0,808	-0,022	0,035	-0,074	0,033
Q66	0,702	0,254	-0,007	-0,049	0,183
Q67	0,019	-0,382	-0,072	0,724	0,111
Q68	0,052	0,064	-0,005	0,783	-0,214

Q69	0,015	0,525	0,217	-0,097	0,487
Q70	0,564	0,169	0,151	-0,213	0,373
Q71	0,095	0,754	0,024	-0,105	0,368
Q72	-0,065	-0,237	-0,083	0,724	0,032
Q73	0,170	0,691	0,208	-0,188	0,056
Q74	0,353	0,582	0,173	-0,288	0,145

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,930	29,648	29,648	5,930	29,648	29,648	2,931	14,654	14,654
2	2,343	11,713	41,361	2,343	11,713	41,361	2,778	13,892	28,546
3	1,677	8,386	49,747	1,677	8,386	49,747	2,455	12,277	40,823
4	1,251	6,253	56,000	1,251	6,253	56,000	2,372	11,860	52,683
5	1,021	5,106	61,105	1,021	5,106	61,105	1,684	8,422	61,105
6	0,980	4,900	66,006						
7	0,837	4,184	70,190						
8	0,742	3,711	73,901						
9	0,699	3,495	77,396						
10	0,662	3,310	80,706						
11	0,582	2,912	83,618						
12	0,539	2,696	86,314						
13	0,520	2,599	88,912						
14	0,455	2,277	91,190						
15	0,373	1,865	93,054						
16	0,347	1,734	94,789						
17	0,308	1,541	96,329						
18	0,293	1,466	97,795						
19	0,233	1,167	98,962						
20	0,208	1,038	100,000						

Extraction Method: Principal Component Analysis.

These items were grouped and labelled in to new variables as per below:

Factor	Question #	Question Text
Knowledge Sharing	60	The company hires highly specialized or knowledgeable personnel

	61	The company makes extensive use of electronic storage (such as, databases, data warehousing, scanned documents)
	64	When internal capabilities are deficient, we acquire them from the outside
	65	Employees use electronic means to communicate
	66	Employees have a large variety of communications tools (telephone, e-mail, Internet, and so on) from which to choose
	70	Employees make extensive use of Information Systems to support their work
	74	Employees are encouraged to communicate clearly
Access to information	69	Employees retrieve archived information when making decisions
	71	Employees are keenly aware of where their knowledge can serve the company
	73	When employees need specific information, they know who will have it
Knowledge Management	55	The company develops experts from within
	56	The company stores detailed information for guiding operations
	57	There is a formal data management function in the company
	59	The company maintains a certain mix of skills among its pool of employees
Learning Culture	58	The company is slow to react to technological change
	67	Our employees resist changing to new ways of doing things
	68	Employees learn about the company's recent developments through informal means (such as news stories and gossip)
	72	Employees keep information (such as, numbers, plans, ideas) away from other employees
Performance	62	The company collects data on all facets of performance
	63	The company acquires sub-units (such as, organizations, functions, departments) based on short-term financial gain

Appendix 6: Sub Research Question 1 – Normality and Correlation results

Normality results:

Tests of Normality							
	Kolmogorov-Smirnov ^a			Shapiro-Wilk			<0.05
	Statistic	df	Sig.	Statistic	df	Sig.	
Leadership	0,063	135	.200*	0,982	135	0,074	FALSE
DM1 - Digital Competence	0,077	135	0,047	0,981	135	0,057	FALSE
DM2 - Insights	0,074	135	0,070	0,969	135	0,004	TRUE
DM3 - Digital Culture	0,068	135	.200*	0,977	135	0,022	TRUE
DM4 - Digital Strategy	0,272	135	0,000	0,799	135	0,000	TRUE

Correlation Results

Correlations						
		Leadership	DM1 - Digital Competence	DM2 - Insights	DM3 - Digital Culture	DM4 - Digital Strategy
Leadership	Pearson Correlation	1	.557**	.570**	.661**	.212*
	Sig. (2-tailed)		0,000	0,000	0,000	0,014
	N	135	135	135	135	135
DM1 - Digital Competence	Pearson Correlation	.557**	1	.738**	.802**	.396**
	Sig. (2-tailed)	0,000		0,000	0,000	0,000
	N	135	136	136	136	136
DM2 - Insights	Pearson Correlation	.570**	.738**	1	.785**	.370**
	Sig. (2-tailed)	0,000	0,000		0,000	0,000
	N	135	136	136	136	136
DM3 - Digital Culture	Pearson Correlation	.661**	.802**	.785**	1	.402**
	Sig. (2-tailed)	0,000	0,000	0,000		0,000
	N	135	136	136	136	136
DM4 - Digital Strategy	Pearson Correlation	.212*	.396**	.370**	.402**	1
	Sig. (2-tailed)	0,014	0,000	0,000	0,000	
	N	135	136	136	136	136

Appendix 7: Sub Research Question 2 – Normality and Correlation results

Normality results

Tests of Normality							
	Kolmogorov-Smirnov ^a			Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	<0.05
Innovation	0,063	136	.200 [*]	0,983	136	0,091	FALSE
DM1 - Digital Competence	0,077	136	0,045	0,981	136	0,055	FALSE
DM2 - Insights	0,072	136	0,080	0,971	136	0,006	TRUE
DM3 - Digital Culture	0,067	136	.200 [*]	0,977	136	0,019	TRUE
DM4 - Digital Strategy	0,270	136	0,000	0,801	136	0,000	TRUE

Correlation results

Correlations						
		Innovation	DM1 - Digital Competence	DM2 - Insights	DM3 - Digital Culture	DM4 - Digital Strategy
Innovation	Pearson Correlation	1	.648**	.671**	.715**	.343**
	Sig. (2-tailed)		0,000	0,000	0,000	0,000
	N	136	136	136	136	136
DM1 - Digital Competence	Pearson Correlation	.648**	1	.738**	.802**	.396**
	Sig. (2-tailed)	0,000		0,000	0,000	0,000
	N	136	136	136	136	136
DM2 - Insights	Pearson Correlation	.671**	.738**	1	.785**	.370**
	Sig. (2-tailed)	0,000	0,000		0,000	0,000
	N	136	136	136	136	136
DM3 - Digital Culture	Pearson Correlation	.715**	.802**	.785**	1	.402**
	Sig. (2-tailed)	0,000	0,000	0,000		0,000
	N	136	136	136	136	136
DM4 - Digital Strategy	Pearson Correlation	.343**	.396**	.370**	.402**	1
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	
	N	136	136	136	136	136

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

Appendix 8: Sub Research Question 3 – Normality and Correlation results

Normality results:

Tests of Normality							
	Kolmogorov-Smirnov ^a			Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	<0.05
OL1 - Knowledge Sharing	0,131	133	0,000	0,901	133	0,000	TRUE
OL2 - Information Access	0,149	133	0,000	0,954	133	0,000	TRUE
OL3 - Knowledge Management	0,148	133	0,000	0,954	133	0,000	TRUE
OL4 - Culture	0,102	133	0,002	0,973	133	0,009	TRUE
OL5 - Performance	0,158	133	0,000	0,954	133	0,000	TRUE
DM1 - Digital Competence	0,075	133	0,063	0,981	133	0,059	FALSE
DM2 - Insights	0,072	133	0,088	0,969	133	0,004	TRUE
DM3 - Digital Culture	0,069	133	.200*	0,977	133	0,022	TRUE
DM4 - Digital Strategy	0,275	133	0,000	0,794	133	0,000	TRUE

Correlation results:

Correlations										
		OL1 - Knowledge Sharing	OL2 - Information Access	OL3 - Knowledge Management	OL4 - Culture	OL5 - Performance	DM1 - Digital Competence	DM2 - Insights	DM3 - Digital Culture	DM4 - Digital Strategy
DM1 - Digital Competence	Pearson Correlation	.208*	.409**	.235**	-.531**	.403**	1	.738**	.802**	.396**
	Sig. (2-tailed)	0,016	0,000	0,006	0,000	0,000		0,000	0,000	0,000
	N	133	133	133	133	133	136	136	136	136
DM2 - Insights	Pearson Correlation	.338**	.424**	.298**	-.524**	.519**	.738**	1	.785**	.370**
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	0,000	0,000		0,000	0,000
	N	133	133	133	133	133	136	136	136	136
DM3 - Digital Culture	Pearson Correlation	.271**	.461**	.295**	-.615**	.449**	.802**	.785**	1	.402**
	Sig. (2-tailed)	0,002	0,000	0,001	0,000	0,000	0,000	0,000		0,000

	N	133	133	133	133	133	136	136	136	136
DM4 - Digital Strategy	Pearson Correlation	.246**	.177*	0,029	-.304**	0,170	.396**	.370**	.402**	1
	Sig. (2-tailed)	0,004	0,041	0,737	0,000	0,050	0,000	0,000	0,000	
	N	133	133	133	133	133	136	136	136	136

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

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

Appendix 9: Regression Results

9.1 Digital competence regression results

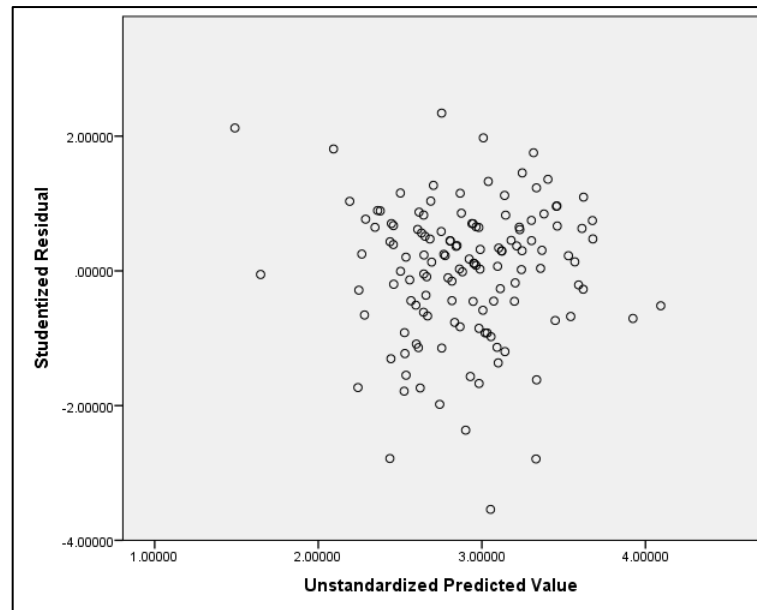
There was independence of residuals, as assessed by a Durbin-Watson statistic of 2,216.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.697 ^a	0,486	0,457	0,44533	2,216

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

b. Dependent Variable: DM1 - Digital Competence

The relationship between the dependent variable and independent variables are linear. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values.

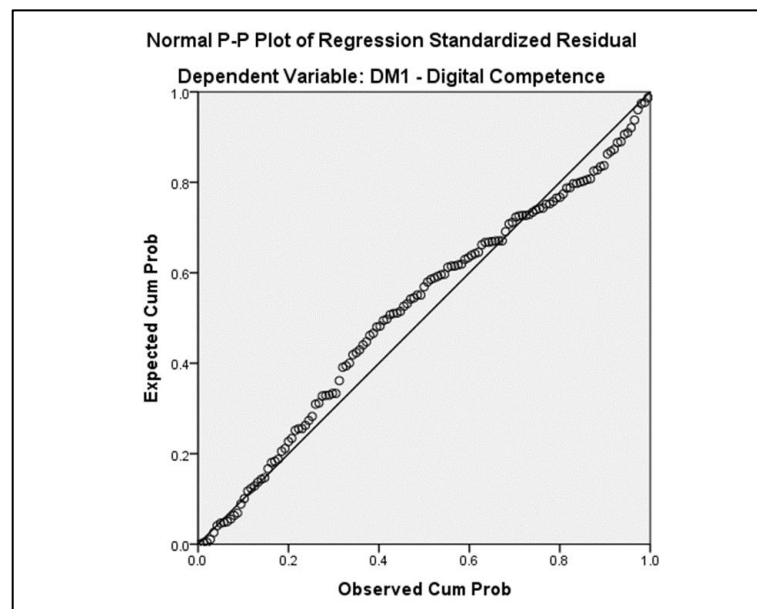


The Tolerance values are greater than 0.1 which implies that there is no problem with collinearity in this particular data set.

Coefficients ^a													
Model		Unstandardize d Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero- order	Partial	Part	Tolerance	VIF
1	(Constant)	1,59 0	0,50 6		3,14 5	0,00 2	0,59 0	2,59 1					
	Innovation	0,35 7	0,09 1	0,39 1	3,94 1	0,00 0	0,17 8	0,53 7	0,63 7	0,33 2	0,25 3	0,41 7	2,39 9
	Leadership	0,09 7	0,07 5	0,12 2	1,29 6	0,19 7	- 0,05 1	0,24 5	0,55 4	0,11 5	0,08 3	0,46 0	2,17 3
	OL1 Knowledge Sharing	- 0,16 9	0,08 4	- 0,16 2	- 2,02 3	0,04 5	- 0,33 5	- 0,00 4	0,20 8	- 0,17 8	- 0,13 0	0,63 9	1,56 4
	OL2 Information Access	0,05 8	0,07 1	0,07 1	0,82 4	0,41 1	- 0,08 2	0,19 8	0,40 9	0,07 4	0,05 3	0,55 8	1,79 1

OL3 Knowledge Management	-	0,042	0,058	0,053	0,717	0,475	-0,073	0,157	0,235	0,064	0,046	0,748	1,337
OL4 Culture	-	-0,130	0,066	-0,169	-1,953	0,053	-0,261	0,002	-0,531	-0,172	-0,125	0,547	1,828
OL5 Performance	-	0,125	0,060	0,176	2,099	0,038	0,007	0,244	0,403	0,184	0,135	0,582	1,717

Studentized deleted residuals showed one case with a value of -3.7. There were two leverage point cases with values >0.2 and no influential points (no Cooks values >1).



Points are close enough to indicate that the residuals are close enough to normal for the analysis to proceed. As multiple regression analysis is fairly robust against deviations from normality, this result was accepted as meaning that no transformations of data is required.

R^2 for the overall model was 48,6% with an adjusted R^2 of 45,7%, a large size effect according to Cohen (1988).

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.697 ^a	0,486	0,457	0,44533	2,216
a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation					
b. Dependent Variable: DM1 - Digital Competence					

$F(7,125) = 16.884, p < 0.0005$.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23,439	7	3,348	16,884	.000 ^b
	Residual	24,790	125	0,198		
	Total	48,229	132			
a. Dependent Variable: DM1 - Digital Competence						
b. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation						

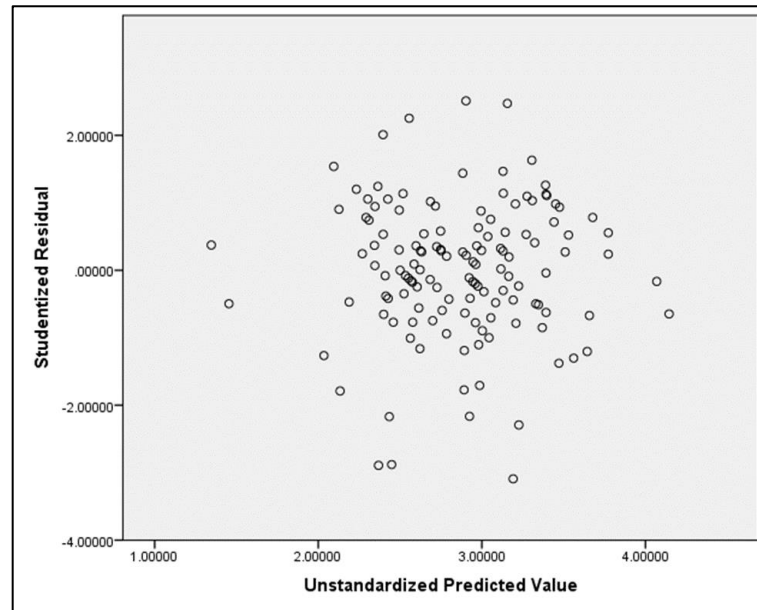
predicted (Digital Competence) = 1,590 + (0,357 * Innovation) + (0,097 * Leadership) - (0,169 * Knowledge Sharing) + (0,058 * Information Access) + (0,042 * Knowledge Management) - (0,13 * Learning Culture) + (0,125 * Performance).

9.2 Digital insights regression results

There was independence of residuals, as assessed by a Durbin-Watson statistic of 1,941.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.736 ^a	0,541	0,516	0,43908	1,941
a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation					
b. Dependent Variable: DM2 - Insights					

The relationship between the dependent variable and independent variables are linear. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values.

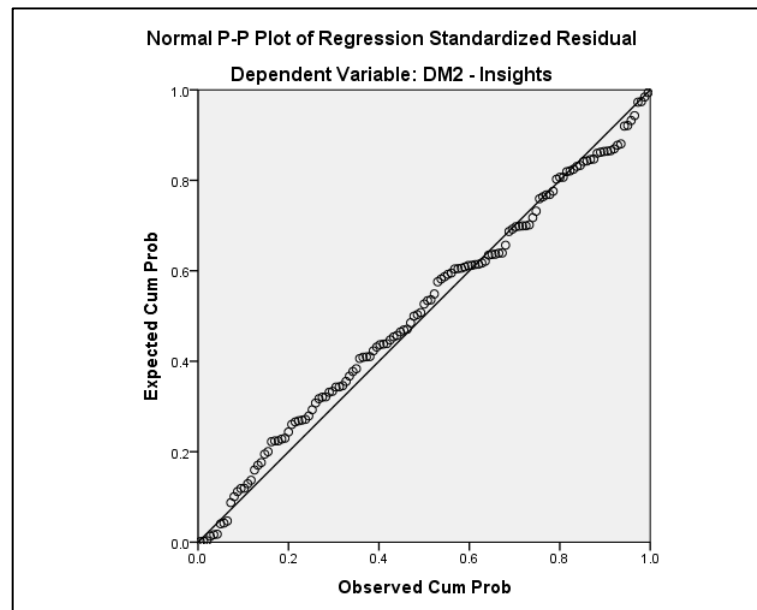


The Tolerance values are greater than 0.1 which implies that there is no problem with collinearity in this particular data set.

Coefficients ^a													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	0,904	0,498		1,813	0,072	-0,083	1,890					
	Innovation	0,369	0,089	0,387	4,125	0,000	0,192	0,546	0,660	0,346	0,250	0,417	2,399
	Leadership	0,092	0,074	0,111	1,242	0,217	-0,054	0,238	0,572	0,110	0,075	0,460	2,173
	OL1 Knowledge Sharing	-0,047	0,083	-0,043	-0,567	0,571	-0,210	0,117	0,338	-0,051	-0,034	0,639	1,564

OL2 - Information Access	-	0,016	0,070	0,018	0,224	0,823	0,154	0,122	0,424	0,020	0,014	0,558	1,791
OL3 - Knowledge Management	-	0,065	0,057	0,079	1,134	0,259	0,048	0,178	0,298	0,101	0,069	0,748	1,337
OL4 - Culture	-	0,115	0,065	0,144	1,762	0,080	0,245	0,014	0,524	0,156	0,107	0,547	1,828
OL5 - Performance	-	0,207	0,059	0,279	3,521	0,001	0,091	0,324	0,519	0,300	0,213	0,582	1,717
a. Dependent Variable: DM2 - Insights													

Studentized deleted residuals showed no cases with a value of ± 3 . There were two leverage point cases with values > 0.2 and no influential points (no Cooks values > 1).



Points are close enough to indicate that the residuals are close enough to normal for the analysis to proceed. As multiple regression analysis is fairly robust against deviations from normality, this result was accepted as meaning that no transformations of data is required.

R^2 for the overall model was 54.1% with an adjusted R^2 of 51.6%, a large size effect according to Cohen (1988).

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.736 ^a	0,541	0,516	0,43908	1,941
a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation					
b. Dependent Variable: DM2 - Insights					

$F(7,125) = 21,064, p < 0.005$.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28,428	7	4,061	21,064	.000 ^b
	Residual	24,099	125	0,193		
	Total	52,527	132			
a. Dependent Variable: DM2 - Insights						
b. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation						

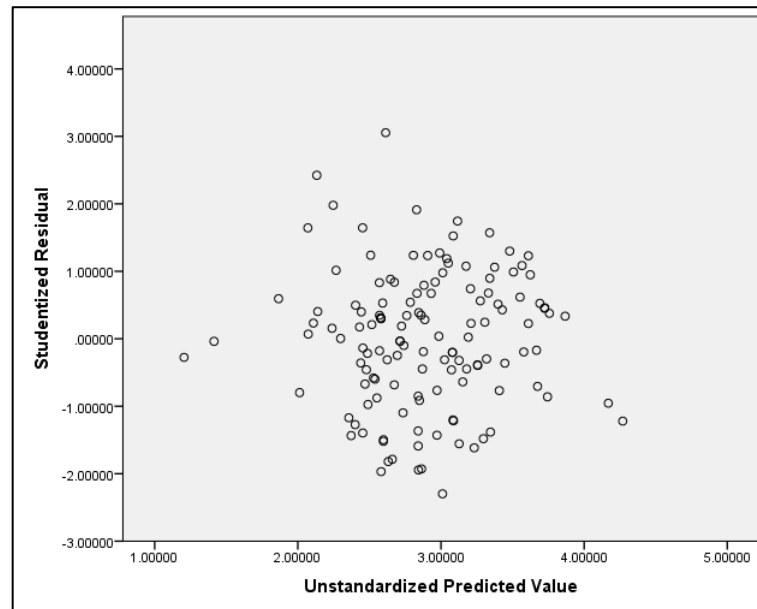
predicted (Digital Insights) = $0,904 + (0,369 * \text{Innovation}) + (0,092 * \text{Leadership}) - (0,047 * \text{Knowledge Sharing}) - (0,016 * \text{Information Access}) + (0,065 * \text{Knowledge Management}) - (0,115 * \text{Learning Culture}) + (0,207 * \text{Performance})$.

9.3 Digital org and culture regression results

There was independence of residuals, as assessed by a Durbin-Watson statistic of 1,991.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.788 ^a	0,620	0,599	0,40695	1,991
a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation					
b. Dependent Variable: DM3 - Digital Culture					

The relationship between the dependent variable and independent variables are linear. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values.

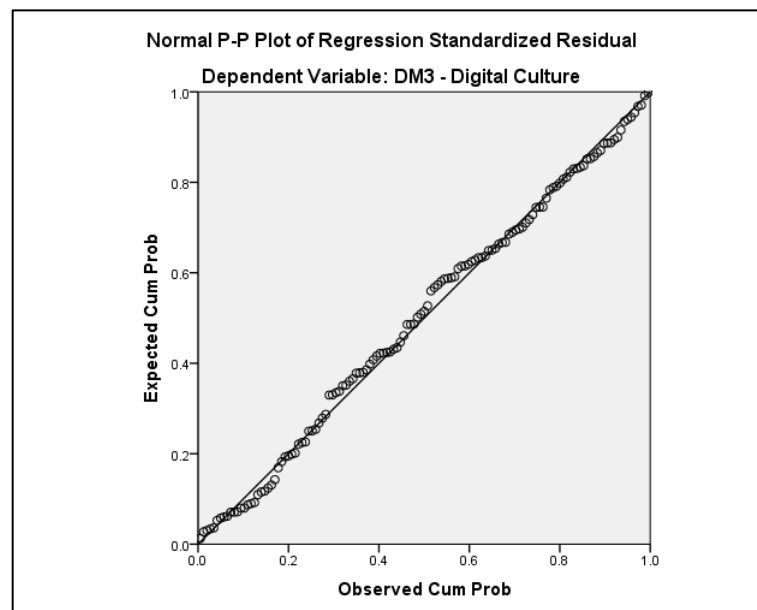


The Tolerance values are greater than 0.1 which implies that there is no problem with collinearity in this particular data set.

Coefficients ^a													
Model		Unstandardize d Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1,26 0	0,46 2		2,72 8	0,00 7	0,34 6	2,17 5					
	Innovation	0,34 9	0,08 3	0,35 9	4,20 8	0,00 0	0,18 5	0,51 3	0,70 7	0,35 2	0,23 2	0,41 7	2,39 9

Leadership	0,18 9	0,06 8	0,22 4	2,75 9	0,00 7	0,05 3	0,32 4	0,66 4	0,24 0	0,15 2	0,46 0	2,17 3
OL1 - Knowledge Sharing	- 0,14 3	- 0,07 7	- 0,12 8	- 1,86 2	0,06 5	- 0,29 4	0,00 9	0,27 1	- 0,16 4	- 0,10 3	0,63 9	1,56 4
OL2 - Information Access	0,04 4	0,06 5	0,05 0	0,68 4	0,49 5	- 0,08 4	0,17 2	0,46 1	0,06 1	0,03 8	0,55 8	1,79 1
OL3 - Knowledge Management	0,06 6	0,05 3	0,07 9	1,23 6	0,21 9	- 0,03 9	0,17 1	0,29 5	0,11 0	0,06 8	0,74 8	1,33 7
OL4 - Culture	- 0,17 2	0,06 1	- 0,21 2	- 2,84 5	0,00 5	- 0,29 2	- 0,05 2	- 0,61 5	- 0,24 7	- 0,15 7	0,54 7	1,82 8
OL5 - Performance	0,12 7	0,05 5	0,16 8	2,31 9	0,02 2	0,01 9	0,23 5	0,44 9	0,20 3	0,12 8	0,58 2	1,71 7

Studentized deleted residuals showed one case with a value of ± 3 . There were two leverage point cases with values > 0.2 and no influential points (no Cooks values > 1).



Points are close enough to indicate that the residuals are close enough to normal for the analysis to proceed. As multiple regression analysis is fairly robust against deviations from normality, this result was accepted as meaning that no transformations of data is required.

R^2 for the overall model was 62.0% with an adjusted R^2 of 59.9%, a large size effect according to Cohen (1988).

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.788 ^a	0,620	0,599	0,40695	1,991

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

b. Dependent Variable: DM3 - Digital Culture

$F(7,125) = 29.159, p < 0.005$.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33,802	7	4,829	29,159	.000 ^b
	Residual	20,701	125	0,166		
	Total	54,503	132			

a. Dependent Variable: DM3 - Digital Culture

b. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

predicted (Digital Org and Culture) = $1,260 + (0,349 * \text{Innovation}) + (0,189 * \text{Leadership}) - (0,143 * \text{Knowledge Sharing}) + (0,044 * \text{Information Access}) + (0,066 * \text{Knowledge Management}) - (0,172 * \text{Learning Culture}) + (0,127 * \text{Performance})$.

9.4 Digital strategy regression results

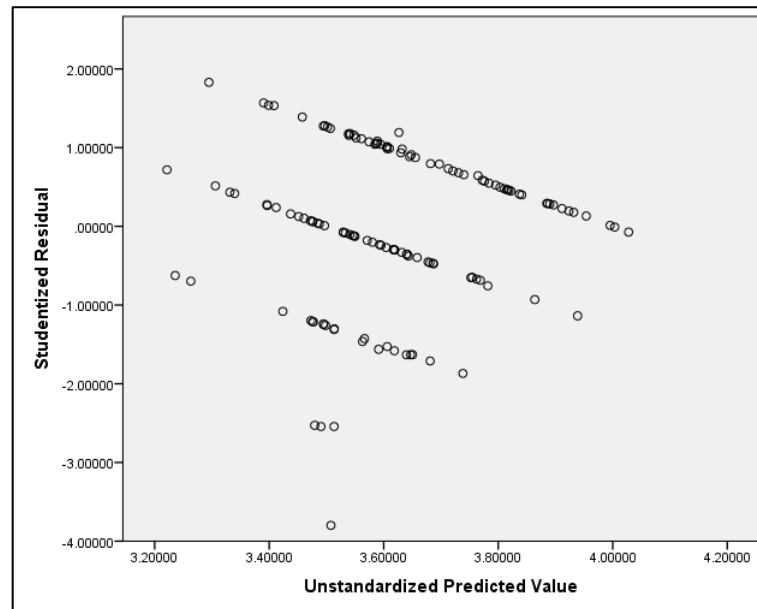
There was independence of residuals, as assessed by a Durbin-Watson statistic of 1,874.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.390 ^a	0,152	0,105	0,40298	1,874

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

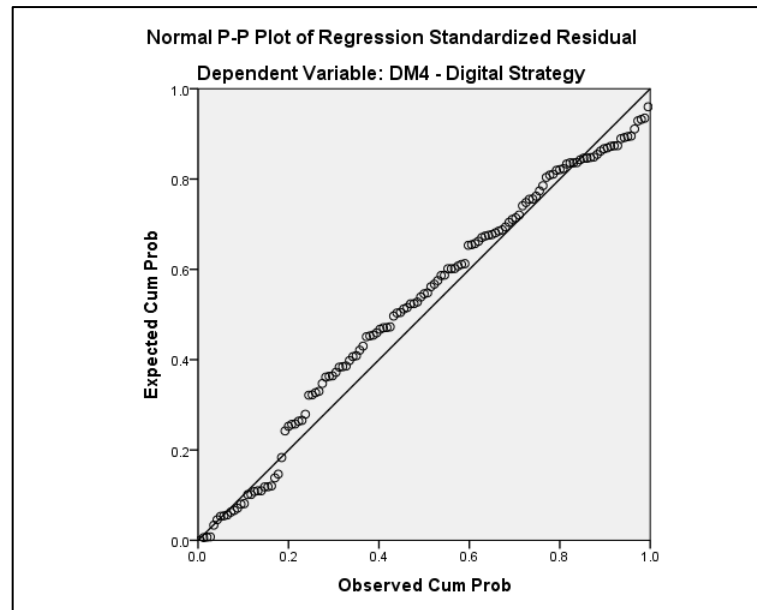
b. Dependent Variable: DM4 - Digital Strategy

The relationship between the dependent variable and independent variables are linear. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values.



The Tolerance values are greater than 0.1 which implies that there is no problem with collinearity in this particular data set.

Studentized deleted residuals showed one case with a value of ± 3 . There were two leverage point cases with values > 0.2 and no influential points (no Cooks values > 1).



Points are close enough to indicate that the residuals are close enough to normal for the analysis to proceed. As multiple regression analysis is fairly robust against deviations from normality, this result was accepted as meaning that no transformations of data is required.

R^2 for the overall model was 15.2% with an adjusted R^2 of 10.5%, a medium size effect according to Cohen (1988).

Coefficients ^a													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,182	0,457		6,955	0,000	2,276	4,087					
	Innovation	0,132	0,082	0,206	1,611	0,110	-0,030	0,295	0,327	0,143	0,133	0,417	2,399
	Leadership	-0,024	0,068	-0,043	-0,353	0,725	-0,158	0,110	0,226	-0,032	-0,029	0,460	2,173

OL1 - Knowledge Sharing	0,136	0,076	0,185	1,794	0,075	0,014	0,286	0,246	0,158	0,148	0,639	1,564
OL2 - Information Access	0,010	0,064	0,018	0,161	0,873	0,137	0,116	0,177	0,014	0,013	0,558	1,791
OL3 - Knowledge Management	0,056	0,053	0,101	1,065	0,289	0,160	0,048	0,029	0,095	0,088	0,748	1,337
OL4 - Culture	0,098	0,060	0,182	1,631	0,105	0,217	0,021	0,304	0,144	0,134	0,547	1,828
OL5 - Performance	0,000	0,054	0,001	0,009	0,993	0,107	0,107	0,170	0,001	0,001	0,582	1,717

a. Dependent Variable: DM4 - Digital Strategy

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.390 ^a	0,152	0,105	0,40298	1,874

a. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

b. Dependent Variable: DM4 - Digital Strategy

$F(7,125) = 3.206, p < 0.005.$

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3,644	7	0,521	3,206	.004 ^b
	Residual	20,299	125	0,162		
	Total	23,944	132			

a. Dependent Variable: DM4 - Digital Strategy

b. Predictors: (Constant), OL5 - Performance, OL4 - Culture, OL3 - Knowledge Management, OL1 - Knowledge Sharing, Leadership, OL2 - Information Access, Innovation

predicted (Digital Strategy) = 3.182 + (0,132 * Innovation) - (0,024 * Leadership) + (0,136 * Knowledge Sharing) - (0,010 * Information Access) - (0,056 * Knowledge Management) - (0,098 * Learning Culture) + (0 * Performance).

Appendix 10: Ethical clearance confirmation

**Gordon
Institute
of Business
Science**
University
of Pretoria

13 June 2017

Heinrich Kieser

Dear Heinrich Kieser,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee