Gordon Institute of Business Science
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Digital business strategy: critical business model components for digital business success

Abri Vosloo

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Abstract

The current business landscape is vastly different from that of a decade ago, due to the continuous technological advancements influencing all aspects of business strategy. This digital evolution impacting organisations has increased the necessity for organisational leaders to incorporate new digital capabilities into their digital business strategies and the design of their digital business models. There is thus a need for organisations to design digital business models that enable them to not only remain competitive, but to also capitalise on the opportunities available to them in the new digital world.

The findings of this research indicate that six business model components that were postulated to form part of a digital business model design are statistically significant in influencing the success of a digital business strategy. In addition, the results indicate the cumulative effect these business model components have in determining the success of the digital business strategy. Furthermore, the results enable the ranking of the various business model components regarding their importance in cumulatively influencing the success of the digital business strategy.

Comparative and multivariate data analysis was conducted on 97 employees who operated on a strategic level within organisations, where a digital business strategy was present and/or where the organisation offered digital products and/or services to the market. As such, only middle to senior level employees who were involved with digital strategy development and execution formed part of the research.

Keywords

Digital business strategy, digital innovation, business models, dynamic capabilities, digital business, digital economy

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 abbreviations

BM: Business Model

DA: Data and Analytics

DBS: Digital Business Strategy

DCV: Dynamic Capabilities View

DSS: Decision Support Systems

IME: Internet-enabled Market Environment

IT: Information Technology

IS: Information Systems

KMO: Kaiser-Meyer-Olkin

PCA: Principle Component Analysis

PME: Physical Market Environment

RBV: Resource Based View

RC: Resources and Competencies

VA: Value Architecture

VC: Value capture

VD: Value Delivery

VN: Value Network

VP: Value Proposition

1 Chapter 1: The Research Problem and Objective

1.1. Introduction

The current business landscape is vastly different from that of a decade ago, which is due to the continuous technological advancements which are now accessible to organisations (Bi, Xu & Wang, 2014; Bohnsack, Pinkse & Kolk, 2014; Fichman, Dos Santos & Zheng, 2014). Organisations have witnessed the growth of the internet and seen its implications on business and academia, with the transition from Web 1.0 to Web 3.0 over the last 10 years (Porter & Heppelmann, 2014). This evolution has had far reaching consequences for Digital Business Strategy (DBS) formulation and Business Model (BM) design in organisations (Bharadwaj, Sawy, Pavlou & Venkatraman, 2013a). Some of these implications include the emergence of new BMs, the creation of intangible and ubiquitous products, and digital services in multi-sided markets that require new revenue models. The new digital business in the modern technology-enabled environment is driving disruption from across industries, which forces businesses to embrace digital strategies to remain competitive (Lopez, 2015b).

In the new digitally enabled business environment, organisational leaders will have to embrace the latest digital technologies available to them (Daugherty, Banerjee & Blitz, 2015). In addition "every business (will) become a digital business" and visionary organisations have the opportunity to effect change on a much larger scale than ever before in the digitally enabled world (Daugherty et al., 2015, p4). Industries such as textiles, automotive, apparel, manufacturing and services are experiencing ongoing digital disruption through digital technology innovation, which has resulted in the fundamental reshaping of these industries (Bennis, 2013; Bharadwaj et al., 2013a; Pagani, 2013). The print media industry provides an example of how digital technology has fundamentally changed the way in which media companies deliver content and how it is absorbed by their customers (Karimi & Walter, 2015). Historically the content was created and absorbed through a physical medium, yet with the emergence of the digitally-enabled customer, organisations such as media companions had to create digital value propositions to remain competitive (Karimi & Walter, 2015).

In addition, industries are digitising their entire operations because of the diffusion of digital technologies across industries that are now accessible to more organisations (Fichman et al., 2014). In this regard, the digital evolution in organisations has increased the importance for organisational leaders to incorporate these digital capabilities into the formulation of their DBSes, with the aim of designing a successful digital BM. Bennis (2013) stated that in order for companies to capture new markets and to grow, leaders need to place greater emphasis on digital technologies which enable companies to create innovative products and services for new and existing companies. To this end, Murry (2014) reports that 74 percent of the CEOs of listed companies plan to pursue new customers in new markets through products and services that are digitally enabled. A report by Bisschoff, Tyrer and Louw (2014, p6) polled 1000 internet consumers in South Africa and found that:

> *"Enabled by technology, today's customers expect to interact with service providers interchangeably across channels, from web to call centre to retail and mobile, depending on their needs at any given moment."*

The emergence of the knowledge economy (Teece, 2010), the Internet (Baden-Fuller & Haefliger, 2013), e-business and e-commerce (Achtenhagen, Melin & Naldi, 2013), the Internet of Things (Dijkman, Sprenkels, Peeters & Jansses, 2015), multi-sided platforms (Bharadwaj et al., 2013a), machine learning (George, Haas & Pentland, 2014), web and data analytics (Waller & Fawcett, 2013), 3D printing, social media, cloud computing and wearable devices (Fichman et al., 2014) has increased the importance of DBS and digital BM design for organisations to remain competitive.

Indeed, organisations that operate in the fast changing digital business environment will have to develop dynamic capabilities (Bharadwaj et al., 2013a). Dynamic capabilities in organisations enable the leadership to formulate and execute their DBS, which allows the organisations to enter or create new business environments in an unknown market space where there is less or no competition (Kim & Mauborgne, 2008). The dynamic capabilities are derived from the DBS that provides the organisation the ability to exploit identified opportunities by transforming its BM (DaSilva & Trkman, 2014).

The starting point for an organisation will be the formulation of their DBS, which should be designed in accordance with the dynamic capabilities perspective and thus not limited to a set of resource and competence accumulation by the firm (Teece, 2014b). The next stage will be the interaction between the DBS and the various digital BM components of the organisation. An important aspect is that the DBS in itself creates these dynamic capabilities that are able to respond to the situational contingencies of the firm through the various BM components (DaSilva & Trkman, 2014). Thus the dynamic capabilities can be seen as the connection between DBS and the various BM components of an organisation.

A well formulated BM design will be able to extract value in various forms of commercial success for an organisation, but an organisation will only be successful through their BM if they have an in-depth understanding of each component (Teece, 2007). In this regard, the currant academic literature proposes numinous BM components in an effort to analyse BM design (Baden-Fuller & Haefliger, 2013; Demil & Lecocq, 2010; Osterwalder, Pigneur & Tucci, 2005). This research will focus on a set of defined BM components that will be analysed. In addition, this study will measure the effect that these BM components have on the success of DBS.

The first component that will be analysed is the value delivery mechanism of the BM. This component is also referred to as the value proposition of the organisation, and is the “source of value creation” of the BM (Amit & Zott, 2001, p494). The created value is the cumulative result of all the various sources of value that are experienced by the participants of the BM (Boons & Lüdeke-Freund, 2013).

The second component in a digital BM is the ability of a firm to capture value from their digital value propositions (Clemons, 2009). The value capture component of the digital BM represents the ‘when’, ‘what’ and ‘how’ components of the BM that describe how value will be created for the organisation (Baden-Fuller & Haefliger, 2013).

The third component of the digital BM will represent the value architecture of the organisation. This component represents the framework for resource allocation and management to support the continuous creation of successful value propositions (Keen & Williams, 2013). The value architecture is comprised of both the internal and external value creating components of the digital BM. Teece (2007) suggested that for organisations to be successful with their respective BMs, their value architecture must be hard to imitate, it must be effective to fully exploit new opportunities, and it must be efficient in its execution.

Resources and competencies will form part of the fourth component of the digital BM design. For organisations to be successful in executing their DBS, they will need to be able to optimally utilise all the internal resources and competencies available to them (Bharadwaj et al., 2013a). Importantly, this research takes the position of the dynamic capabilities view of a firm in which sustained competitive advantage is not guaranteed to companies that are able to accumulate valuable resource and skill assets through years of operations (Teece, Pisano & Shuen, 1997). Instead, firms must be able to demonstrate rapid responsiveness in acquiring new resources and developing the new sets of skills required by the digital economy.

The fifth component of the digital BM design is the data and data analytics capabilities of an organisation. These two elements in the component represent an organisation's ability to accurately capture and analyse the data in an organisation. In addition, the data analytics element represents the organisation's ability to make sense of the captured data. There has been a shift in focus amongst organisations from being data capture driven towards systems that are focused on developing deeper insights from the data that are captured (George et al., 2014).

The last component to form part of the critical digital BM design is the value network of the organisation, which exists in a group of companies that are mutually complementary (Clarysse, Wright, Bruneel & Mahajan, 2014). These value network partners assist each other to develop unique digital value propositions where all of the participants are able to benefit from each other's strengths (Pagani, 2013).

1.2. Purpose of this study

This research study aims to critically analyse the influence of a set of BM components on the success of the DBS, namely value delivery, value capture, value architecture, resources and competencies, data and analytics and the value network. The study will:

- analyse the individual relationships between the various BM components and the success of the DBS;
- examine the cumulative effect these BM components have on influencing the success of the DBS;
- rank the importance of these various BM components relative to the success of the BM; and
- propose a BM design cycle to assist digital BM analysis.

The insights from the research will assist organisations to strategically formulate their DBS and design their digital BMs. Further, the research is positioned to fill a gap in the academic literature by proposing a set of BM components that should be incorporated by organisations into the design of their respective digital BMs. The paper will also present a framework through which the digital BM design can be analysed.

1.3. Research problem

There is a need for organisations to design digital BMs that enable them to not only remain competitive, but to also capitalise on the opportunities available to them in the new digital world (Daugherty et al., 2015; Dijkman et al., 2015). In the new digital economy, organisations have to continuously create, review and adapt their BM designs to reposition themselves for the changing digital needs of their consumers.

As the literature review in Chapter 2 will indicate, there are different views regarding what components make up a successful digital BM design. Furthermore, there is currently little academic literature that quantitatively analyses the relationship between the various BM components and their influence on the success of DBS. In addition, the academic literature is divided on exactly what these BM components are, and these previous studies do not explain the individual nor cumulative effects these BM components have on the success of a DBS. To this extent organisations do not have a clear understanding of how to design their digital BM because they are not able to prioritise the various BM components they need to include within their design.

1.4. Research objectives

The objectives of this study are to identify the extent to which a set of six digital BM components, which form part of the digital BM design, influences the success of the DBS. This research study will further establish the extent to which these BM components individually and cumulatively influence the success of the DBS. The research will finally propose a BM design cycle through which the BM can be analysed.

2 Chapter 2: Literature Review

2.1. Introduction

In the last few years many studies have focused on strategy formulation within organisations in the digitally enabled business environment that specifically aim at creating new growth opportunities (Dijkman et al., 2015; George et al., 2014; Nathan & Rosso, 2015). The development of digital technologies has fundamentally changed the traditional business processes and methods regarding how organisations interact with their business environment. This has resulted in the emergence of digital disruptive organisations that, through the use of newly formed digital capabilities, are able to compete and disrupt competition across industries (Karimi & Walter, 2015). The digital revolution has witnessed the emergence of interactive digital technologies, virtualisation, peer-to-peer networks, cloud computing, internet of services and other digital developments that are disrupting many industries and the current BMs (Pagani, 2013). This digital evolution has seen the emergence of the 'digital businesses'.

A digital business is a participant in the digital economy that leverages technological innovation in developing digital or digitally enabled products or services (Pagani, 2013). More specifically , a 'digital business' can be defined as "the evolution of business that uses new combinations of information and connectivity to create new sources of customer value, company revenue and operational performance" (McDonald et al., 2014, p5). For the purpose of this study, the definition by Lopez (2015a, p10) for digital business will be adopted:

"The digital business is the creation of new business designs that connect not only people and business, but also connect people, business and things (physical objects that are active players and contribute to business value) to drive revenue and efficiency. These objects can include sensor devices, asset-tracking devices, smart machines, smart grids, 3D printing and robotics, and smart cities and drone delivery services."

Another concept that has emerged is the existence of the 'digital economy'. The digital business operates within the 'digital economy', which can be classified as an economic system that is based on digital technologies (Tapscott, 1997). These digital business within the digital economy can either be created digitally or can become digital through the course of its existence.

Within this new digital economy, digital businesses will have to continuously innovate by leveraging their digital capabilities to transform physical products and services into digitally enabled offerings in order to remain competitive (Woodard, Tschang, Ramasubbu & Sambamurthy, 2013). Organisations will develop these digital capabilities through continuous digital innovation, which is an important component for organisations to remain competitive and will have a major impact on future DBS formulation (Brynjolfsson & McAfee, 2012; Mithas et al., 2013; Woodard et al., 2013). Digital innovation is defined as "a product, process, or business model that is perceived as new, requires some significant changes on the part of adopters, and is embodied in or enabled by IT" (Fichman et al., 2014, p330).

A crucial aspect of digital innovation is the digitisation of organisational processes, products and services (Grover & Kohli, 2013). 'Digitisation' is referred to as "the practice of taking processes, content or objects that used to be primarily (or entirely) physical or analog and transforming them to be primarily (or entirely) digital" (Fichman et al., 2014, p333). Digital innovation is made possible through the ability to merge two business constructs (Fichman et al., 2014). Firstly, organisations must have a thorough understanding of the digital possibilities that are available to them through technological advancements. Secondly, organisations must possess a comprehensive understanding of the organisational and societal needs that can be fulfilled through possible new digital value propositions developed by the firm. If organisations do not constantly promote and integrate digital innovation throughout the entire company structure, they will not be able to sustain their competitive advantage (Piccoli & Ives, 2005).

The digital economy allows organisations the opportunity to experiment with new mechanisms to create value, that are networked in nature and developed by multiple partners for multiple users (Zott et al., 2011). The redefinition of value for organisations enabled by the digital economy attracted the attention of management scholars, who would interoperate the new sources of value creation through the means of BMs. From this basis, this research will attempt to determine whether six identified digital BM components are included in the design of an organisation's digital BM design, and will analyse the value that is generated from these components towards the success of the BM.

2.2. Decision making in the digital economy

In order for organisations to remain competitive in the digital economy, their leaders will have to adapt to the dynamic nature of this fast changing digital business environment (Lu, Niu & Zhang, 2013; Rigby, 2014). More specifically, Bennis (2013) suggested that the very nature of leadership will have to change if technological advancements are to be leveraged to exploit new opportunities before they are subsumed by non-digital businesses. It was thus imperative to analyse strategic decision making as part of this study into DBS and digital BM design. As new technologies emerge, organisations must decide how to interoperate the new technology and how these firms will be able to adopt these new digital capabilities as part of their existing or future operations. These organisations must also make decisions on how the new technologies will evolve and ultimately how the customers will respond to them (Teece, 2007).

An important aspect that influences the decision making ability of leaders is the extent of their knowledge asymmetry. Teece (2007) posited that in addition to knowledge asymmetry, decision makers should focus on developing the ability to filter the information available to them. This is referred to as “sensing” the local technology environment and the external sources for technological innovation that can possibly affect the organisation (p1324). When a technological opportunity is sensed, the opportunity must then be seized through fast decision making. These decisions include the maintaining or upskilling of technological skills, the strategic investment to be made by the organisation, and the design of the appropriate BM to generate value (Teece, 2007).

Lu et al. (2013) discussed the importance of Decision Support Systems (DDSes) for cognitive orientation in the digital business environment for today’s leaders. The DDS systems are aimed at supporting decision makers through a human cognitive perspective. The authors found that in the current digital environment, “decision situations appear to be more unstructured, dynamic, and uncertain with time pressures and high personal stake” (p1068). The authors elaborated on the shortcomings of Business Intelligence (BI) systems because these fail to effectively turn data into knowledge for executives. It is clear that it is more important to have a “clear and consistent” overview of a particular business situation, as opposed to “lots of facts” (p1059).

Leaders have the ability to leverage off historical experiences whilst formulating future scenario planning. Unfortunately, in poorly-structured dynamic digital environments, organisational leaders do not have the same length of time to construct rational reasoning as in the physical environment. This does not hold true for fast changing dynamic digital business environments (Lu et al., 2013). Organisations will have to be able to make sense of the fast changing digital economy and more importantly, they must be able to adapt to the changes in the business environment. Data and data analytics will play a vital role in organisations' ability to formulate a focused DBS that is able to identify opportunities through data capture and data analytical capabilities and to formulate a digital value proposition to exploit these new opportunities (George et al., 2014; Nathan & Rosso, 2015).

To be able to align the internal value architecture of an organisation to the changing digital economy, organisations will have to develop a clear DBS to sustain competitive advantage and to exploit opportunities in the market through digital initiatives. To this extent, the DBS of organisations is vitally important in developing digital value propositions for the organisation (Bennis, 2013; O'Reilly III & Tushman, 2011; Wales, Parida & Patel, 2013). An important aspect of the digital economy is the ubiquitous nature of information that allows today's leaders to have a better understanding of all the different stakeholders across all the various levels of a firm (Bennis, 2013). It is vital for leaders in organisations to make sense of the abundance of information available to their organisations to remain competitive. Using these ideas as a guiding context, transformational leadership is suited for fast changing dynamic environments; transformational leaders have the ability to make sense of technological and digital innovation in environments where specific goals and planned outcomes are not as defined as for traditional forms of innovation (Vaccaro, Jansen, Van den Bosch & Volberda, 2012).

Another aspect for a leader in an organisation to consider is the emergence of the new virtual workplace (Wasko, Teigland, Leidner & Jarvenpaa, 2011). These virtual worlds function as complementary communication channels to real world collaboration and organising economic activity. The benefits of virtual worlds and game-based learning in organisations are that it allows for better participation, collaboration and engagement between the organisational staff, as well as between the organisation and its external stakeholders, in developing digital product offerings (Wasko et al., 2011). Digital possibilities such as the integration of virtual world collaborative initiatives will be promoted by the organisation's internal digital natives. It is thus important for organisational leaders to incorporate their digital natives into their DBS formulation structures to drive the adoption of technology into all the processes of the organisation. The next section will focus on the formulation and execution of DBS in organisations.

2.3. Digital business strategy

2.3.1. Defining a DBS

The current literature on strategy presents numerous definitions of the DBS (Bharadwaj et al., 2013a; Woodard et al., 2013). Most specifically, DBS is described as a pattern of deliberate actions that are taken by organisations that compete through digitally enabled offerings such as products and services (Woodard et al., 2013). This definition of DBS is built on the premise of "digital ecodynamics" (El Sawy, Malhotra, Park & Pavlou, 2010, p835). This phenomenon is described as a fused dynamic interaction between the fast changing environment, dynamic capabilities and the IT systems in organisations.

For the purpose of this research, the definition of a DBS by Bharadwaj et al. (2013a) was adopted. The authors' definition states that the DBS can be seen as the organisational strategy itself, which is formulated and executed through the use of digital resources with the aim of creating differentiated value.

The emergence of new digital technologies has continually influenced business strategy as "modular, distributed, cross functional and global business processes that allow for work to be carried out across time, distance and function" (Bharadwaj et al., 2013a, p472). To this extent, the organisational strategy must be able to leverage off the new capabilities from digital technology to remain competitive. An important aspect of the DBS is that it should not be seen as separate from the current business strategy, but instead be viewed as the business strategy itself (Bharadwaj et al., 2013a). The authors suggest that the time has come to rethink the current functional-level role that information technology (IT) strategies hold in organisations. An IT strategy has traditionally been seen as subordinate to the overarching business strategy; it aims to improve a firm's performance through the facilitation of non-digital capabilities by enabling new digital capabilities that create and capture value (Drnevich & Croson, 2013). To this extent, Bharadwaj et al. (2013a) suggested that there should be a fusion between the business strategy and the IT strategy of an organisation to form a singular overarching IT enabled business strategy, herein termed the digital business strategy.

Importantly, a DBS differs from a functional IT strategy as it "transcends" the functional areas within an organisation and the different IT enabled processes (Bharadwaj et al., 2013a, p473). According to Bharadwaj et al. (2013a), DBS is the direct result of the fusion between the organisational and IT strategy of a firm. To this extent, a DBS can be seen as the overarching strategy that encapsulates these two business constructs.

The next section will discuss the importance of a DBS to sustain competitive advantage for an organisation.

2.3.2. DBS and sustained competitive advantage

An important aspect of strategy and digital BM design is the creation of sustained competitive advantage (Teece, 2014b). This section of the research will evaluate DBS formulation from the resource based view and the dynamic capabilities perspective, with the aim of creating a sustained competitive advantage. In evaluating DBS, Porter (2001, p62) pointed out that digital technologies allow companies the opportunity to establish "distinctive strategic positioning", and that companies will have to adopt these digital technologies into their strategic planning to remain competitive. In addition, innovative digital strategic frameworks will drive new sources of value creation through generativity, heterogeneity and the creation of digital product platforms (Yoo et al., 2010).

The digital economy is also described as an environment where the defined industry boundaries are blurred by technology enabled products and services. To this extent, leaders must not be constrained by the limitations of perceived specified industry boundaries whilst exploring new digital innovations and opportunities (Porter & Heppelmann, 2014). In the digital economy firms are able to compete in industries that they would normally not have had access to, and through digitally enabled value propositions are able to compete in these new markets (Porter, 2001). The importance of a sustained competitive advantage is explained by a value creating strategy that is not implemented simultaneously by competitors, and importantly, the competitors are unable to duplicate the benefits arising from the strategy (Barney, 1991).

The literature that was studied for this research indicated that there are two main schools of thought when it comes to analysing the DBS and the sustained competitive advantage of organisations. The first school of thought proposes the resource based view (RBV) of an organisation, which argues that a firm will only be able to create a sustained competitive advantage if it is in the possession of a rare, imperfectly imitable, valuable resource (Barney, 1991; Makadok, 2001).

In contrast to the RBV, Teece, Pisano and Shuen (1997) proposed the dynamic capabilities view (DCV) of a firm. The DCV argues that a sustained competitive advantage is not guaranteed to firms that are able to accumulate valuable resource and skill assets through years of operations. Instead, the authors claimed that only firms that are able to demonstrate rapid responsiveness to product innovation, coupled with managerial capabilities to adapt to the changing business environment, will be able to sustain competitive advantage. In analysing the DBS and BM design of organisations, the DCV is best suited for this study. This is because digital technologies enable various forms of dynamic capabilities, which in turn enable the creation of digital value propositions that are able to result in a sustained competitive advantage for organisations (Teece, 2010).

The DCV addresses two key strategic aspects that do not form part of either sustained competitive advantage or RBV. Firstly, the term 'dynamic' refers to the ability of an organisation to renew the competencies that enable it to remain competitive in a dynamic environment. Secondly, the term 'capability' refers to the roles of the strategic management in "adapting, integrating and reconfiguring internal and external skills, and resources to match the requirements of a changing environment" (Teece et al., 1997, p515). Organisations are able to create unique products and services for new and robust markets beyond the boundaries of the organisation that result in superior profits generation (Teece, 2014b). Teece (2007) stated that for these capabilities to be classified as dynamic, they need to be difficult-to-imitate for other competitors. The true value of dynamic capabilities resides in the fact that they enable firms to repeatedly sustain a competitive advantage in the continuously changing business environment (Teece, 2014b). An important aspect for the success of DCV is that "human action" is required by the managers in organisations to constantly guide dynamic capabilities through the "sensing, creating, co-creating, seizing and transformation supported by entrepreneurial consciousness and imagination" (Teece, 2014b, p339).

In addition to the RBV and the DCV that forms the basis for analysing DBS and digital BM design, is the notion of temporary strategic advantage (D'aveni, Dagnino & Smith, 2010). High speed environments are characterised by constant change from a multi-dimensional perspective. D'aveni et al. (2010) suggested that organisations in this temporary advantage environment will have to adopt multiple strategies simultaneously to remain competitive. Together with the RBV and the DCV, the temporary advantage perspective suggests that a firm's competitive advantage disappears over time, which forces organisations to continuously innovate in an effort to sustain their competitive advantage. Organisations will have to have a DBS with multiple digital value propositions that are offered simultaneously to ensure that firms remain competitive.

Another aspect of DBS formulation and digital BM design is the importance of first mover advantage in the digital economy (D'aveni et al., 2010; Dutta, Lee & Yasai-Ardekani, 2014; Teece, 2010). A first mover is defined as an organisation that is the first to enter a specific market, which is supported by a "sizeable investment in the production and distribution of the product, and the elapsed time between its entry and that of later entrants is of sufficient magnitude so as to allow the first-mover to achieve advantageous resource positions" (Varadarajan, Yadav & Shankar, 2008, p295). In academic literature there are competing views regarding the success of first mover advantage for an organisation. The first school of thought suggests that organisations that are first to successfully introduce new technological innovative products and services to the market are able to capitalise on reduced competition and are able to secure greater market share compared to followers into new technology enabled markets (Adner & Kapoor, 2010). This view was supported by Zott and Amit (2010, p221), who suggested that firms that are first in the market are able to "lock-in" the customers and are able to increase the switching cost to those customers to migrate to follower competitive value propositions in the market.

The second school of thought opposes the relevance of first mover advantage, for example Porter (2001) suggested that the switching cost to customers regarding internet enabled products and services will be far less than compared to the physical market environment. The author stated that digital products such as e-wallets and content-consolidation applications reduce the switching costs for customers. In addition, these digital offerings provide digital services that allow customers to transact digitally with multiple suppliers whilst personalising the information streams the customers receive, eliminating any benefits associated though being the first in the market. As such, organisations that operate in the digital economy may not receive the benefits associated with first mover advantage. Digitally enabled products and services allow organisations the opportunity to easily compete in new markets previously not attainable through only physical products and services.

In addition to evaluating a DBS in accordance with the DCV and the contrasting views regarding the perceived first mover advantage in the digital economy, is the movement towards the importance of the digital economy supported by the evolution of the physical market environment (PME) to a digital internet enabled market environment (IME) (Varadarajan et al., 2008). IME is described as the digital market that allows buyers and sellers to transact and to share information through networks and connected mobile devices. Some of the more important IME characteristics are the richness of transactional information that flows between the byers and the sellers and the low search cost for prospective buyers (Varadarajan et al., 2008).

Building on the discussion regarding first mover advantage, Varadarajan et al. (2008) suggested that first mover positions in an IME are able to capture a competitive advantage if three conditions are made. These are that firstly, the network effect has a more profound influence on an IME compared to the PME. More specifically, first mover organisations will have to get closer to their customers faster by leveraging network information to create digital products and services aligned to the changing needs of their customers. Secondly, organisations will have to continuously invest in multi-faceted innovations that are driven by the technology leadership. Compared to the PME, the IME requires constant BM process, products and service innovation to proactively develop new digital value propositions. Lastly, the authors suggest that organisations will have to develop “sticky features” that will increase the transaction costs incurred by customers in the digital environment (Varadarajan et al., 2008, p300). First mover organisations in an IME must innovate in such a way that they allow their customers to seamlessly adopt the next generation of innovative products and services with the purpose of creating sustained competitive advantage.

It is vital for organisations to embrace the dynamics of the digital economy and develop a DBS that is able to create multiple innovative digital value propositions and be able to capture any value from that is generated through these initiatives. Westerman and Mcafee (2012) proposed that companies that are able to successfully develop advanced levels of digital maturity are on average 26 percent more profitable than their competitors’ industry averages. This measure of profitability is based on a basket of measurements that include EBIT margin and net profit margin. Westerman and Mcafee (2012, p2) referred to successful digital businesses as being “digitally mature” organisations. These digitally mature firms are classified as organisations that are able to develop digital capabilities by re-engineering their entire business processes, customer engagement and BM designs. These digital masters then align their entire company through strong leadership capabilities towards a technology vision that drives digital transformation (Westerman & Mcafee, 2012). Additional benefits to a successful DBS include an on average nine percent rise in revenue per employee coupled with an increased fixed asset turnover ratio for digital mature organisations (Westerman & Mcafee, 2012). The benefits of a successful DBS and digital BM design is also confirmed by Tallon and Pinsonneault (2011) and Woodard et al. (2013), who reported similar results of economic benefit directly resulting from the DBS. Evidence from the above indicates that successful DBS is indicative of bottom-line benefits to organisations. This research will build on the known benefits associated with DBS by analysing the different digital BM components included in the DBS and their impact on the success of the DBS.

The DBS of an organisation must balance the short term with the long term strategic perspective of an organisation. Woodard et al. (2013) pointed out in their conceptual framework of analysing DBS that firms and leaders need to balance the trade-offs between the interplay of short term and long term actions of continual adaptation. The authors asserted that the negative effect of technical debt is due to a lock-in strategy design, performance costs and inappropriate technology choices, which lead to a firm not being able to capitalise on disruptive technology trends (Woodard et al., 2013). An organisation must thus be aware of the challenges that are associated with their DBS and digital BM design to ensure that they are able to continually adapt to the ever changing digital economy of the firm. The next section of the research will focus on the digital BM of the organisation.

2.4. Digital Business Models

A plethora of academic and management literature has focused on BM theory, design, evolution and how the BM interacts with the business environment (Achtenhagen et al., 2013; Bohnsack et al., 2014; Dmitriev, Simmons, Truong, Palmer & Schneckenberg, 2014; Osterwalder et al., 2005). As there is no single accepted definition of a BM, the definition by Teece (2010, p172) was used for this research:

> *"The essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit. It is the organisational and financial architecture of a business."*

A BM defines the manner in which an organisation will deliver value to its customers, specifies how the organisation will receive payments from these customers, and outlines how the organisation transforms payments into profits. The BM can be seen as an organisation's "hypothesis" regarding the way in which they can deliver the products and services that fulfil the needs of their customers (Teece, 2007, p1329). Importantly, the BM describes how the value will be delivered to the customer and how that value will be captured by the organisation.

Teece (2007) explained that a BM must define the level of technology that is integrated into the products and services that are to be offered, as well as the design of new revenue and cost structures of an organisation. In addition, the author highlighted that the BM must make recommendations for the possible redesign of existing structures of an organisation regarding the technology and organisational requirement needed to successfully integrate the new technology into the desired products and services to be offered. Lastly, the author suggested that the BM must identify the target market and the value capture process the organisation will benefit from.

The academic importance of BM design is largely driven by the emergence of:

- the knowledge economy (Teece, 2010);
- the internet (Baden-Fuller & Haefliger, 2013);
- e-business and e-commerce (Achtenhagen, Melin & Naldi, 2013);
- the Internet of Things (Dijkman et al., 2015);
- multi-sided platforms (Bharadwaj et al., 2013a);
- machine learning (George et al., 2014);
- web and data analytics (Waller & Fawcett, 2013); and
- 3D printing, social media, cloud computing and wearable devices (Fichman et al., 2014).

Because of these fast-paced technological developments, business must move towards a more customer-centric approach to value creation and leverage the latest technological capabilities (Teece, 2010). It is important to note that the imitation of BMs that already exist in the digital economy will be insufficient to ensure sustained competitive advantage for firms. Instead, BMs need to be differentiated (hard to imitate), effective and efficient if they are to guarantee sustained competitive advantage (Teece, 2010).

In analysing the academic literature, a multitude of BM designs were identified that can be adopted by organisations to develop distinctive value propositions for the digital economy. Some of these BM designs available include:

- Subscription models (Teece, 2010).
- Online retail models (DaSilva & Trkman, 2014).
- Freemium models (Baden-Fuller & Haefliger, 2013; Demil & Lecocq, 2010).
- Open source models (Demil & Lecocq, 2010; Lichtenthaler, 2011).
- Razor and blade (digital lock-In) models (Baden-Fuller & Haefliger, 2013).
- Hybrid models (Baden-Fuller & Haefliger, 2013).

Another aspect of a BM design is that it is heavily reliant on situational factors such as changing markets, technologies and legal restrictions. To this extent a BM design must follow an iterative development process that will ensure it delivers a sustained competitive advantage (Teece, 2010). To guarantee that organisations are able to design competitive value creating BMs, firms are required to make strategic decisions regarding technology choices, financial terms, sales strategies, network partnering possibilities and market segmentation (Teece, 2007).

An important component to consider during the design of a BM is the value capture component of the DBS (DaSilva & Trkman, 2014). Zott and Amit (2007) suggested that value through the BM can be created via two methods. Firstly, value is created by increasing the willingness of the customer to pay for the products or services offered. Secondly, value is created by the organisation where the decrease in the opportunity costs between suppliers and partners. To this extent, the total value that is created by the BM is the cumulative result of the value created for all the stakeholders of the firm. In addition, the authors suggested that there is a positive correlation between the design of the BM and the performance of the firm (Zott & Amit, 2007).

Organisations will have to design their respective BMs to align with their DBS by taking all the factors into consideration that have been mentioned in this section. The next section of the research will focus on the various BM design themes available to organisations.

2.5. Digital Business Model Themes

The BM design that is selected by an organisation can broadly be classified into three distinct themes (Chatterjee, 2013). These include (1) efficiency-based themes, (2) novelty-centred themes, and (3) lock-in themes. Importantly, organisations are not limited to a specific BM design theme and the eventual BM designs that are implemented by organisations are often a combination of all three (Chatterjee, 2013).

2.5.1. Efficiency-Based themes

The efficiency-based themes for BM design are implemented by organisations that operate in a highly competitive environment that can be classified as price takers in the market (Chatterjee, 2013). Value capture by an organisation occurs through the more efficient production of products and services compared to their competitors (Chatterjee, 2013; Zott & Amit, 2010). Organisations will achieve success with an efficiency-centred theme by leveraging these transactional efficiencies. The objective of the efficiency-based BM design is not to address efficiency improvements throughout the entire organisation, but rather to focus on transaction cost reduction (Zott & Amit, 2007).

The transaction cost reduction associated with the efficiency-based BM design can be derived through various areas (Zott & Amit, 2007). Firstly, this specific BM design focuses on the reduction of coordination costs between stakeholders. Secondly, this design is centred on the reduction of complexity and information asymmetry through the standardisation of its activities and the systems of an organisation. Chatterjee (2013, p99) extended this logic by combining “network efficiency” to BM design, which refers to efficiency reduction throughout the entire network between customers and organisations. The main focus of the network efficiency variant BM design is to create an environment where buyers and sellers have access to real-time information that is both transparent and reliable.

2.5.2. Novelty-Centred Business Models

The second BM design theme is the novelty-centred BM design, which focuses on creating new economic activities for organisations with the goal of generating economic value. Organisations that drive novelty-centred BM design are able to leverage off new digital technologies that enable the development of new digital products and services to their customers (Zott & Amit, 2010). Firstly, this BM design facilitates the adoption of new activities for organisations, secondly, it provides new methods for linking these activities, and finally, the BM design introduces new approaches to governing the latest activities of the organisation (Zott & Amit, 2010). Organisations that are able to achieve a high level of novelty within their respective BM designs will create higher switching costs for their customers and stakeholders because of the scarcity of alternatives in the market (Zott & Amit, 2007). Zott and Amit (2010) found that organisations that implement innovative BM designs generate higher levels of financial performance compared to companies that are not novelty-centred in their BM design.

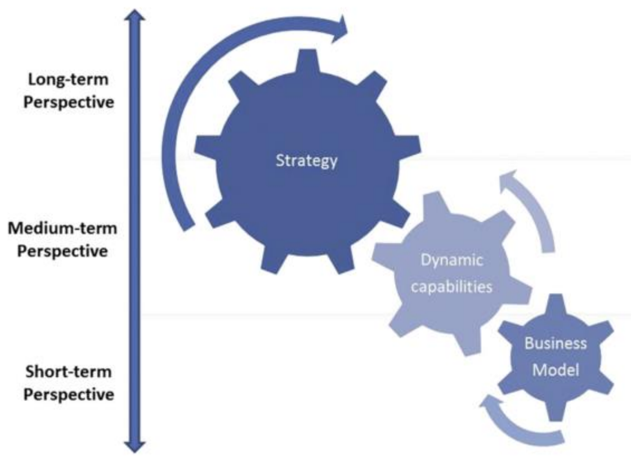
2.5.3. Lock-In Business Models

The third BM design theme is referred to as the lock-in BM design theme, which is centred around the notion that organisations pursue a “value capture logic” that attracts and retains customers while simultaneously increasing their switching costs and keeping competitors and imitators out of the market (Chatterjee, 2013, p 99). The lock-in BM design is referred to by Chatterjee as a loyalty-based BM design theme. An important element to the success of the lock-in BM design theme is the existence of network externalities (Chatterjee, 2013; Zott & Amit, 2010), which is the phenomenon that occurs when the customers of a lock-in BM model become the unofficial ambassadors for the brand, product or service offered by the organisation. These ambassadors constantly invest time and effort into building and communicating the benefits associated with the brand of the organisations to other network partners (customers, partners, suppliers) (Zott & Amit, 2010).

2.6. Digital Business Model Components

This section will focus on the various components that make up the digital BM of an organisation. The selection of a business strategy is described as being more granular than the more generic approach followed in developing a BM (Teece, 2010), which should be meticulously crafted to be able to extract value in the form of commercial success for the organisation (Teece, 2007). Baden-Fuller and Haefliger (2013) argued that a BM should be viewed separately from a business strategy; more specifically, the BM design is a “key micro foundation” that forms part of the DCV of a firm (Teece, 2010, p190). It is thus important to couple a business strategy analysis with a BM analysis to ensure that an organisation will sustain a competitive advantage post the implementation of a new BM (Baden-Fuller & Haefliger, 2013). DaSilva and Trkman (2014) extended this logic by introducing a framework (Figure 1) that represents the interrelationship between business strategy, dynamic capabilities and BMs. According to the authors, strategy (long-term perspective) enables dynamic capabilities (medium term perspectives) which results in BMs (short term perspective). Strategy creates a set of dynamic capabilities that are able to respond to situational contingencies through the organisational business model (DaSilva & Trkman, 2014). The DCV used to analyse a DBS forms the connection between the DBS and the BM of an organisation. The model indicates that neither strategy nor BM design will function without the dynamic capabilities that form the link between the two components.

Figure 1: Strategy, dynamic capabilities and business model interaction



Source: DaSilva and Trkman (2014)

The interaction between the DBS, dynamic capabilities and the BM can be described in the following sequence, as per Figure 1. The organisation must first have a clear DBS with a goal in mind. The next step in the model is for the organisation to derive dynamic capabilities associated with the strategic goal. In turn, these dynamic capabilities will provide the organisation with the ability to exploit identified opportunities by transforming its BM (DaSilva & Trkman, 2014). The literature studied for this research did not explain in sequential steps how the DBS influences the various BM components that are in part supported by the dynamic capabilities of a firm. These three constructs (the DBS, dynamic capabilities and the BM) are interdependent of each other, and this research will focus on the various digital BM components supported by dynamic capabilities that make up the BM design of the firm.

When designing a digital BM, Teece (2007) suggested that an organisation must have an in-depth understanding of several components that will influence the design. Firstly, the organisation must have an understanding of the payment habits of their customers and the procurement and sales cycles that will influence them. Secondly, there should be a clear understanding regarding the entire cost component of the business. Thirdly, the BM design will be influenced by the organisations' competitors' value propositions and their anticipated responses to new digital BMs. Lastly, an organisation should have a clear understanding regarding the customer needs to be satisfied with the digital value propositions of the BM. The design of a BM is so important that neither good governance practices nor strong leadership are able to influence the success of an organisation if an incorrect BM is designed and implemented (Teece, 2007).

In designing a digital BM, the academic literature on BM design contains numerous descriptions of BM components that are used to analyse and design BMs. When it comes to the design of a BM, Demil and Lecocq (2010) identified three crucial components, the first of which is the resources and competencies component. Resources are described as either being developed internally or in the organisation's external markets, while competencies refer to the ability of the knowledge workers. The second component proposed by Demil and Lecocq (2010) forms the organisational structure component, which includes the value chain and the value networks of the organisation. The third component is the value delivery (value proposition) component, which forms part of the digital products and services offered to the customer.

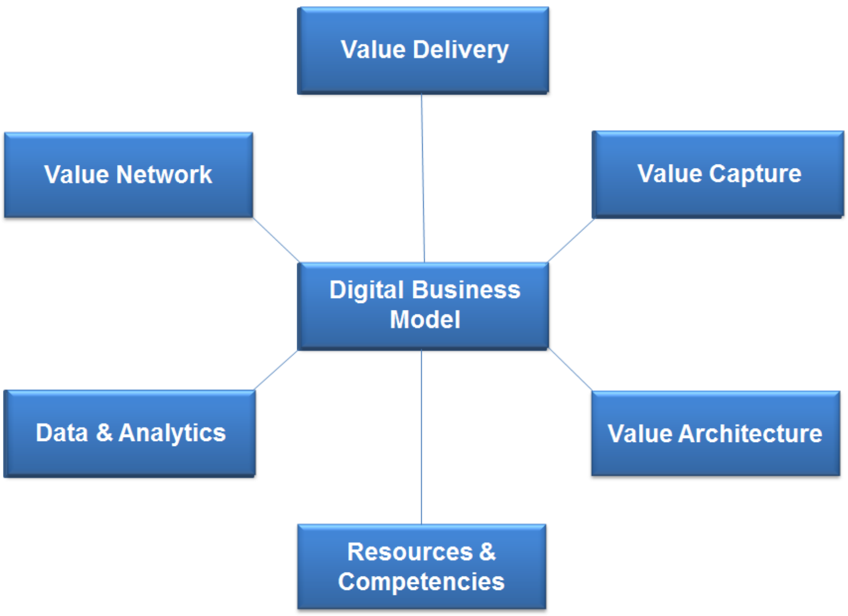
Baden-Fuller and Haefliger (2013) proposed an additional three components that should be included in the BM design. Customer identification is the first component, in which the BM identifies the users, indicates whether the users are paying, and in the case of non-paying users, identifies the paying customers. Customer engagement forms the second component, which requires the sensing of the customers' needs and the development of a value proposition in accordance with their changing needs. Monetisation (value capture) forms the last component, which addresses the 'when', 'what' and 'how' money is collected by the organisation.

After evaluating the thee components identified by both Baden-Fuller and Haefliger (2013) and Demil and Lecocq (2010), as well as the additional 36 BM sub-components by Zott et al. (2011), this research study will focus on six BM design components identified by the academic literature. These digital BM components are:

1. The value delivery component
2. The value capture component
3. The value architecture of the organisation
4. The resources and competencies available to the organisation
5. The data and data analytical capabilities
6. The value network component

All six of the BM design components influence the digital BM and are represented in Figure 2.

Figure 2: Six components of a Business Model



In order to develop a deeper understanding of each of the various BM components, they will be discussed individually. The first component of the digital BM design is the value delivery component.

2.6.1. Value delivery

In this research study, the terms 'value proposition' and 'value delivery' are used interchangeably. A successful BM design delivers value through the value proposition. The value delivery component of the digital BM can be described as the "source of value creation" or the "value driver" of the BM (Amit & Zott, 2001, p494). To this extent, the value proposition needs to be delivered to the customer in the form of unique products or services (Demil & Lecocq, 2010). The final value created by the digital value proposition that is delivered to the customer is the summation of all the values experienced by the participants of the digital business. Boons and Lüdeke-Freund (2013) elaborated on the BM design process and suggested that the BM design must follow a systemic perspective and always take cognisance of the value delivery component to continuously create new sources of value to the customer.

In the digital economy, products are perceived as being intangible and ubiquitous, and are characterised by two-sided markets where customers desire solutions rather than products that may not exist (Teece, 2010). To this extent, the value delivery of an organisation forms a fundamental component of the design of a BM. The next component of the digital BM design is the value capture component.

2.6.2. Value capture

In designing the value proposition of the DBS, the BM must be able to extract value back into the organisation from the digital offerings in order to create value. To this extent, an organisation must be able to capture the value (monetise) that is generated through its value proposition to the customer (Clemons, 2009). The value capture component occurs within the value network in the digital BM design (Zott et al., 2011). Monetisation reflects the 'when', 'what' and 'how' component of the BM design that specifically indicates how money or returns (value) will be raised by the BM for the organisation (Baden-Fuller & Haefliger, 2013). Without a well-designed BM, organisations fail to generate revenue with the launch of new digital or digitally enabled products and services (Teece, 2010). More specifically, the value can be monetised through "selling real things, selling virtual things and selling access" (Clemons, 2009, p19).

Teece (2010) extended on this logic and suggested three models for organisations to capture value through their DBS. Firstly, organisations can own the entire value chain in developing, designing and distributing their digital products or services. Secondly, organisations can choose to outsource (pure licensing) their digital business component. This option is only viable if the organisation has strong intellectual property rights. Thirdly, organisations can choose a hybrid approach that consists of a mixture of the first two approaches. This third approach is the most popular BM design and requires an established value network.

2.6.3. Value architecture

The value architecture of the firm can be seen as the "blueprint" for how to allocate resources and competencies to be able to cater for the changing needs of consumers in the digital environment (Keen & Williams, 2013, p644). It is this "strategic architecture" of an organisation that must be hard to imitate, be effective and be efficient (Teece, 2007, p1330). For a DBS to be successful, the value architecture must focus on exploiting the opportunities that arise from disruption while constantly building and developing the value architecture of the organisation (Teece, 2007).

Importantly, organisations must understand the various choices available to them and they must be fully informed of all the aspects in their industry when selecting an appropriate value architecture (Teece, 2010). Keen and Williams (2013) suggested that the value architecture of an organisation is the combination of three elements. Firstly, the value narrative requires that an organisation needs to have a clear DBS incorporating how value will be created for the current period and for the future with measurable metrics. The second element is the value engine that describes the value generating activities that are linked through the process design and the specific relationships that are focused on delivering value. The final element of the value architecture is the opportunity platform that provides the structure for identifying future opportunities to invest resources to capture future value. After the organisation has successfully established a value architecture that is aligned to the DBS, the organisation must align its resources and competencies in accordance with the DBS.

2.6.4. Resources and competencies

In order for companies to develop the scope of their DBS, organisations need to optimally utilise their resources and core competencies to continue the development of products and markets (Bharadwaj et al., 2013a). Resources were defined by Keen and Williams (2013, p646) as the "fixed assets, stable value dimensions of branding and the in-house competencies" in an organisation, while Ravichandran and Lertwongsatien (2005) described resources as the raw material used for developing new competencies in organisations, which are firm specific and impossible to imitate (Teece et al., 1997). Examples of where digital resources are utilised to increase the scope of businesses through their digital BMs are real-time patient monitoring through GE's m-health devices and Nike's collaboration with Apple's iOS (Bharadwaj et al., 2013a).

In the new digital economy, DBS "transcends the traditional functional areas" within organisations and acts as an overarching strategy that relies on digital resources as the "connected tissue" between all the various components (Bharadwaj et al., 2013a, p473). The design moves that an organisation can exercise regarding DBS execution are influenced by the constraining or prevailing resources of the organisation (Woodard et al., 2013). Organisational strategists are not able to execute an effective DBS design to address urgent organisational needs when resources are scarce (Woodard et al., 2013). Indeed, resources can be seen as a critical component to effective digital BM design.

Competencies represent the choice element regarding resource allocation and and deployment in an organisation (Ravichandran & Lertwongsatien, 2005). More specifically, two dimensions of competencies are required by organisational leaders and their respective departments. Firstly, transformational competence is required in organisations that represent the ability of an organisation to transform towards the needs of the new digital economy. Secondly, operational competencies are required to represent the ability of an organisation to provide consistent and reliable support to the respective business units. As such, varying levels of competencies in organisations are expected to impact the organisational performance. Competencies will only provide a competitive advantage if they are difficult to imitate and if the competencies themselves can be applied routinely (Teece et al., 1997). The next internal BM component within the digital BM is the data capture and data analytical capabilities of an organisation.

2.6.5. Data and analytics

Before the emergence of the digital economy, organisations operated in business ecosystems that were characterised by data scarcity, which resulted in decisions being made with either incomplete and/or poor quality data. Big data represents the extraction of information from large amounts of data (Bharadwaj et al., 2013a). Bharadwaj et al. suggested that because of the emergence of and the availability of big data, organisations are now open to entirely new portfolios of digital opportunities and strategic approaches concerning the digitisation of products, processes and services.

Big data can be referred to as "data sets", where the size of these data sets are not able to be captured, curated, managed or processed with conventional software tools (Bharadwaj et al., 2013a, p477). Big data has been used to describe analytical techniques that are both large and complex, and which require advanced data storage, analysis, management and visualisation capabilities (Chen, Chiang, & Storey, 2012). Big data is continuously generated by, amongst others:

- Internet clicks
- Mobile transactions
- Social networks
- Data that is generated by machine-to-machine sensors
- The environment
- Transportation systems
- Healthcare (Bharadwaj et al., 2013a)

In addition, George, Haas and Pentland (2014, p321) commented that the importance of big data for organisations has shifted away from being focused on the quantity of data that can be generated, towards a more "granular information" structure of understanding and interpreting the data.

In conjunction with big data is the field of data analytics, which refers to business intelligence and analytical technologies that are comprised of data mining and the statistical abilities of organisations (Chen et al., 2012). In addition, George et al. (2014) described data analytical techniques are drawn from various disciplines such as statistics, computer science, economics and applied mathematics. Statistical advances in the form of machine learning have also been successfully applied to data, text and web analytics in organisations (Chen et al., 2012). Whilst companies are investing in their capacity to analyse the data that is generated, only a few companies have made a corresponding investment in changing their organisational processes to generate value from the data and the information (Bharadwaj et al., 2013a).

Another additional benefit of data and data analytics is that it provides organisations with the opportunity to analyse not only individual but also team-based behavioural patterns through sensors and badges that track individuals as they collaborate on projects (George et al., 2014). In addition, individuals within organisations can directly translate new knowledge through data and data analytics to enhance decision making and performance (McAfee & Brynjolfsson, 2012). This has large scale implications for the world of work in the digital era and provides mangers, strategists and leaders with unprecedented capabilities to optimally run organisations. Apart from the enhanced decision making capability that big data provides to organisations, "data-driven" firms are on average 5 percent more productive and 6 percent more profitable than their competitors (McAfee & Brynjolfsson, 2012, p4).

A final key aspect regarding an organisation's ability to capture and analyse data is the extent to which the organisation is supported by its IT infrastructure. In the vast and changing digital economy, organisations are struggling to be agile in responding to the shifting market requirements and possible new opportunities (Tallon & Pinsonneault, 2011). The more responsive and agile organisations are regarding aligning their IT infrastructure to the demands of the digital economy, the more prosperous these organisations will be (Tallon & Pinsonneault, 2011). Organisations that do possess the necessary resources, competencies and data strategies still need to align all these various components through the strategic value architecture of the organisation. The final component of the digital BM is the value network of the organisation.

2.6.6. Value network

The value network of an organisation comprises all its external stakeholders. In developing a digital BM, an organisation might not be able to develop a digital value proposition due to a lack of resources, skills and expertise. These organisations must partner with their stakeholders in order to develop a digital value proposition to fulfil the needs of their customers. As such, the value network of an organisation can be described as a "cluster of economic actors collaborating to deliver value to the end consumers and where each actor takes some responsibility for the success or failure of the network" (Pagani, 2013, p619).

The value network is described as a "temporal structure of loosely coupled value proposing social and economic actors interacting through institutions and technology, to firstly, co-produce service offerings, secondly to exchange service offerings and lastly to co-create value" (Lusch, Vargo, & Tanniru, 2010, p20). Clarysse, Wright, Bruneel, and Mahajan (2014) elaborated on this definition and suggested that a value network exists in a group of companies that are all mutually complementary in the business ecosystem. The DBS requires coordination from across industries and firms regarding products and process innovation, with the aim of creating dynamic digital ecosystems (Pagani, 2013). Value networks are also described by Lusch et al. (2010, p23) as "living organisms" that are continuously changing, adapting and learning in dynamic environments. Organisations that adopt the network perspective (Pagani, 2013) are able to remain competitive in the new digital economy by continuously creating value within their business ecosystem. Organisations that are able to combine their internal value architecture with their external value networks will be able to leverage all the cumulative resources and competencies that will enable them to create unique digital products and services.

2.7. Conclusion

The literature review provides background regarding DBS, digital BMs and the various components that form part of the digital BM design. For organisations to sustain competitiveness, their leadership will have to develop the ability to make sense of the fast changing digital environment and align their DBS and BMs accordingly. The digital advancements and the dynamic capabilities will enable organisations to create multiple innovative digital value propositions to create this sustained competitiveness. The dynamic capabilities can be viewed as the connection between the DBS and the digital BM of the organisation.

The digital BM is described in the literature as the premise from which the DBS is executed. Viewed separately from the DBS, the BM design follows an iterative process and is constantly adapted in accordance with the DBS of the organisation. The literature provides multiple views regarding the components that should form part of the BM design of an organisation. Although there are many similarities between the various BM components that are proposed, this study will propose six critical components that should form part of any digital BM design.

The research will further identify the extent to which these six digital BM components form part of the digital BM design and their influence on the success of the DBS. This research study will also establish the degree to which these BM components individually and cumulatively influence the success of the DBS.

3 Chapter 3: Research Hypothesis

This research examines the prevalence of the six identified components (value delivery, value capture, value architecture, resources and competencies, data and data analytics and value network) in the design of a digital BM. In addition, the research will further establish the extent to which these BM components individually and cumulatively influence the success of a DBS. This study on individual BM components and their effect on a DBS' success is important, because as per Zott et al. (2011), a BM is not a representation of a singular component. Rather, the authors posited that a BM is the aggregate of all the components and their inter relationships with each other. Despite this there is limited academic literature that analyses the relationship between various BM components and other business constructs such as DBS success (Zott et al., 2011). For this reason it is difficult to draw inferences regarding the desired digital BM design, the combination of its components that are utilised in the digital BM design, and their effectiveness in generating value for the organisation.

To this extent, Siggelkow (2002) posit the benefit of an using an ex ante approach in the identification of core elements in analysing organisational systems. The benefits of the identification of BM components for a digital BM design allow for the measurement of consistencies and change within each of the elements of the digital BM design. The limitations to such an ex ante approach is that the analysis will assume that all the components that are analysed will be of equal importance (Siggelkow, 2002). Despite the limitations, Demil and Lecocq (2010) stated that by postulating a small number of elements that are core to the BM, it will overcome the limitations imposed by Siggelkow (2002) and allow for analysis across firms. As such, this research will propose six BM components that will form part of a digital BM design.

3.1. Hypothesis

Figure 3: Digital business model component hypotheses 1 - 6

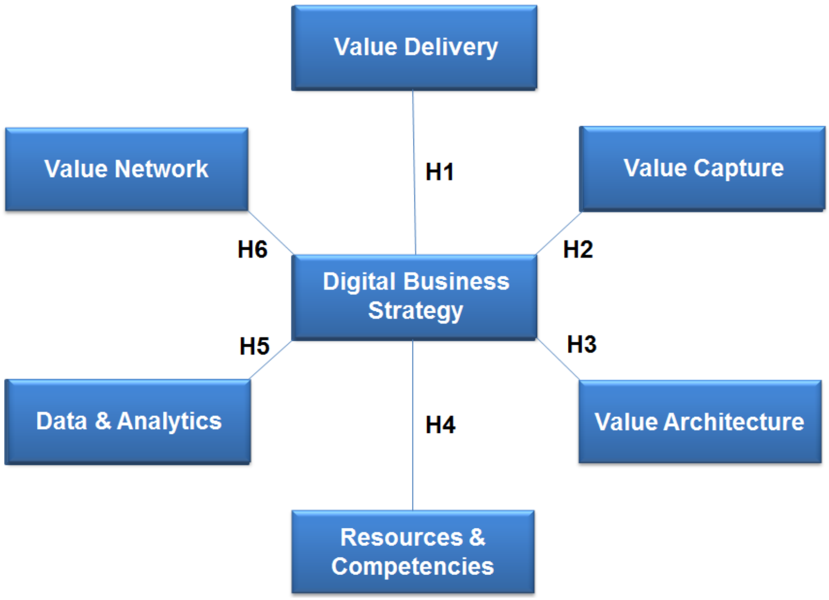
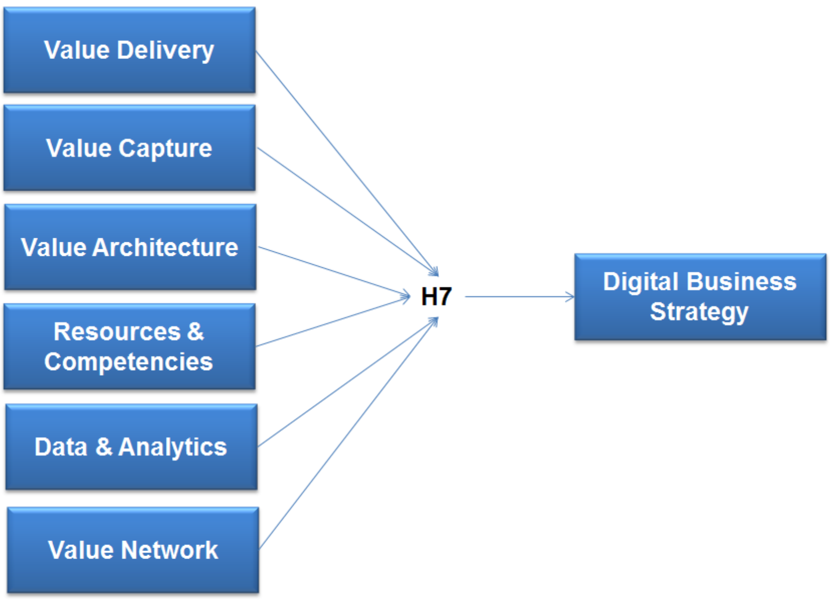


Figure 4: Cumulative component effect on a digital business strategy



Hypothesis 1: There is a significant relationship between organisations that create a unique value proposition and the success of their digital business strategy.

The end result of value network activities is the creation of a value proposition (value delivery) in the form of unique products and services to customers. The organisations will have to adopt a systematic perspective to continuously leverage their value creation components to deliver new sources of value to the customer (Boons & Lüdeke-Freund, 2013). In the digital environment a value proposition can be imitated more easily than in the physical environment; this research will analyse how effectively organisations can create unique value propositions through their products and services on a continual basis. The success of a unique digital product or service will only be captured by an organisation that is able to monetise their BM design.

Hypothesis 2: There is a significant relationship between an organisation's ability to successfully monetise their business model and the success of their digital business strategy.

The value capture (monetising) component enables organisations to generate revenue from existing and future digitally enabled products and services offered by the organisation (Teece, 2010). Organisations that are not able to successfully incorporate this component into the design of their digital BM will fail to extract any value created by the value proposition. This research will focus on the importance of this component and if organisations are able to generate value from their digital BMs. Once the value capture component of the digital business model is conceptualised, the value architecture should be utilised.

Hypothesis 3: There is a significant relationship between an organisation-wide value architecture that forms part of the business model design and the success of the digital business strategy.

An organisation that possesses adequate resources, competencies and data infrastructure needs to ensure that all these elements are aligned in accordance with the DBS. A well-designed value architecture ensures that the resources, competencies and digital infrastructure is allocated in accordance with the DBS across the organisations (Keen & Williams, 2013). The value architecture forms the component of the BM that is difficult to imitate by competitors and is central in the study of successful digital BM designs (Teece, 2007). After the organisation has successfully established the internal value architecture aligned to the DBS, the organisation must leverage and/or develop the resources and competencies required.

Hypothesis 4: There is a significant relationship between an organisation that possesses the appropriate resources and competencies that are dedicated to the business model and the success of the digital business strategy.

It is key in this research to understand the importance of the relationship that was established by Bharadwaj et al. (2013a), which suggests that resources form a critical element in the success of a firm's digital initiatives. In conjunction with the resources, the organisational competencies as described by Ravichandran and Lertwongsatien (2005) that represent the basis of organisations to compete, will be joined together to form one component of the digital BM. An important additional element to take into consideration is the data capture, management and analysis component of the digital BM.

Hypothesis 5: There is a significant relationship between organisations that have the ability to adequately capture and analyse data and the success of their digital business strategy.

Organisations that possess the necessary IT infrastructure and analytical ability to accurately analyse the captured data are able to enter into entirely new portfolios of digital opportunities regarding digital products and services offered (Bharadwaj et al., 2013a). To this extent, McAfee and Brynjolfsson (2012) suggested that data driven organisations will be more productive and profitable compared to their competitors. The success of the data strategy followed by an organisation will be greatly impacted by the flexibility and the agility of the IT infrastructure and how it ultimately aligns to the DBS. Taking the view that an organisation does possess the necessary resources, competencies and data strategies, it must align them towards the DBS of the organisation. This leads one to hypothesis that:

Hypothesis 6: There is a significant relationship between organisations that fully integrate their value network in their business model design and the success of their digital business strategy.

The value network of an organisation suggests that benefits can be shared between companies that function in similar business ecosystems (Clarysse et al., 2014). The literature suggests that the value network creates coordinating activities between organisations from across industries regarding innovative practices that result in mutual benefits for all parties, which form part of the value creation process (Pagani, 2013). This research will quantify the importance of these networks between organisations in relation to the other components that are analysed. Organisations that are able to combine their internal value architecture with their external value networks will be able to leverage all their cumulative resources and competencies to create unique digital products and services. The final hypothesis represents the cumulative effect that all the components in the digital BM design have on the success of the DBS.

Hypothesis 7: All six of the business model components are able to collectively influence the success of the digital business strategy.

This hypothesis will test the cumulative impact of all six of the BM components on the success of the DBS. The BM must be viewed as a system that integrates all the various BM components with each other to function as a system. The success of the DBS will be the result of the aggregate impact of all the various BM components (Zott et al., 2011).

3.2. Conclusion

The hypotheses will guide the researcher to understand the importance of the various digital BM design components and the relationship between the components and the success of a BM. The research will analyse if a set of identified digital BM components form part of a digital BM design and if their inclusion in the BM design will influence the success of the DBS for an organisation. The research will contribute to the academic literature that was reviewed in Chapter 2 by analysing the individual and cumulative impact these BM components have on the success of a DBS. Chapter 4 will illustrate the methods that were used to analyse the hypotheses posed in this chapter.

4 Chapter 4: Research Methodology

4.1. Introduction

The study focused on the relationship between the various BM components and how they both individually and cumulatively influence the success of the DBS. This chapter will discuss the research approach that was taken by the researcher in testing all seven of the hypotheses.

An online questionnaire was used to capture the data for this study and statistical tests were conducted on the responses. More specifically, a comparative analysis was conducted between the various BM components and the digital business success element of this study. In addition, the researcher used a multivariate analysis to determine the cumulative effect of all the BM components simultaneously and their cumulative impact on the success of the DBS. The researcher assumed a statistical level of significance of 95 percent for this particular research.

4.2. Research approach

The aim of this study was to identify the extent to which a set of six digital BM components that form part of a digital BM design influences the success of the DBS. These components included a:

- value delivery component;
- value capture component;
- value architecture component;
- resources and competencies component;
- data and data analytics component; and a
- value network component.

The study further established the extent to which these BM components individually and cumulatively influence the success of a DBS.

4.2.1 Research method

In order to test the hypotheses that were proposed, a quantitative study was conducted through the use of a self-administering online questionnaire. The questionnaire was developed from research questions that were found in Achtenhagen et al. (2013), Baden-Fuller and Haefliger (2013), Bharadwaj et al. (2013a), Ravichandran and Lertwongsatien (2005) and Tallon and Pinsonneault (2011), which analysed the various components that form part of a BM. Williams (2007) described this type of quantitative study as being separate from the researcher, i.e. the results that are obtained from this quantitative analysis can be used to objectively represent reality. Furthermore, the results represent an accurate representation of the field being studied (Saunders & Lewis, 2012).

Zikmund, Babin, Carr and Griffin (2012) highlighted the importance of being aware of errors and biases that may occur such as non-response bias, low response rates, subject bias and extremity bias in the completion of the online questionnaire. Additional errors could include subject errors, subject bias observer errors and observer bias, which would influence the reliability of the research findings (Saunders & Lewis, 2012).

There are several disadvantages of using a questionnaire, including ambiguity that may be caused by the questions, failure of completion due to respondent fatigue, and a possible low response rate that may occur due to respondents not clearly understanding the questions that are posed (Brace, 2008). Brace (2008) suggested that these shortcomings could be addressed through the use of a pilot study, which focuses on highlighting any reliability and validity issues that may arise through the self-administration of a questionnaire.

While the researcher acknowledged the limitations of using a questionnaire and how it could affect the results of the research, there are also advantages in the administering of a questionnaire for this type of research. Zikmund et al. (2012) explained that this type of research is a quick, inexpensive and accurate method of collecting data from across a wide geographical area, time frame and industries. Brace (2008) also reported that questionnaires are advantageous because they allow for anonymity and confidentiality, resulting in more honest responses to sensitive questions.

The response rate for this research is based on the number of organisations that were approached to complete the questionnaire. The response rate also includes the referred responses from the organisations and business units that were identified to fit the respondent profile of this study.

4.2.2. Pretesting of the questionnaire

After the formulations of the questions and the design of the questionnaire, the next step involved the pretesting of the questionnaire, which allowed the researcher to make alterations to the questions and the design of the questionnaire to ensure that the results obtained were aligned to the research questions in the study (Brace, 2008). A pilot study allows for the researcher to clarify any existing ambiguities that could have negatively affected the results of the questionnaire. A pilot study may not completely eliminate all ambiguity, validity, reliability or survey research errors (Picardi & Masick, 2013).

A pilot study was conducted with 10 respondents, and feedback from each of the respondents was incorporated into the final questionnaire that was used for this research. This involved the completion of the questionnaire with a small group (pilot group) of individuals, who were asked to provide the researcher with notes regarding the questionnaire (Brace, 2008). The profiles of the individuals that were selected were similar to the sample profile under study. Brace (2008) explained that conducting a pre-test in the form of an informal pilot study allows the researcher to identify issues regarding routing errors and wording problems that may exist in the questionnaire. Conducting a pre-test also allows the researcher to identify the existence of any leading questions and bias due to the order of the questions (Zikmund et al., 2012).

Interviews were conducted with the individuals of the pilot group to establish the approximate length of time it took to complete the questionnaire. The feedback from the pilot group indicated that the length of the questionnaire was sufficient for the study. Furthermore, feedback from the pilot group did not indicate any wording issues, leading questions or misinterpretation problems. The pre-tests also indicated that the questions posed in the questionnaire were sufficient to answer the hypotheses of the research study.

After receiving and evaluating the feedback from the pilot group, the questionnaire was deemed acceptable to be used and was distributed to the sample for data collection.

4.3. Population and sampling frame

The unit of analysis was at the BM level that focused on the strategic business units within these organisations. Although DBS and BM design are viewed as separate (Teece, 2010), the components of the digital BM design is formulated and selected at a strategic level within the organisation.

The population included all small, medium and large organisations with either a DBS or that offer digital product(s) and/or service(s) to the market. For organisations to be considered part of the population they had to have designed, developed and launched a digital product(s) and/or service(s). Organisations that no longer offered a digital product(s) and/or service(s) and had withdrawn their digital product(s) and/or service(s) for any reason before the research also formed part of the population. The researcher decided to include organisations that no longer offered digital product(s) and/or service(s) to the market because of their experience or lack thereof in designing appropriate digital BMs and the contribution they would make to the research study.

The definition of small and medium organisations as per the National Small Business Act of 1996 as amended by the National Small Business Amendment Acts of 2003 and 2004 of section 1 (National Small Business Act of 1996) was used as a guide to develop definitive ranges for small and medium companies:

Small Enterprises:

- Between 20 - 50 employees or
- Annual turnover of between R500 000 and R25 million per year

Medium Enterprises:

- Between 51 - 200 employees or
- Annual turnover of between R26 and R50 million per year

Large organisations were classified as being:

- 201 or more employees or
- Annual turnover of R51 million per year or more

The sample frame (Zikmund et al., 2012) was aimed at a strategic level and focused on employees who operated on a strategic level within these organisations, where a DBS was present, and/or where the organisation offered a digital product(s) and/or service(s) to the market. As such, only middle to senior level employees who were involved with strategy development and execution formed part of the sample frame of this research. This allowed the researcher deeper insight into the prevalence of BM components within organisations and the relationship between the components and the success of the DBS.

4.3.1. Sampling technique

The sampling technique that was used for this study was non-probability sampling. Zikmund et al. (2012) described this type of sampling as arbitrary because the researcher is influenced by his or her own personal judgement. The authors also highlighted that projecting the results beyond the sample will be statistically inappropriate.

A purposeful non-probability sampling technique was used to target employees within organisations that fit the respondent profile. If a researcher uses his own judgement regarding the selection of responders who would best answer the research questions posed, he is required to explain the criteria and the underlying foundation on which he based his decisions (Saunders & Lewis, 2012).

Snowball sampling was also integrated into the sampling technique used for this research study. The advantage of snowball sampling is the cost saving in acquiring more respondents. Zikmund et al. (2012) pointed out, however, that a respondent may recommend other respondents who are similar to themselves, which may lead to bias. Snowball sampling did assist in the identification of organisations with either a DBS or organisations that offered and/or offer a digital product(s) and/or service(s) to the market. This assisted in increasing the sample size required to achieve a statistically significant sample.

An important aspect to consider is the disadvantages associated with the various forms of non-probability sampling techniques that were used in this research. Firstly, Zikmund et al. (2012) suggested that purposeful sampling can be influenced by the researcher's biases regarding his beliefs, which may result in a sample that misrepresents the population. In addition, Zikmund et al. (2012) stated that snowball sampling can also be negatively influenced by the researcher's biases and lead to results that are not independent and may project data that is beyond the intended sample frame. The researcher took this into consideration while conducting the study.

4.4. Research approach

4.4.1. Questionnaire design

The questionnaire was conducted through the use of Survey Monkey (an online survey tool) and anonymity was guaranteed to all the potential respondents. The questionnaire was comprised of a set of qualifying questions that allowed the researcher to establish the job level, experience and seniority of the respondents (see Appendix A for the questionnaire that was used) in order to ensure that they operated on a strategic level. Likert scale questions were used to determine the existence of the identified BM components that formed part of the DBS strategy. In addition, Likert scale questions were used to determine the relationship between the existence of the various BM components and the ultimate success of the BM. The researcher used a combination of five and seven point Likert scales to enable him to understand on an organisational level, from the individual responses, the impact the BM design has on the functions within the organisation and the overall performance of the DBS.

A five point Likert scale was used to acquire responses for the questions that were linked to each of the BM design components (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network). The five point Likert scale was used in the following format:

1 – Strongly disagree; 2 – Disagree; 3 – Uncertain; 4 – Agree; 5 – Strongly Agree

A seven point Likert scale was used to collect responses regarding the overall DBS success for the organisation. The seven point Likert scale was used in the following format:

1 – Strongly disagree; 2 – Disagree; 3 – Somewhat Disagree; 4 - Uncertain; 5 – Somewhat Agree; 6 - Agree; 7 – Strongly Agree

Research questions in literature regarding BM design and DBS formulation were studied to create a set of research questions that were linked to each of the six components that constituted the digital BM design under study - value delivery, value capture, value architecture, resources and competencies, data and analytics and value network.

To this extent, the research questions posed by Bharadwaj et al. (2013a) aimed to expand the researcher's knowledge regarding the scope and scale of a DBS, while developing a better understanding of digital resource utilisation in creating differentiated business value. The four themes defined by Bharadwaj et al. (2013a) created a framework for further study in the field of DBS development. The four themes can be classified as the (1) scope of DBS, (2) scale of DBS, (3) speed of DBS and (4) sources of DBS value creation. Bharadwaj et al. (2013a) suggested future research questions for each of the four themes that were identified. Achtenhagen et al. (2013) created a set of questions that aimed to create sustained value creation through the (1) shaping, (2) adapting, and (3) renewing of the BM design by the managers in organisations. The questionnaire developed by Achtenhagen et al. (2013) reflected on the complexities of BM design and how the various components of a BM interact with each other. This study contributes to the literature by providing a framework to better understand how BM changes through strategic actions aimed at creating sustained value.

The research of Baden-Fuller and Haefliger (2013) identified four components that enhanced the understanding of BM innovation and its relationship with technological innovation; (1) customer identification, (2) customer engagement, (3) value delivery and (4) monetisation (Baden-Fuller & Haefliger, 2013).

A study by Ravichandran and Lertwongsatien (2005) provided empirical evidence of a positive relationship between IT support for the core competencies of the organisation and how it affects a firm's performance. The model that was proposed by the authors overcame the shortcomings of previous information systems (IS) success models and contributed by making a direct empirical assessment between the organisational effectiveness and the IS activities. The questionnaire developed by Ravichandran and Lertwongsatien centred around six themes, which provided great insight into the development of the research questions for this research study. The six constructs were: (1) IS human resource capital, (2) IT infrastructure flexibility, (3) partnership quality, (4) IS capabilities, (5) IT support for core competencies and (6) information intensity.

Tallon and Pinsonneault's (2011) research made a large contribution thanks to their empirical testing of IT alignment and agility and how these two constructs affect firm performance. The study further added to the literature by suggesting that the two constructs provide an enabling perspective and new insight into the relationship between IT alignment, agility and firm performance. The questionnaire developed by Tallon and Pinsonneault (2011) contributed to the development of the questionnaire for this research study.

The literature provides deep insight into the development of specific questions that are linked to the various BM design constructs. Unfortunately, much of these research approaches under study did not provide the Cronbach's Alpha's for their respective studies. Cronbach's Alpha (coefficient alpha) was developed by Cronbach (1951) as a measure to test the internal consistencies in multi-item scales (Peterson, 1994). Cronbach's Alpha has become the most effective and widely used measure for testing the reliability of multi-item scale testing (Peterson, 1994). To this extent, Cronbach's Alpha should not be used to impede or restrict research design, but should rather be used to improve the usefulness of research (Peterson, 1994). The Cronbach's Alpha implies that the larger the number of items within a scale, the greater the reliability will be (Peterson, 1994). The Cronbach's Alpha was calculated for five underlying constructs in this study (Figure 5).

Figure 5: Cronbach's Alpha constructs

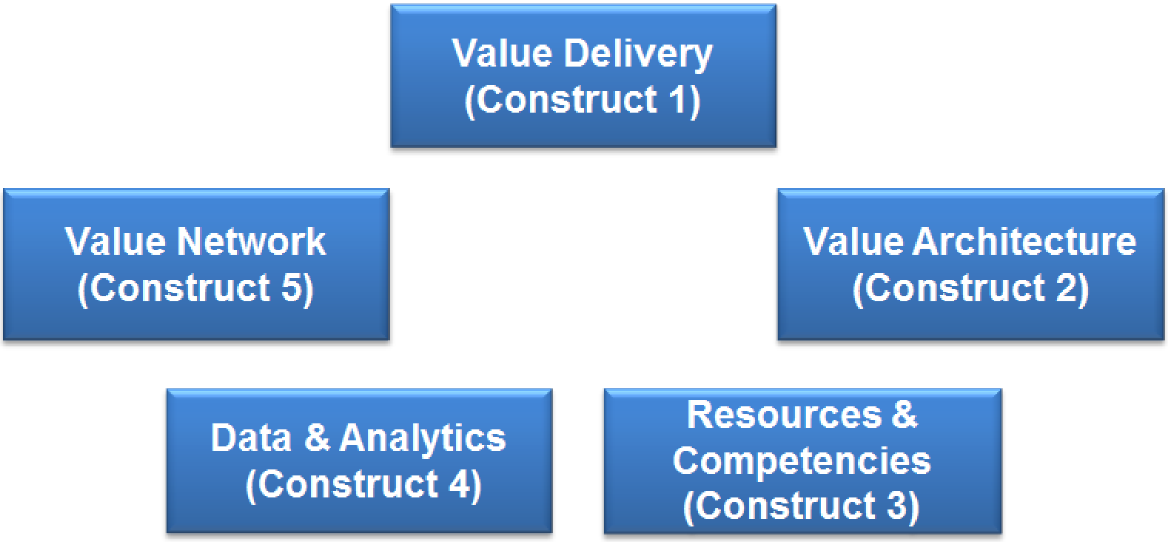


Table 1: Calculated Cronbach's Alpha scores for the various constructs used in the questionnaire

Constructs	Calculated Cronbach's Alpha	Number of questions	Internal consistency
1	0.810	5	Good
2	0.861	5	Good
3	0.841	5	Good
4	0.817	6	Good
5	0.808	3	Good

The Cronbach's Alpha ranged between 0.808 and 0.861 for the five constructs, indicating a high internal consistency (Ravichandran & Lertwongsatien, 2005).

Value delivery construct (Construct 1): The questions from the first construct were adapted from the questions posed by Tallon and Pinsonneault (2011), Bharadwaj et al. (2013a) and Achtenhagen et al. (2013). The Cronbach's Alpha was calculated on the adapted questions for this study and the results indicated a good level of internal consistency as determined by a Cronbach's Alpha of 0.810 (Ravichandran & Lertwongsatien, 2005).

Value architecture construct (Construct 2): The questions from the second construct were adapted from the questions posed by Bharadwaj et al. (2013a) and Achtenhagen et al. (2013). The Cronbach's Alpha was calculated on the adapted questions for this study and the results indicated a high level of internal consistency as determined by a Cronbach's Alpha of 0.861 (Ravichandran & Lertwongsatien, 2005).

Resources and competencies construct (Construct 3): The questions from the third construct were adapted from the research questions posed by Ravichandran and Lertwongsatien (2005) and Achtenhagen et al. (2013). The Cronbach's Alpha was calculated for the adapted questions for this study and the results indicated a high level of internal consistency as determined by a Cronbach's Alpha of 0.841 (Ravichandran & Lertwongsatien, 2005).

Data and data analysis construct (Construct 4): The questions from the fourth construct were adapted from the research questions posed by Tallon and Pinsonneault (2011) and Bharadwaj et al. (2013a). The Cronbach's Alpha was calculated for the adapted questions for this study and the results indicated a high level of internal consistency as determined by a Cronbach's Alpha of 0.817 (Ravichandran & Lertwongsatien, 2005).

Value network construct (Construct 5): The questions from the fifth construct were adapted from the questions posed by Tallon and Pinsonneault (2011) and Bharadwaj et al. (2013a). The Cronbach's Alpha was calculated on the adapted questions for this study and the results indicated a good level of internal consistency as determined by a Cronbach's Alpha of 0.808.

In addition, a study by Cox and Eli (1980) suggested that the optimal questionnaire response alternatives that would deliver constant results should be in the range between five and nine. This suggestion was supported by Brace (2008, p70), who claimed that the five point scale would provide "sufficient discrimination for most purposes and is easily understood by respondents". Brace also stated that if greater discrimination was required, the size of the scale could be increased to seven. For this reason, a two pronged Likert scale approach was adopted for this research study; firstly, a five point Likert scale was used to acquire responses for the questions that were linked to each of the BM design components. Secondly, a seven point Likert scale was used to collect responses regarding the overall digital BM performance for the organisation. The seven point Likert scale allowed for greater discrimination regarding the performance criteria of the digital BMs. This allowed the researcher to understand on an organisational level, from the individual responses, the impact the BM design had on the functions within the organisation and the overall performance of the BM.

4.5. Data collection

4.5.1. Nature of the sample and sample size

A quantitative research design was selected for the research study, as a quantitative analysis of the digital BM designs allowed the researcher to create meaning from data that was being analysed whilst being objective in his approach (Williams, 2007). Zikmund et al. (2012) suggested that a quantitative research approach is more suited towards confirmatory research that tests a hypothesis against the data collected. This research approach allowed the researcher to analytically test the relationships between the various proposed digital BM design components and their individual and collective influence on the success of the DBS.

The online questionnaire was distributed to 465 individuals who were purposefully selected to be part of the research. In addition, a snowball sampling method was used to distribute the questionnaire to more individuals who fit the profile of the sample that was targeted, therefore it is difficult to report on the response rate. (The response rate reported indicates the number of individuals who were contacted directly by the researcher to form part of sample and who completed the questionnaire.) Only individuals who were strategically involved with digital products and digital services in organisations were selected to be part of the sample.

A total of 465 individuals were identified and contacted directly to form part of the research study. From this number 144 individuals partook in the questionnaires but only 114 completed them. This resulted in a response rate of 25 percent. This high response rate can be attributed to the currant relevancy of the study being conducted and the desire for clarity regarding the design of digital BM. Through further data editing, the responses of an additional 14 respondents were discarded from the final data set as they did not qualify as targeted respondents in accordance with the predetermined research design. The data editing also revealed three responses that qualified as outliers and these responses were removed from the research study. This resulted in a total of 97 responses forming part of the final data analysis. This response rate was deemed to be satisfactory in accordance with the suggested satisfactory response rate of above 10 percent as proposed by Zikmund et al. (2012).

4.6 Data analysis

Three critical steps need to be completed before the data gathered can be analysed (Zikmund et al., 2012). These include the editing, coding and filing (checking for errors) of the data.

4.6.1. Data editing

The editing of data involves checking and adjusting data related to omissions, consistency issues and legibility. Importantly, the editing of the data was subjective in nature and the researcher remained objective whilst scrutinising the data (Zikmund et al., 2012). Three questionnaires were discarded after the evaluation of a box and whisper plot that was used to identify outliers. Zikmund et al. (2012) described outliers as values that fall outside the normal range of the data captured; extreme values need to be discarded from the data set so as not to influence the results during data analysis. In this research there were no outliers in the final data set for values greater than three box-lengths from the edge of the box.

The questionnaire was designed to gather additional information from the respondents through the use of qualifying questions that prompted the respondents to elaborate on their answers through the means of follow up questions. In the event the respondents did not meet the qualifying conditions, the online questionnaire did not prompt them to complete certain sections of the online questionnaire. These missing values were edited for data analysis through the use of a plug value in accordance with the predetermined decision rule (Zikmund et al., 2012). Furthermore, no inconsistencies or legibility issues were reported in the research study.

4.6.2. Coding and filing of data

After editing the data, the responses from the questionnaire were assigned numerical values for each of the responses captured. Zikmund et al. (2012, p472) referred to this process as being “exhaustive” in nature, meaning a specific coding category should exist for all the possible responses. All the responses were captured online through Survey Monkey and were then exported to Microsoft Excel 2010, which allowed the researcher to perform further statistical analysis using IBM® SPSS® statistics version 23. A final error checking and verification stage was completed on all the data in SPSS®, which ensured that the codes assigned to the responses were legitimate.

4.6.3. Normal distribution

The frequency distribution of scores for this research was assumed to be normally distributed. Field (2013) described normal distribution as data that are distributed symmetrically around the centre of all the scores in the dataset. A vertical line can be drawn through the centre of the distribution and the resulting halves would be the same on both sides. Field (2013) also described that normally distributed data will be characterised by a bell-shaped curve that will reflect the greatest frequencies of scores in the middle and the smaller frequencies to the outer side of the bell-shaped curve.

4.6.4. Principle Component Analysis (PCA)

The PCA is a data reduction technique that is used to identify a relative smaller number of components that would account for a relatively larger number of measures (Decoster, 1998). PCA can be seen as the basis of multivariate analysis that estimates the correlation between the various variables (Wold, Esbensen & Geladi, 1987). More specifically, the PCA is a variable reduction technique that is used to reduce a larger set of variables into smaller principle components (Field, 2013). In addition, the PCA was the most appropriate method of factor analysis for this particular study because this approach would allow the researcher to identify and explain the underlying constructs in the field of DBS and digital BM design.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also chosen for this study. The KMO allows the researcher to run linear relationships between the variables and is used as a measure to determine if a PCA is the most appropriate analysis to be conducted on the dataset (Field, 2013). KMO indices that are greater than .70s can be classified as being middling and indices above .60 would be acceptable for factor analysis (Kaiser, 1974). The Bartlett's test was conducted in conjunction with the KMO test, which indicates whether the correlation matrix that is calculated is significantly different to the identity matrix (Field, 2013).

In addition, an eigenvalue of greater than one was used in accordance with the Kaiser criterion for this research (Decoster, 1998). The eigenvalue represents the total variance that is explained by each of the factors (Zikmund et al., 2012). A varimax factor rotation method was applied during this study, which was described by Zikmund et al. (2012) and Decoster (1998) as the most common type of orthogonal rotation method. The factor analysis allowed the researcher to decrease the number of variables into a reduced set of variates. This approach is in accordance with the rule of parsimony, which states that the fewer variables used during multivariate analysis will deliver better results (Zikmund et al., 2012).

4.6.5. Correlation

Correlation analysis was used by the researcher to understand and verify the significant associations between the various elements that make up the BM design constructs and the success component of the DBS. The correlation coefficients are the statistical measures of the covariance and the associations between two or more variables (Zikmund et al., 2012). To this extent, a Pearson correlation analysis was conducted to analyse the relationship between the various components and the digital business success variable for five hypotheses. The correlation coefficients also indicated the relationship between the various elements within each of the BM design constructs. The Pearson correlation test can be classified as a non-parametric test (Field, 2013).

In addition, a Kendall's tau correlation analysis was conducted between the value capture and the digital business success component of the research. From the results of the Kendall's tau correlation analysis, more accurate generalisations could be drawn compared to the results from the Pearson and Spearman analysis (Field, 2013). The Kendall's value can be accepted as being a more accurate measure than the correlation in the population (Field, 2013).

4.6.6. Multivariate linear regression analysis

A multivariate linear regresion analysis was conducted to determine the cumulative influence of all six digital BM components (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) on the success of the DBS. Regression analysis is described as a dependency technique used to determine the relationship between dependent and independent variables (Zikmund et al., 2012). Multiple regression analysis is a common statistical technique used in applied research that provides information for further discussion regarding the individual and cumulative relationships between the various dependent and independent variables that forms part of a multiple regression equation (Green, 2014).

A possible shortcoming of regression analysis is that it provides relatively little information concerning the underlying relationships between the variables included in the regression equation. The main objective of the regression analysis is to identify the variables that are most suited to predict the future scenario that will "maximise the predictive power of the model" (Tinsley & Brown, 2000, p152). A dummy variable will be used to measure the influence of value capture that forms part of the multiple regresion anaylsis.

The proposed multivariate linear regression model for this research will be:

Digital business success = value delivery + value capture + value architecture + resources and competencies + data and analytics + value network

4.7. Research limitations

The limitation to the methods that were used for this research include:

- The research was not industry specific

The research that was conducted was across multiple industries. To this extent, the digital BM design will undoubtedly be influenced by the type of industries that formed part of this study. In addition, the research results will also not be able to provide specific industry BM design characteristics.

- Distribution of the questionnaire

The research was conducted through the use of an online questionnaire that was completed via the internet. For this reason, only participants that had access to an internet connection during the time of the research could form part of the study.

- Measure of DBS success

In order to establish the degree of digital BM success for each of the organisations that formed part of this research, the respondents were required to indicate the level of DBS success. The digital DBS success was self-reported in accordance with the perceived success associated with their respective digital BMs, thus this self-reported success factor will not be free of biases. In addition, this self-reported DBS success factor is not determined or verified objectively. Because of data limitations, the research did not allow for the evaluation or measure of value creation directly at the BM level.

- Implementation of the DBS and the digital BM

The research study did not evaluate the quality level of the management that designed or implemented the DBS at the respective organisations that formed part of this study.

- Scope of theory

The scope of the theory that is presented in this research paper and the data that were used did not allow the researcher to draw generalisable conclusions regarding the digital BM design in the larger population of organisations.

- Research experience

In conducting the non-probability sampling techniques that were used during this research, the experience of the researcher plays a vital role. To this extent, the researcher may not have had the adequate level of experience required in this field.

4.8. Conclusion

This chapter provided a deeper understanding of the testing of the hypotheses that were presented in Chapter 3. This chapter began with the research approach that was used to conduct the research, after which the questionnaire design and pretesting was discussed and the Cronbach's Alphas were presented. The limitations of the research approach were also described. This was followed by the population and sample frame section that, together with the specific sampling techniques, were used for this research.

The chapter then described the statistical tests that were chosen, followed by the limitations that need to be considered for this specific research. The researcher was aware of all the limitations that are associated with this particular study regarding the results that were obtained and the eventual interpretation of these results. The next chapter will discuss the results that were obtained in this study.

5 Chapter 5: Results

5.1. Introduction

This chapter will discuss the main findings of the data that were collected, as well as the statistical analysis that was conducted on them. The statistical analysis of each of the seven hypotheses will also be presented. Firstly, the sample size and response rate will be presented for the respondents who formed part of the final analysis; more specifically, the total population size was n=97 and the researcher assumed a statistical level of significance of 95 percent. The sample size and response rate description will be followed by the representation of the results of each of the seven hypotheses tested. The hypotheses that were tested are as follows:

Figure 6: Six hypotheses relating to each of the business model components

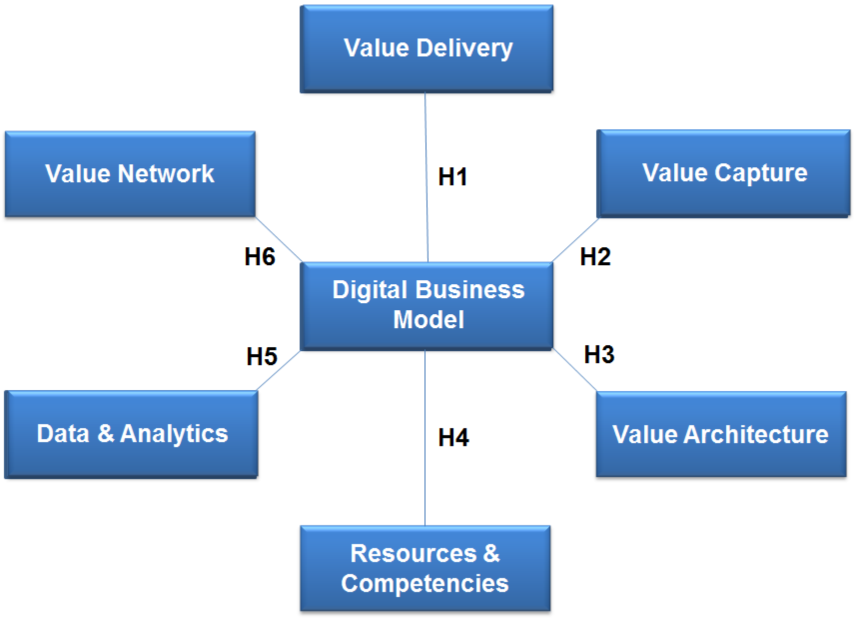
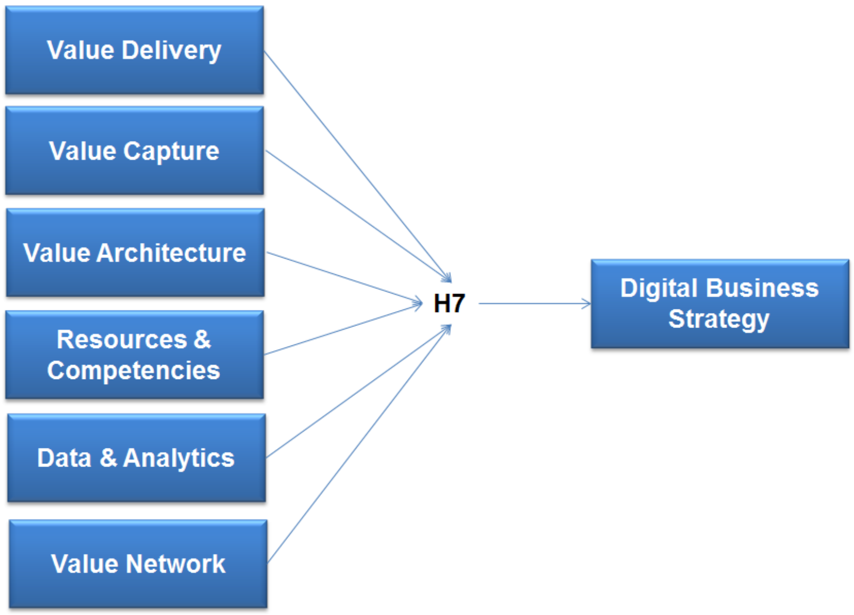


Figure 7: Cumulative component effect on digital business strategy



Hypothesis 1: There is a significant relationship between organisations that create a unique value proposition and the success of their digital business strategy.

Hypothesis 2: There is a significant relationship between an organisation's ability to successfully monetise their business model and the success of their digital business strategy.

Hypothesis 3: There is a significant relationship between an organisation-wide value architecture that forms part of the business model design and the success of the digital business strategy.

Hypothesis 4: There is a significant relationship between an organisation that possesses the appropriate resources and competencies that are dedicated to the business model and the success of the digital business strategy.

Hypothesis 5: There is a significant relationship between organisations that have the ability to adequately capture and analyse data and the success of their digital business strategy.

Hypothesis 6: There is a significant relationship between organisations that fully integrate their value network in their business model design and the success of their digital business strategy.

Hypothesis 7: All six of the business model components are able to collectively influence the success of the digital business strategy.

A factor analysis was conducted to statistically confirm and reduce the number of factors from all the various constructs in this study. The factor analysis was conducted through the use of a correlation matrix for all the variables that represented a particular factor construct. The PCA is a data reduction technique that is used to identify a relatively smaller number of components that would account for a relatively larger number of measures (Decoster, 1998). As such, the PCA was the most appropriate method of factor analysis for this particular study, because this approach allowed the researcher to identify and explain the underlying constructs in the field of DBS and digital BM design. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also chosen for this study. The KMO allows the researcher to run linear relationships between the variables and is used as a measure to determine if a PCA is the most appropriate analysis to be conducted on the dataset (Field, 2013).

In addition, a Bartlett's test results indicate whether the variance-covariance matrix of each of the factors are proportional to the identity matrix (Field, 2013). The total variance explained for the hypotheses represents the amount of variance of each of the components. The results indicated that all of the components that were analysed were retained and that there was no reduction in principle components for any of the five constructs analysed. In addition, a correlation analysis was conducted to determine the relationship between the value capture component for the digital BM and its relationship with the DBS success factor.

Finally, a multivariate linear regression analysis was conducted to determine the variance explained for the model and the relative contributions of each of the components of the model. The multivariate linear regression model represents the overall success of the DBS and how it is influenced by the respective digital business model components suggested by this study. The following results depict the sampling size and characteristics of the individual responses that formed part of the data analysis.

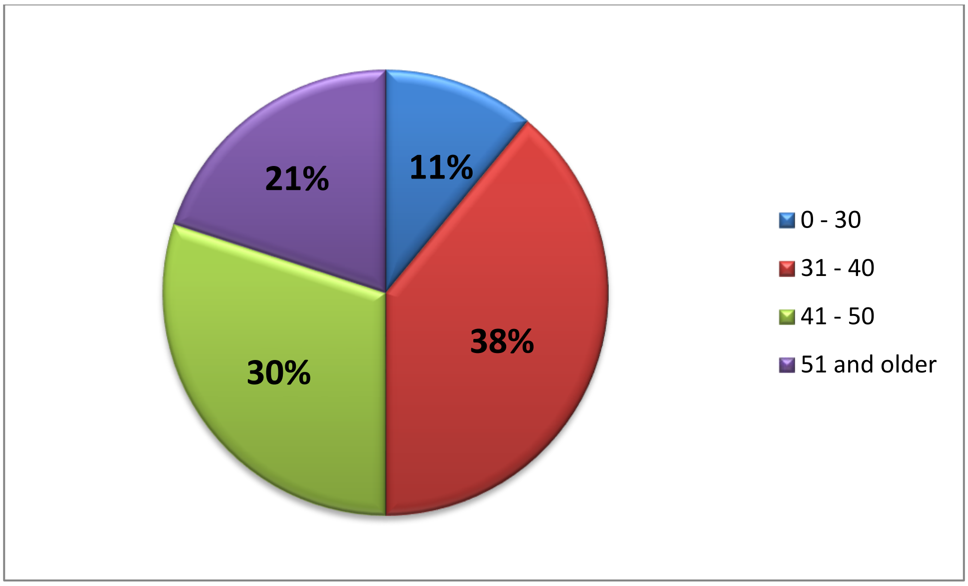
5.2. Sample size and response rate

In order to analyse the digital business components that form part of an organisation's digital business strategy, 465 individuals were directly contacted to complete the online questionnaire. From the distributed questionnaires, a total of 144 individuals partook in the questionnaires and a resulting 114 individuals completed the questionnaire. This yielded a response rate of 25 percent. Zikmund et al. (2012) suggested that a suitable response rate similar to the research method that was conducted in this study can be expected to be in excess of 10 percent. After further data editing, the responses from 17 respondents were removed, resulting in a final dataset of n=97 respondents. There were no outliers in the data as inspected through the use of a box and whisper plot for values greater than three box-lengths from the edge of the box.

5.2.1. Age groups of respondents

In total, 89 percent of the respondents that formed part of the sample were 31 years and older. The biggest group of respondents were in the age group 31-40 years, followed by the second biggest group being in 41-50 years group.

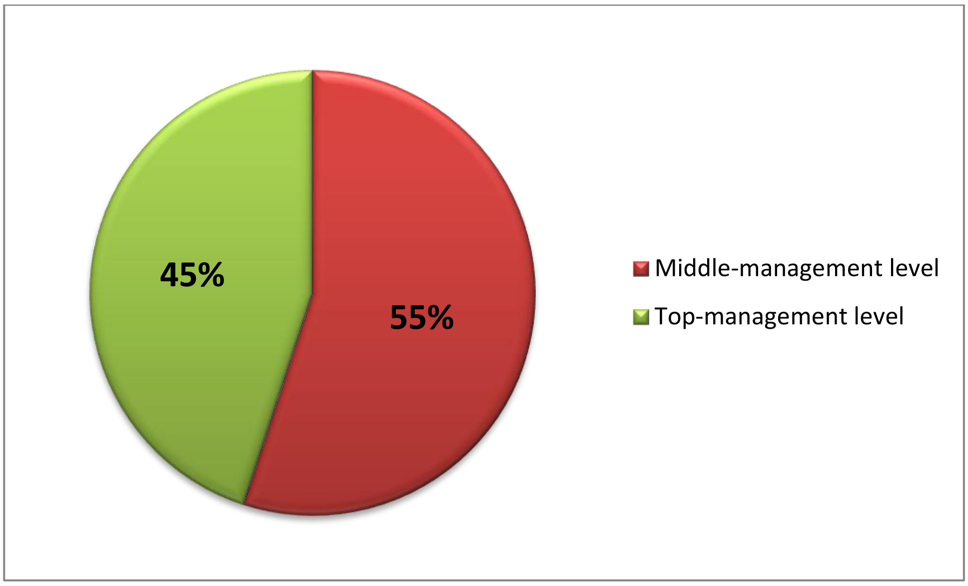
Figure 8: Age group percentage of the sample



5.2.2. Management level of respondents

The targeted sample was focused primarily on a strategic level - only responses from middle and top management levels fit the target sample criteria. The final dataset showed a similar number of middle and top managers.

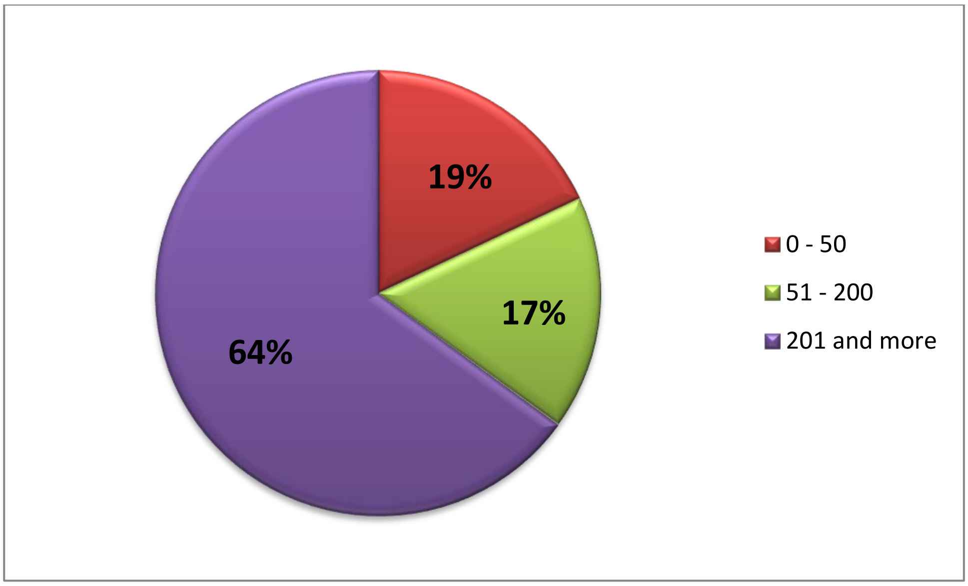
Figure 9: Management level of sample as a percentage



5.2.3. Number of employees in organisations

The majority (64 percent) of the organisations that were surveyed had an employee count in excess of 201 employees. The remaining 36 percent of the sample were divided between organisations with less than 50 employees and organisations with between 51 and 200 employees.

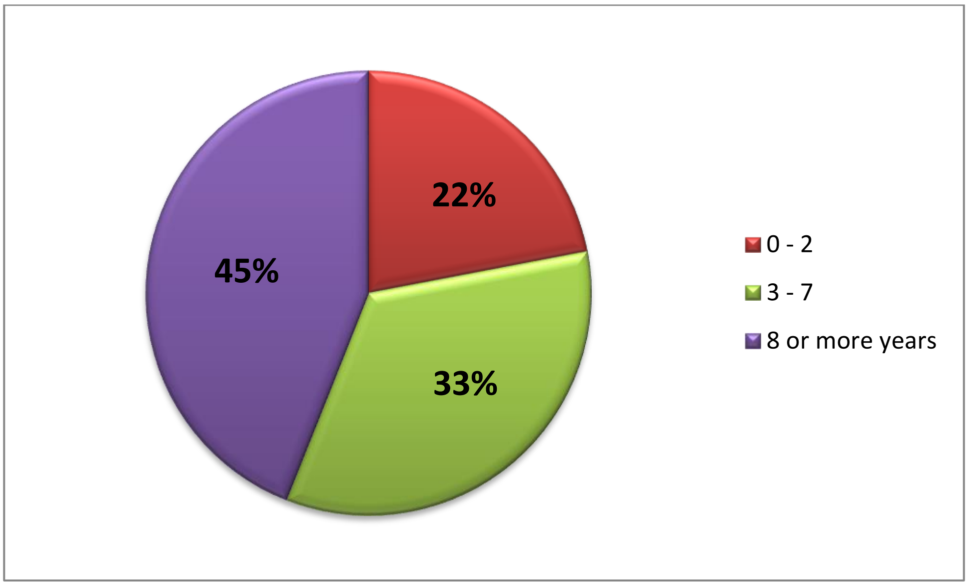
Figure 10: Number of employees in organisations as a percentage



5.2.4. Number of years employed with the current organisation

The survey data indicated that the majority (78 percent) of the respondents surveyed were employed for more than three years by their current employer at the time of the study. The biggest percentage (45 percent) of respondents surveyed was employed in excess of eight years with their current employers. The smallest group of respondents had been employed for less than two years with their current employers at the time of the study.

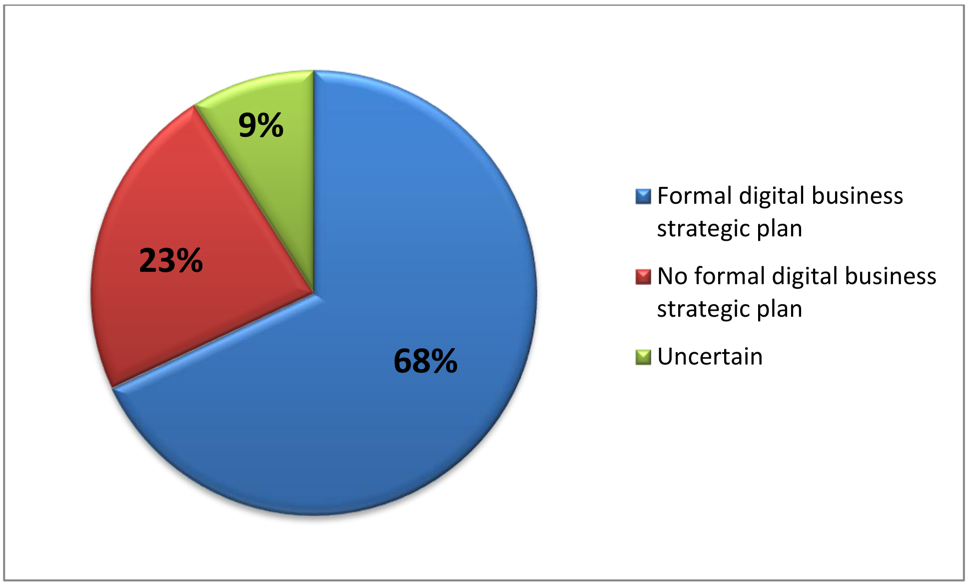
Figure 11: Number of years employed at current organisation as a percentage



5.2.5. Formal digital strategy plan

From the 97 respondents that formed part of the data analysis, 68 percent of the companies had a formal digital strategy plan in place at the time of the study. Because the survey was conducted with respondents who were actively involved with digital strategy formulation, it can be inferred with relative confidence that the respondents would be aware of the existence of a digital strategy plan if such a formal strategy indeed existed. To this extent, one can conclude from the "uncertain" responses that were captured from the respondents that these organisations did not have a formal digital strategy plan in place. This brought the total of non-formal digital strategy plan organisations to 32 percent.

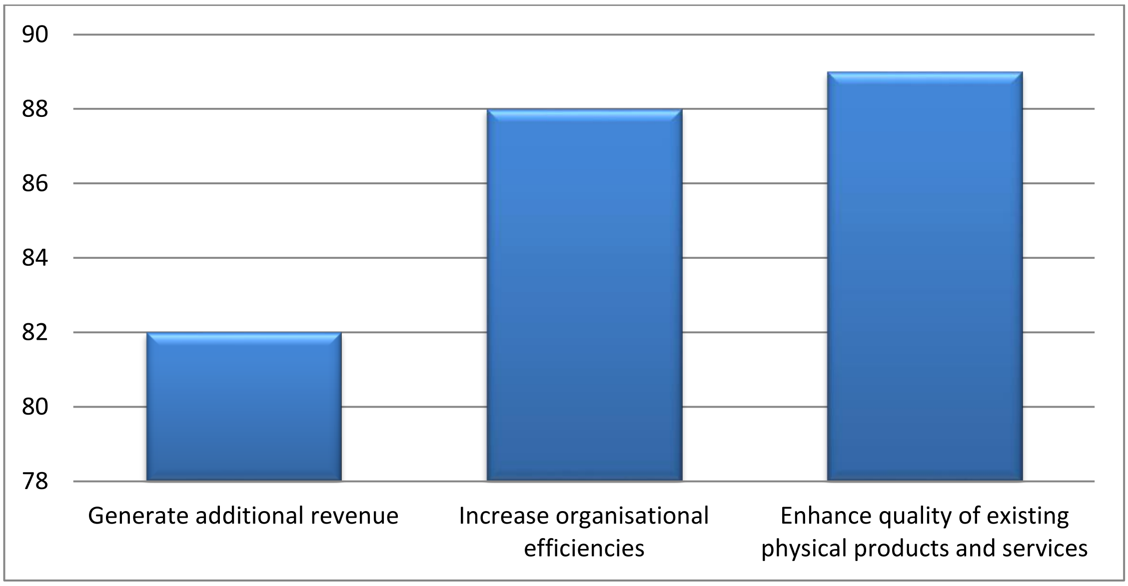
Figure 12: Percentage of organisations with a formal digital strategy plan



5.2.6. The digital strategy plan objectives

In total, 82 respondents (85 percent) indicated that their digital initiatives are aimed at creating new revenue streams for their organisations through digital channels. The results also showed that 88 respondents (90 percent) indicated that their digital initiatives are aimed at increasing their internal organisational efficiencies through the integration of digital capabilities. The majority of the respondents (89 respondents, 92 percent) indicated that their digital initiatives are aimed at enhancing the quality of their current physical products and services.

Figure 13: Digital business strategy objectives

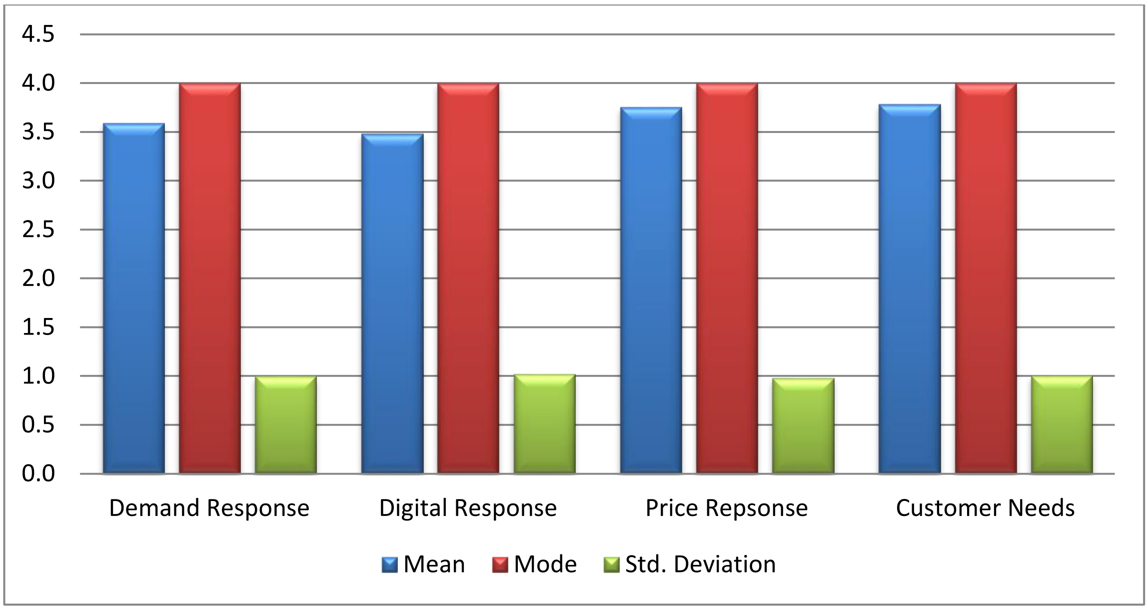


A correlation analysis was subsequently conducted in order to understand the relationship between the digital business strategy objectives and their relationship with the DBS of the organisation.

5.3. Hypothesis 1 – Value delivery

5.3.1. Descriptive Statistics

Figure 14: Value capture variable: Mean, Mode and Standard Deviation



The value delivery is comprised of four dependent variables: (1) the ability of an organisation to respond to changes in the aggregate demand, (2) the ability of an organisation to respond to new digital products and services launched by their competitors, (3) the ability of an organisation to respond to price changes in their competitors' prices and (4) the ability to deliver digital products and services that adequately meet the needs of the consumer in the digital economy.

The mean scores for the various value delivery variables ranged from 3.485 for the digital response variable to 3.784 for the consumer needs variable. The mode scores for all the variables in the value delivery construct was four (Agree, according to the five point Likert Scale). The standard deviation ranged from between 0.9793 for the price response variable to 1.0218 for the digital response variable. The variables in the value delivery construct was analysed through the use of a PCA.

5.3.2. Principle Component Analysis

From the variable list, three variables represented communalities above 0.5 (see Appendix B). For the purpose of this study, the price response variable was included in the construct with a communality value of 0.468. This variable was included to better understand the relationship between a firm's ability to react to price changes in the market and how this ability affects the success of the digital initiatives of the firm.

The PCA was conducted on the four variables that were selected to form part of the value delivery with n=97. By analysing the correlation matrix (see Appendix B), it is evident that all the variables had correlation coefficients greater than 0.3.

The overall KMO was measured at 0.768 (Table 2), which can be classified as middling (Kaiser, 1974). In conjunction with the KMO result, the Bartlett's test was statistically significant at $p < .05$ at six degrees of freedom, indicating that the data were factorisable.

Table 2: KMO and Bartlett's test results for the value delivery construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.768
Bartlett's Test of Sphericity	Approx. Chi-Square	130.545
	Df	6
	Sig.	.000

The individual KMO variable correlation results indicate that for the individual variables, the KMO measures were all in excess of 0.7 (see Appendix B). These results can also be classified as middling (Kaiser, 1974).

Analysing the result from the total variance explained measurement, only one variable had an eigenvalue that was greater than one (Table 3). This one variable explains 63.967 percent of the total variance.

Table 3: Total variance explained results for the value delivery construct

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.559	63.967	63.967	2.559	63.967	63.967
2	.687	17.164	81.132			
3	.406	10.140	91.272			
4	.349	8.728	100.000			

5.3.3. Correlation analysis

A Pearson's value delivery digital business success correlation was run to determine the relationship between an organisation's ability to deliver a digital value proposition and the success of the overall digital business strategy. The results indicate a strong positive statistical correlation between an organisation's value delivery component of a BM and the success of their DBS, $r(95) = .772$, $p < .05$ (Table 4). The value delivery component explains 60 percent of the variance of the digital business success.

Table 4: Correlation analysis: Value delivery and digital business success

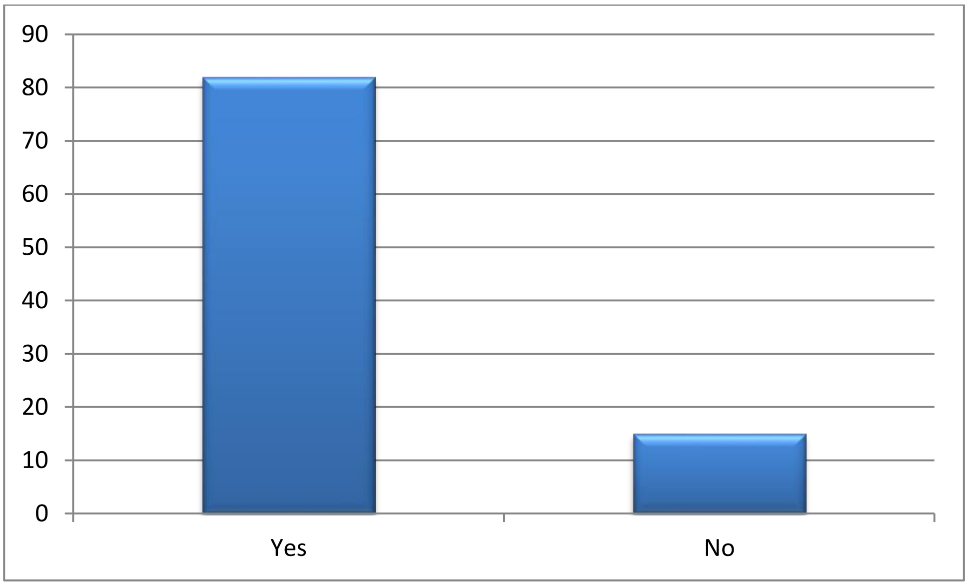
Correlations		Value Delivery
Digital Business Success	Pearson Correlation	.772
	Sig. (2-tailed)	0.00
	N	97

5.4. Hypothesis 2 – Value Capture

5.4.1. Descriptive statistics

From the dataset n=97, 81 respondents (84 percent) indicated that their organisations successfully generate revenue from their digital initiatives. In total, 16 respondents (16 percent) indicated that their digital initiatives did not generate revenue.

Figure 15: Organisations where revenue is generated through digital initiatives



In order to analyse the relationship between the value capture construct and DBS success, a correlation analysis was conducted.

5.4.2. Correlation analysis

A Kendall's tau-b correlation analysis was conducted to determine the relationship between the value capture construct and the DBS success variable in the dataset. The value capture construct represents the organisation's ability to generate revenue from their digital initiatives. The results indicated a medium positive correlation between an organisation's revenue generating ability from digital initiatives in relationship to the success of the DBS (Table 5). The relationship is statistically significant, $\tau b = 0.322$, $p < .05$.

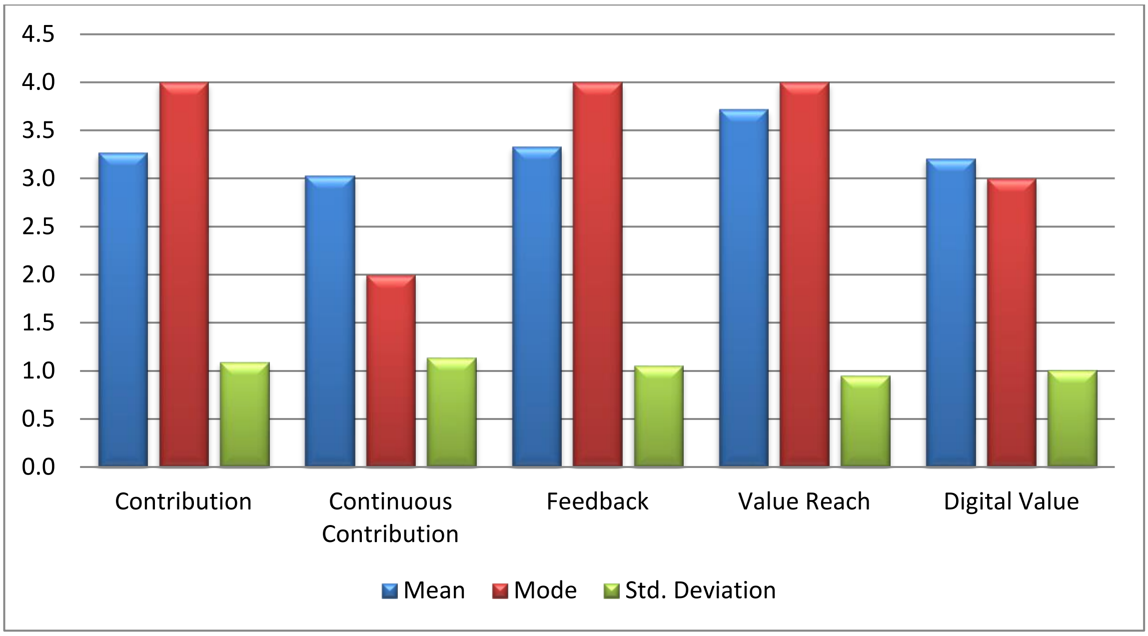
Table 5: Correlation matric for DBS success and the revenue generation construct

			Digital Business Success
Kendall's tau b	Revenue Generation	Correlation Coefficient	0.322
		Sig. (2-tailed)	.000
		N	97

5.5. Hypothesis 3 – Value architecture

5.5.1. Descriptive statistics

Figure 16: Value architecture variables: Mean, Mode and Standard Deviation



The value architecture is comprised of five independent variables: (1) the contribution from all the business units towards the digital initiatives, (2) the continued support to the execution of the digital initiatives, (3) the extent to which feedback is provided to all the business units regarding the DBS, (4) the extent to which the DBS creates value throughout all the business units and (5) the value created by the DBS.

The mean scores for the various value architecture variables ranged from 3.030 for the continuous contribution variable to 3.722 for the value reach variable. The mode score for all the variables were four (Agree, according to the five point Likert scale). The standard deviation ranged from 0.9546 for the value reach variable to 1.1407 for the continuous contribution variable.

To analyse the relationship between organisations that has defined their digital value architecture as being core to their digital business strategy and the overall success of their digital initiatives, a PCA analysis was conducted.

5.5.2. Principle Component Analysis

A PCA was conducted on the five variables that form part of the value architecture construct with n=97. As with the previous two constructs, the correlation matrix (see

Appendix B), indicated that it is evident that all the variables had at least one correlation coefficient that was greater than 0.3. The correlation matrix indicated that all 10 of the variable correlations were above 0.3.

The overall KMO was measured at 0.795 (Table 6), which can be classified as middling (Kaiser, 1974). The Bartlett's test was statistically significant at $p < .05$ at 10 degrees of freedom, indicating that the analysed data were factorisable.

Table 6: KMO and Bartlett's test results for the value architecture construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	231.858
	df	10
	Sig.	.000

The total variance explained results indicated that only one variable had an eigenvalue that was greater than one, which subsequently explained 64.226 percent of the total variance (Table 7). All five of the variables in the value architecture construct had communalities above the 0.5 threshold (Field, 2013) (see Appendix B).

Table 7: Total variance explained results for the value architecture construct

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.211	64.226	64.226	3.211	64.226	64.226
2	.649	12.986	77.212			
3	.505	10.107	87.318			
4	.462	9.240	96.559			
5	.172	3.441	100.000			

5.5.3. Correlation analysis

A Pearson's value architecture digital business success correlation was run to determine the relationship between how well the value architecture was designed within an organisation and the success of the overall digital business strategy. The results indicated a strong positive statistical correlation between an organisation's value architecture component of the BM design and the success of the DBS, $r(95) = .643$, $p < .05$ (Table 8). The value architecture component explained 41 percent of the variance of the digital business success.

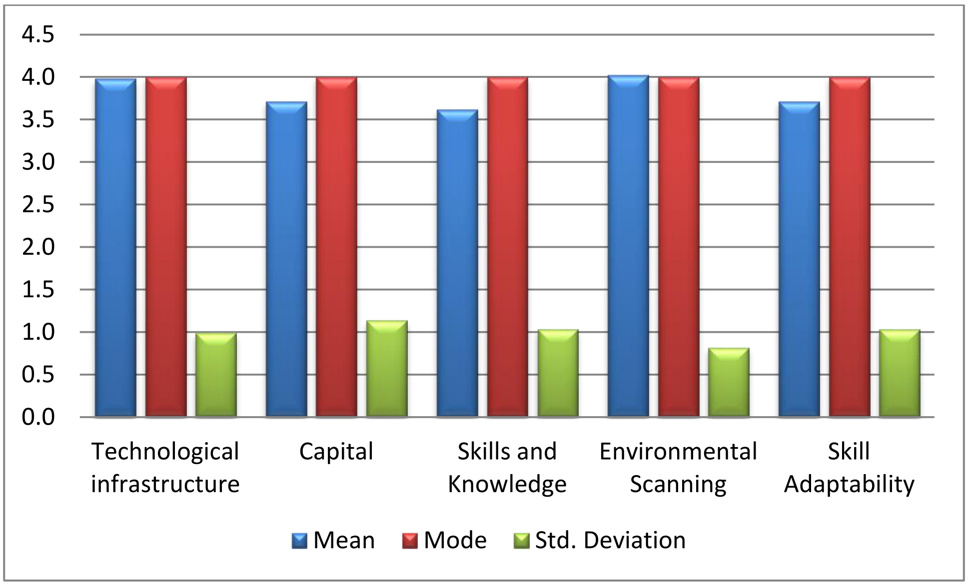
Table 8: Correlation analysis: Value architecture and digital business success

Correlations		Value Architecture
Digital Business Success	Pearson Correlation	0.643
	Sig. (2-tailed)	.000
	N	97

5.6. Hypothesis 4 – Resources and Competencies

5.6.1. Descriptive statistics

Figure 17: Resources and competencies variables: Mean, Mode and Standard Deviation



The resources and competencies construct is comprised of five independent variables: (1) the availability of technological infrastructure to operate effectively, (2) capital availability towards the digital initiatives, (3) skills and knowledge required in a digital economy, (4) ability to effectively identify digital opportunities and (5) ability to quickly learn and apply new technology and skills.

The mean scores for the resources and competencies variables ranged from 3.711 for capital availability allocated to the digital business strategy of the organisations, to

4.021 for the environmental scanning ability of organisations. The mode score for all the variables in the resources and competency construct was four (Agree, according to the five point Likert scale). The standard deviation ranged from 0.8162 for the environmental scanning variable to 1.1361 for the capital variable.

In determining whether there is a significant relationship between organisations that possess sufficient levels of resources and competencies and if these factors influence the overall successfulness of their digital initiatives, the construct was subjected to a PCA.

5.6.2. Principle Component Analysis

The PCA was conducted on five variables that form part of the resources and competencies construct from the 97 respondents. By analysing the correlation matrix (see Appendix B), it is evident that all the variables had at least one correlation coefficient that was greater than 0.3. The correlation matrix indicated that all 10 variables had a correlation above 0.3 (See Appendix B).

The overall KMO was measured at 0.769 (Table 9). Kaiser (1974) classifies this result as being middling. In conjunction with the KMO result, the Bartlett's test of sphericity was statistically significant at $p < .05$ at 10 degrees of freedom, indicating that the data were factorisable.

Table 9: KMO and Bartlett's test results for resources and competencies construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.769
Bartlett's Test of Sphericity	Approx. Chi-Square	219.088
	df	10
	Sig.	.000

The individual KMO variable correlation results indicated that for the individual variables, the KMO measures were all in excess of 0.7 (see Appendix B) and can also be classified as middling to meritorious (Kaiser, 1974).

When analysing the result from the total variance explained measurement, only one variable had an eigenvalue that was greater than one, which explains 61.875 percent of the total variance (Table 10).

Table 10: Total variance explained results for resources and competencies construct

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.094	61.875	61.875	3.094	61.875	61.875
2	.899	17.982	79.857			
3	.442	8.848	88.705			
4	.312	6.237	94.942			
5	.253	5.058	100.000			

All the variables in the resources and competencies construct had communalities above the 0.5 threshold (Field, 2013). Field suggested that with samples ranging between approximately 100 and 200, the minimum communality level should not be below the 0.5 range. To this extent, all the valuables in the resources and competencies construct were above the 0.5 range and were retained for this particular construct (see Appendix B). For the purposes of analysing the resources and competencies construct, all five of the variables were included in this study.

5.6.3. Correlation analysis

A Pearson's resources and competencies digital business success correlation was run to determine the relationship between an organisation's resources and competencies and the success of the overall digital business strategy. The results indicated a strong positive statistical correlation between an organisation's resources and competencies component of the BM design and the success of the DBS, $r(95) = .710$, $p < .05$ (Table 11). The resources and competencies component explains 50 percent of the variance of the digital business success.

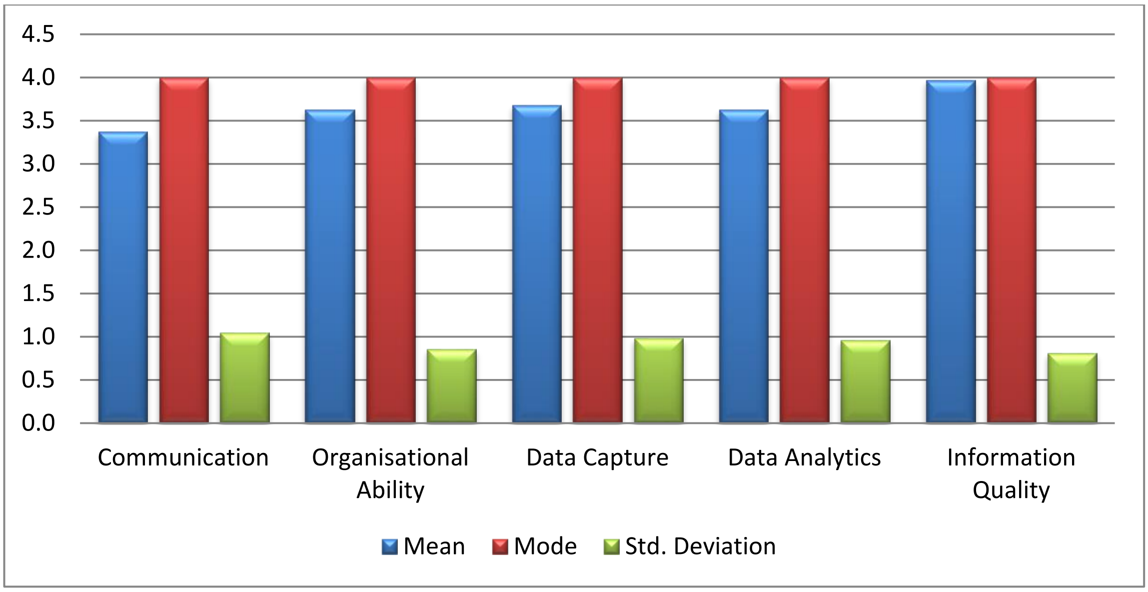
Table 11: Correlation analysis: Resources and competencies and digital business success

Correlations		Resources and Competencies
Digital Business Success	Pearson Correlation	0.710
	Sig. (2-tailed)	.000
	N	97

5.7. Hypothesis 5 – Data and data analytics

5.7.1. Descriptive statistics

Figure 18: Data and data analytics variables: Mean, Mode and Standard Deviation



The data and data analytics construct was comprised of five independent variables: (1) information generated by data analytics are effectively communicated back into the organisation, (2) the organisation has the ability (technological, individual skills and technological leadership) to capitalise on data that are generated, (3) data are captured across all the business units, (4) the organisation is able to extensively analyse the captured data and (5) the information generated by the data analytics is useful to the organisation.

The mean scores for the various data and data analytics variables ranged from 3.371 for communication variable to 3.969 for the information quality variable. The mode score for all the variables in the data and data analytics construct is four (Agree according to the five point Likert Scale). The standard deviation ranged from 0.8095 for the information quality variable to 1.0440 for the communication variable.

Similarly, a PCA analysis was conducted to analyse the relationship between organisations that have sufficient data and data analytical capability and how this digital component influences the overall success of the digital business model.

5.7.2. Principle Component Analysis

From the variable list, five variables represented communalities above 0.5. To this extent, the test was run until there were no communalities less than 0.5 (two iterations) (see Appendix B).

The PCA was conducted on five variables that formed part of the data and data analytics construct with n = 97. The correlation matrix (see Appendix B) indicated that it is evident that all the variables had at least one correlation coefficient that was greater than 0.3. The correlation matrix indicated that all of the 10 variables had a correlation above 0.3.

The overall KMO is measured at 0.784 (Table 12). According to Kaiser (1974), the result can be classified as middling (0.7 ≤ KMO < 0.8). The Bartlett's test was statistically significant at $p < .05$ at 10 degrees of freedom, indicating that the analysed data was factorisable.

Table 12: KMO and Bartlett's test results for the data and data analysis construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	168.785
	df	10
	Sig.	.000

Analysing the result from the total variance explained measurement, the results indicate that only one variable has an eigenvalue that is greater than one, which explains 58.279 percent of the total variance (Table 13).

Table 13: Total variance explained results for the data and data analysis construct

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.914	58.279	58.279	2.914	58.279	58.279
2	.740	14.808	73.087			
3	.599	11.971	85.058			
4	.484	9.680	94.738			
5	.263	5.262	100.000			

5.7.3. Correlation analysis

A Pearson's data and analytics digital business success correlation was run to determine the relationship between an organisation's data capture and data analytical capabilities and the success of the overall digital business strategy. The results indicated a strong positive statistical correlation between an organisation's resources and competencies component of the BM design and the success of the DBS, r(95) = .679, p < .05 (Table 14). The data and data analytics component explained 46 percent of the variance of the digital business success.

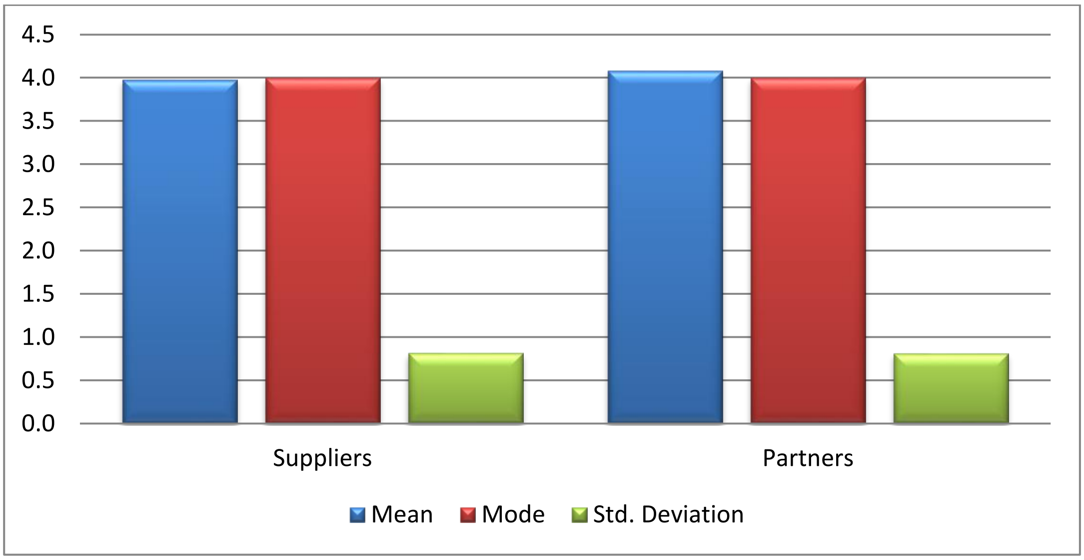
Table 14: Correlation analysis: Data and data analytics and the digital business success

Correlations		Data and Data Analytics
Digital Business Success	Pearson Correlation	0.679
	Sig. (2-tailed)	.000
	N	97

5.8. Hypothesis 6 – Value network

5.8.1. Descriptive statistics

Figure 19: Value network variables: Mean, Mode and Standard Deviation



The value network construct was comprised of two independent variables: (1) suppliers play a vital role that enables an organisation to compete in the digital economy, and (2) partnerships that enable organisations to digitally compete.

The mean scores for the two value network variables were 3.9794 for the supplier's variable and 3.083 for the partnership variable. The mode score for the two variables were both four (Agree, according to the five point Likert Scale). The standard deviation ranged from 0.8123 for the partnership variable to 0.8162 for the supplier variable.

To analyse the relationship between organisations that have developed their digital value network with regard to their digital business strategy and the overall success of their digital initiatives, a PCA analysis was conducted.

5.8.2. Principle Component Analysis

From the variable list, two variables represented communalities above 0.5. The test was run through two iterations until there were no communalities less than 0.5 (see Appendix B).

The PCA was conducted on the two variables that formed part of the value network construct from the 97 respondents. The correlation matrix indicated that the correlation between the two variables was above 0.3 (see Appendix B).

The overall KMO was measured at 0.500 (Table 15). According to Kaiser (1974), this result can be classified as being middling. In conjunction with the KMO result, the Bartlett's test of sphericity was statistically significant at $p < .05$ at one degree of freedom, indicating that the data were factorisable. The individual KMO variable correlation results indicated that for the individual variables, the KMO measures were all in excess of 0.5 (see Appendix B).

Table 15: KMO and Bartlett's test results for the value network construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	58.216
	df	1
	Sig.	.000

When analysing the result from the total variance explained measurement, only one variable had a eigenvalue greater than one, which explains 83.909 percent of the total variance (Table 16).

Table 16: Total variance explained results for the value network construct

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.678	83.909	83.909	1.678	83.909	83.909
2	.322	16.091	100.000			

5.8.3. Correlation analysis

A Pearson's value network digital business success correlation was run to determine the relationship between an organisation's value network and the success of the overall digital business strategy. The results indicated a weak positive statistical correlation between an organisation's value network component of a BM design and the success of the DBS, r(95) = .211, p < .05 (Table 17). The value network component explains four percent of the variance of the digital business success.

Table 17: Correlation analysis: Value network and digital business success

Correlations		Value Network
Digital Business Success	Pearson Correlation	0.211
	Sig. (2-tailed)	0.038
	N	97

A multivariate regression analysis was then conducted to determine whether the six digital business model components posed by this study were statistically significant in influencing the success of the DBS in organisations.

5.9. Hypothesis 7 – Cumulative effect of all components on digital business success

5.9.1. Multivariate linear recreation – six component model

A multiple regression analysis was conducted to predict the digital business success from the cumulative influence of all six BM components (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network).

From Table 18 it can be seen that the results indicate that there is independence of residuals, as assessed by a Durbin-Watson statistic of 2.231.

Table 18: Model summary for a six component model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.844	.712	.693	.70536	2.231

The results from the ANOVA analysis (Table 19) indicate that the model is statistically significant in predicting the success of the digital business model of an organisation, $F(6,90) = 18.445$, $p < .05$.

Table 19: ANOVA for a six component model

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	110.728	6	18.445	37.093	.000
	Residual	44.778	90	.498		
	Total	155.505	96			

All the assumptions regarding linearity, homoscedasticity, the independence of errors, normality of residuals and unusual points were met for this multiple regression analysis. Only four of the six variables were statistically significant in predicting the success of the digital business model. The standard errors for the regression can be found in Table 20 and the t values in Table 21.

Table 20: Estimated model coefficients for a six component model

	Unstandardised Coefficients		Standardised Coefficients
Model	B	Std. Error	Beta
(Constant)	-0.176	0.526	
Value Capture	0.546	0.213	0.156
Resources & Competencies	0.379	0.139	0.235
Data and Analytics	0.222	0.171	0.12
Value Architecture	0.248	0.12	0.164
Value Network	-0.009	0.102	-0.005
Value Delivery	0.577	0.131	0.392

Table 21: Statistical significance of the independent variables for a six component model

Model	t	Sig.	95.0% Confidence Interval for B	
			Lower Bound	Upper Bound
(Constant)	-0.335	0.739	-1.221	0.869
Value Capture	2.564	0.012	0.123	0.968
Resources & Competencies	2.724	0.008	0.103	0.656
Data & Analytics	1.296	0.198	-0.118	0.562
Value Architecture	2.058	0.042	0.009	0.487
Value Network	-0.088	0.930	-0.211	0.193
Value Delivery	4.391	0.000	0.316	0.837

5.9.2. Multivariate linear recreation – four component model

A second multiple regression analysis was conducted which included four of the original six components that formed part of the six components' multiple variate linear regression. The four components included the:

- value delivery component;
- value capture component;
- value architecture component; and
- resources and competencies component.

From Table 22 the results indicate that there is independence of residuals as assessed by a Durbin-Watson statistic of 2.248.

Table 22: Model summary for a four component model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.841	.707	.694	.70414	2.248

The results from the ANOVA analysis (Table 23) indicate that the model is statistically significant in predicting the success of the digital business model of an organisation: $F(4,92) = 27.472$, $p < .05$.

Table 23: ANOVA for a four component model

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	109.890	4	27.472	55.408	.000
	Residual	45.615	92	.496		
	Total	155.505	96			

All the assumptions regarding linearity, homoscedasticity, the independence of errors, normality of residuals and unusual points were met for this multiple regression analysis. All four of the variables were statistically significant in predicting the success of the digital business model. The standard errors for the regression can be found in Table 24 and the t values in Table 25.

Table 24: Estimated model coefficients for a four component model

Model	Unstandardised Coefficients B	Std. Error	Standardised Coefficients Beta
(Constant)	0.024	0.380	
Value Capture	0.501	0.208	0.143
Resources & Competencies	0.441	0.131	0.273
Value Architecture	0.289	0.115	0.192
Value Delivery	0.643	0.119	0.437

Table 25: Statistical significance of the independent variables for a four component model

Model	t	Sig.	95.0% Confidence Interval for B	
			Lower Bound	Upper Bound
(Constant)	0.063	0.950	-1.221	0.869
Value Capture	2.411	0.018	0.123	0.968
Resources & Competencies	3.378	0.001	0.103	0.656
Value Architecture	2.518	0.014	-0.118	0.562
Value Delivery	5.422	0.000	0.009	0.487

5.10. Conclusion

Hypothesis 1: There is a significant relationship between organisations that create a unique value proposition and the success of their digital business strategy.

The correlation analysis results indicated a strong positive correlation between the value proposition component of the digital BM and the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between value delivery and digital business success.

Hypothesis 2: There is a significant relationship between an organisation's ability to successfully monetise their business model and the success of their digital business strategy.

The correlation analysis results indicated a medium positive correlation between revenue generating ability from digital initiatives and its relationship to the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between revenue generating ability and digital business success.

Hypothesis 3: There is a significant relationship between an organisation-wide value architecture that forms part of the business model design and the success of the digital business strategy.

The correlation analysis results indicated a strong positive correlation between the value architecture component of the digital BM and the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between value architecture and digital business success.

Hypothesis 4: There is a significant relationship between an organisation that possesses the appropriate resources and competencies that are dedicated to the business model and the success of the digital business strategy.

The correlation analysis results indicated a strong positive correlation between the resource and competencies component of the digital BM and the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between resources and competencies and digital business success.

Hypothesis 5: There is a significant relationship between organisations that have the ability to adequately capture and analyse data and the success of their digital business strategy.

The correlation analysis results indicated a strong positive correlation between the data and data analytics component of the digital BM and the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between data and data analytics and digital business success.

Hypothesis 6: There is a significant relationship between organisations that fully integrate their value network in their business model design and the success of their digital business strategy.

The correlation analysis results indicated a weak positive correlation between the value network component of the digital BM and the success of the DBS. The relationship was statistically significant at $p < .05$. The null hypothesis can thus be rejected as there is a positive statistically significant relationship between the value network and digital business success.

Hypothesis 7: All six of the business model components are able to collectively influence the success of the digital business strategy.

A multivariate linear regression analysis was conducted to analyse the cumulative effect of all six of the BM components simultaneously to predict digital business success. Although the model was statistically significant at $p < .05$, only four of the six (value delivery, value capture, value architecture and resources and competencies) components were statistically significant in predicting the success of the DBS. Thus the null hypothesis cannot be rejected because only four BM components are statistically significant to cumulatively determine the success of the DBS.

The results from Chapter 5 and their impact on digital business model design will be presented in Chapter 6.

6 Chapter 6: Discussion of Results

6.1. Introduction

This chapter will summarise the study as well as provide a discussion on the findings related to each of the six digital business model components. In addition, the recommendations for further research will be described with a limitations section, before a conclusion is made. The purpose of this chapter is to expand on the current knowledge regarding digital BM design and the relationship between the identified six digital BM components and how each of the components influence the success of the DBS. The chapter will also evaluate the results related to the cumulative influence that all six BM components simultaneously exert on digital business success.

6.2. Summary of the study

The purpose of this study was to identify the extent to which a set of six digital BM components form part of a digital BM design and their influence on the success of a DBS. This research further established the extent to which these BM components individually and cumulatively influence the success of a DBS. There is a need for organisations to be effective in their digital BM design in order to remain competitive and capitalise on the digital opportunities available in the new digitally enabled economy, and a DBS must take cognisance of technological advancement and opportunities that arise (Baden-Fuller & Haefliger, 2013). In addition, for a DBS to be successful an organisation's leaders must place greater emphasis on leveraging these technological advancements and aligning the DBS of the organisation to continuously enable the creation of innovative digital value propositions (Bennis, 2013).

The study was conducted through the means of a self-administered questionnaire by the targeted respondents, which was quantitatively analysed. The sample frame (Zikmund et al., 2012) was aimed at a strategic level and focused on employees within organisations where a DBS was present and/or the companies offered a digital product(s) and/or service(s) to the market. Because the unit of analysis was at a strategic level, only responses from middle to senior management formed part of this research.

The study included 97 respondents (44 middle management respondents and 53 senior management respondents) who were involved with DBS formulation and execution across various industries. From the sample, 66 respondents indicated that their respective organisations had a formal DBS in place (Figure 12). A demographic description was provided in Chapter 5 that indicated the size of the companies (according to head count) and the number of years' experience of the respondents. The study included six hypotheses that tested the individual relationships between the various BM components that were posed for this study. A seventh hypothesis tested the cumulative influence that all the BM components simultaneously had in determining the success of the DBS. The seven hypotheses were:

Hypothesis 1: There is a significant relationship between organisations that create a unique value proposition and the success of their digital business strategy.

Hypothesis 2: There is a significant relationship between an organisation's ability to successfully monetise their business model and the success of their digital business strategy.

Hypothesis 3: There is a significant relationship between an organisation-wide value architecture that forms part of the business model design and the success of the digital business strategy.

Hypothesis 4: There is a significant relationship between an organisation that possesses the appropriate resources and competencies that are dedicated to the business model and the success of the digital business strategy.

Hypothesis 5: There is a significant relationship between organisations that have the ability to adequately capture and analyse data and the success of their digital business strategy.

Hypothesis 6: There is a significant relationship between organisations that fully integrate their value network in their business model design and the success of their digital business strategy.

Hypothesis 7: All six of the business model components are able to collectively influence the success of the digital business strategy.

6.3. Discussion of the findings

6.3.1. Value delivery

The value delivery component of the digital business model represents the digital value proposition of the BM. Firstly, the value proposition represents the organisation's ability to respond to changes in demand patterns in its environment. Secondly, it embodies the digital and price responsiveness of organisations. Lastly, it represents the firm's ability to create unique digital offerings to cater to the changing needs of their consumers.

The results from Table 4 in Chapter 5 indicate that there is indeed a strong positive statistically significant relationship between organisations that are able to create unique digital value propositions and successful digital business strategies. In addition, the results from the six components' (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in Chapter 5 (Table 21) indicate that the value delivery component is statistically the strongest component of the six BM components that simultaneously influence digital business success. The results from the four components' (value delivery, value capture, value architecture, resources and competencies) multivariate linear regression analysis in Chapter 5 (Table 25) also indicate that value delivery component is statistically the strongest component of the four BM components that simultaneously influence digital business success.

The results from the present study confirm the findings of Boons and Lüdeke-Freund (2013) that state the importance of the value proposition relative to the BM to continuously create new sources of value for the customer. The digital value propositions that are formed by organisations are characterised as being dynamic in nature and constantly evolving. These digital offerings are not only intangible but also ubiquitous (Teece, 2010), and organisations must initially develop a conceptual understanding of the type of value proposition the organisation would ideally want to develop without being limited to the resources and competencies of that specific organisation. Instead, organisations should leverage the dynamic capabilities that exist between the DBS and the BM design (DaSilva & Trkman, 2014) and not be bound by their perceived limitation of the specific industry boundaries in developing their value delivery component (Porter & Heppelmann, 2014). In order for the digital value proposition to create a sustained competitive advantage, the value proposition must remain in a dynamic state and constantly be reviewed and modified by the DBS. Importantly, the value proposition is not formed in isolation from the value capture component of the digital BM.

6.3.2. Value capture

As mentioned in the above section, the value capture component is formed in conjunction with the value delivery component. The organisation forms a conceptual understanding of a planned value proposition while at the same time developing a strategy on how value will be captured and extracted from the digital initiative. The research aimed to establish if there is a relationship between an organisation's ability to monetise the digital offering and the success of the digital business strategy.

In order to formulate a better understanding of the value capture component it is important to know what the main objectives of the digital offerings are for the organisations that formed part of the research study. The results from Figure 13 in Chapter 5 indicate that the majority of organisations use their digital initiatives with the main aim of enhancing the quality of their existing physical products and services. The second most important objective is to increase internal efficiencies with a digital initiative, followed by the perspective of launching digital offerings with the goal of creating additional revenue streams. All three of the objectives listed are described as the monetisation of the value proposition. Monetisation reflects any manner in which money, revenue or other returns are captured by the BM, creating value for the organisation (Baden-Fuller & Haefliger, 2013).

In addition, a correlation analysis was conducted to examine the relationship between the organisation's ability to generate revenue from its digital initiatives and the success of the digital business strategy. The results from Table 5 in Chapter 5 indicate that there is a medium positive statistically significant relationship between a firm's ability to generate revenue and the success of the digital business strategy. In addition, the results from the six components' (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in Chapter 5 (Table 21) indicate that the value capture component is statistically the third strongest component of the six BM components that simultaneously influence digital business success. The results from the four components' (value delivery, value capture, value architecture, resources and competencies) multivariate linear regression analysis in Chapter 5 (Table 25) also indicated that the value capture component is statistically the third strongest component of the four BM components that simultaneously influence digital business success.

The results confirm the suggestions from Baden-Fuller and Haefliger (2013) that it is of vital importance to firms to capture value through their BM while delivering a value proposition. Teece (2010) explained that the BM design forms the premise of how successful an organisation will be at extracting value from the digital initiative. The value capture component of the digital BM cannot be seen as separate from the value delivery component, and neither of the two components can be developed without a well-designed digital BM. In the initial stages of the digital BM design, a conceptual understanding of the value capture component is formulated in conjunction with the conceptual value proposition. Through the interaction between the organisation's internal and external digital BM components which are underpinned by the dynamic capabilities, organisations create dynamic value propositions and value capture components that constantly evolve in accordance with the changing needs in the organisation's environment. Through continuous review, the value capture component constantly adapts in accordance with the DBS. In order to develop the conceptual value proposition and value capture component into their dynamic market ready states, the firm needs to leverage its internal and external capabilities through the value architecture BM component.

6.3.3. Value architecture

The next component to be analysed is the value architecture component of the digital BM design of the organisation. The value architecture provides the framework for an organisation regarding resource management that allows a firm to continuously create value propositions for dynamic markets (Keen & Williams, 2013). The research aimed to establish if there is a relationship between an organisational wide value architecture that forms part of the business model design and the success of the business model.

The value architecture component in this study represents the extent to which the entire organisation contributes towards the DBS. In addition, the value architecture signifies the communication channel between the DBS and the entire organisation and the extent to which the entire organisation benefits from the digital initiatives.

The results from Table 8 in Chapter 5 indicate that there is indeed a strong positive statistically significant relationship between organisations that are able to design the value architecture within their firms and a successful digital business strategy. In addition, the results from the six components' (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in Chapter 5 (Table 21) indicate that the value architecture component is statistically the fourth strongest component of the six BM components that simultaneously influence digital business success. The results from the four components' (value delivery, value capture, value architecture, resources and competencies) multivariate linear regression analysis in Chapter 5 (Table 25) also indicate that value architecture is indeed statistically significant to cumulatively influence digital business success.

These results confirm the suggestion by Keen and Williams (2013) that for organisations to remain competitive in the digital economy, simple technology strategies and existing BMs will not be sufficient to sustain competitiveness. Instead, the authors suggested that only through leveraging the value architecture of an organisation, will they be able to identify and build on digital opportunities in the market.

The value architecture component as described in this study creates a framework that aligns the internal (resources, competencies, data capture and data analytics) and external (value network) value creating components of the digital BM with the DBS. This framework determines the extent to which the conceptual value proposition and value capture component can be created from both the internal and external value creating components of the BM. In addition, the value architecture component that is proposed is responsible for continuously engaging the entire organisation regarding the developments, progress and failures of the digital initiatives from the DBS. The first internal value creating BM component within the value architecture is the resources and competencies of the organisation.

6.3.4. Resources and competencies

The resources and competencies component consists of various elements. Firstly, the resources and competencies component represents the level of technological infrastructure the organisation has access to. This component also represents the level of capital that is available for digital initiatives and the skills and knowledge levels within the organisation that are required for the DBS to be executed. Finally, the resources and competencies component represents an organisation's ability to successfully identify digital opportunities and the speed at which organisations can learn and apply new technologies that are acquired to execute a DBS. The research aimed to establish if there is a significant relationship between an organisation that possesses the appropriate resources and competencies that are dedicated to the business model and the success of the digital business strategy.

The results from Table 11 in Chapter 5 indicate that there is indeed a strong positive statistically significant relationship between an organisation's resources and competencies component of their BM and a successful digital business strategy. In addition, the results from the six components' (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in chapter 5 (Table 21) indicate that the resources and competencies component is statistically the second strongest component of the six BM components that simultaneously influence digital business success. The results from the four components' (value delivery, value capture, value architecture, resources and competencies) multivariate linear regression analysis in Chapter 5 (Table 25) also indicated that the resources and competencies component is statistically the second strongest component of the four BM components that simultaneously influence digital business success.

These results support the findings of Ravichandran and Lertwongsatien (2005), who commented that organisations with the appropriate amount of resources and level of competencies will be able to create a sustained competitive advantage. Importantly, Teece et al. (1997) described the organisation's resources from the dynamic capabilities perspective. The authors suggested that sustained competitive advantage will not be guaranteed to the organisations that are successful in accumulating valuable resources in accordance with the RBV. Instead, Teece et al (1997) argued that firms need to demonstrate an ability to rapidly respond to the changing needs of the consumer.

In the current digital economy that is characterised by disruptive innovation, organisations that follow the RBV approach to digital strategy will not be able to adapt their value proposition and value capture components of their DBS to align with the changing needs of the market. This is because the RBV assumes that the BM design first starts with the internal resource and competencies premise, before a conceptual value proposition can be created. If organisations adopt the RBV in developing BMs, these organisations assume that their accumulated resources and competencies are absolutely relevant and sufficient in developing competitive value propositions in the digital economy. Instead, organisations must first start by analysing their external environment when designing their digital BMs. Through scanning the environment and identifying an opportunity, firms create a conceptual value proposition that is not bound by the current resources and competencies of an organisation. Rather, the resources and competencies are aligned to the DBS in accordance with the conceptual value proposition. Thus the resources and competencies of an organisation do not form the premise on which the digital BM is designed, but the component supports the conceptual value proposition and value capture components of the DBS. The resources and competencies can be seen as being in a dynamic state and are constantly developed and acquired in accordance with the value proposition and value capture component. The second internal component within the value architecture is the data capture and data analytical capabilities of an organisation.

6.3.5. Data and data analytics

The data and data analytics component of the digital BM design represent an organisation's ability to accurately capture and analyse the data in an organisation. The data element in this component represents the extent to which the data is captured across the entire organisation. In addition, the data analytics element represents the organisation's ability to make sense of the captured data. Data analytics describes how successfully the information can be extracted from the captured data and the extent to which the information is communicated back into the organisation. Lastly, the data and analytics component represents the organisation's ability to capitalise on the information that is generated. The research aims to establish if there is a significant relationship between organisations that have the ability to adequately capture and analyse data and the success of the business model.

The results from Table 14 in Chapter 5 indicate that there is indeed a strong positive statistically significant relationship between an organisation's data capture and analytical abilities and a successful digital business strategy. These results confirm the findings of George et al. (2014) and Tallon and Pinsonneault (2011), who stated that advanced data capture and data analytical capabilities are fundamental for organisations to remain competitive in the digital economy.

In addition to the correlation analysis that was conducted, two multivariate linear regression models (a six and a four component variable model) were tested to determine the influence of the data and analytics component on the success of the digital strategy, in conjunction with the other five BM components. The results from the six components' (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in Chapter 5 (Table 21) indicate that the data and analytics component is not statistically significant to simultaneously influence digital business success. This resulted in the data and data analytics component not forming part of the final multivariate linear regression four component model of the study (Table 25). Although there is a strong positive relationship between the data and analytics component and the success of the DBS, this component is not statistically significant in influencing digital business success compared with the four components (value delivery, value capture, value architecture and resources and competencies) that form part of the final multivariate linear regression four component model in Table 25.

The results from the multivariate linear regression analysis confirm the findings of Bijmolt et al. (2010), who suggested that there are certain barriers to implementing data and data analytics in an organisation. To this extent, the results from Table 25 in Chapter 5 statistically confirm the existence of these barriers in the sample that was studied. Data quality is the first barrier that was suggested by Bijmolt et al. (2010), which relates directly to the organisation's data capture element within the data and data analytics component. The complexity of the data analytical models forms the second barrier proposed by the authors. This barrier relates directly to the organisation's analytical capability, such as possessing the adequate technological infrastructure and skills to perform advanced statistical analysis on the captured data. The third barrier relates to the usability of the results. This barrier refers to an organisation's ability to capitalise on the results that are generated from the data analytics. In addition, this barrier directly relates to the level of usefulness of the results for the entire organisation in formulating the DBS.

The results also confirm the suggestion by George et al. (2014) that organisations still need to develop their understanding of the ubiquitous nature of data in order to generate new sources of revenue. The importance for organisations regarding their data management objectives have shifted away from being primarily focused on the capturing of data, towards a system that is focused on developing a deeper understanding of the data that are captured (George et al., 2014). Whilst companies are investing in the processes' capacity to analyse the data that are generated, only a few companies have made a corresponding investment in changing their organisational processes to generate value from the data and information (Bharadwaj et al., 2013a). For organisations to be successful with their data management objectives, the data that are captured and analysed and the information that is extracted must be communicated back into the organisation. The information must create a "clear and consistent" picture of a particular business situation or opportunity, from which strategic decision can be taken (Lu et al., 2013, p1059).

The data and data analysis component of the digital BM is vital for organisations to be able to develop competitive value propositions and value capture components in their respective business environments (Bharadwaj et al., 2013a; Bijmolt et al., 2010; George et al., 2014; Tallon & Pinsonneault, 2011). The results from this research contradict this view because the organisations that formed part of this research were not able to create value from their data and data analytical capabilities to influence the success of their digital BMs. This result may indicate that data and data analytics are not well understood, implemented or utilised by organisations.

6.3.6. Value network

The value networks represent an ecosystem where a group of companies are able to create simultaneous value by combining their assets and skills (Clarysse et al., 2014). The value network allows organisations to develop value propositions and value capture components for their respective digital BMs through collaboration with other organisations. These organisations would not have been able to create unique value propositions and value capture components without the integrated efforts of other organisations. The value network component in this study focused on two stakeholder groups - suppliers and partners. The research aimed to establish if there is a significant relationship between organisations that fully integrate their value networks into their business model designs and the success of their business models.

The results from Table 17 in Chapter 5 indicate a weak positive statistically significant relationship between an organisation's value network and a successful digital business strategy. Although this result indicates a weaker relationship compared to the other BM components that were tested in the above sections, the relationship is still statistically significant. In addition to the correlation analysis that was conducted, two multivariate linear regression models (a six and four component variable model) were tested to determine the influence of the value network component on the success of the digital strategy, in conjunction with the other five BM components. The results from the six component (value delivery, value capture, value architecture, resources and competencies, data and analytics and value network) multivariate linear regression analysis in Chapter 5 (Table 21) indicate that the value network component is not statistically significant to simultaneously influence digital business success. This resulted in the value network component not forming part of the final multivariate linear regression four component model of the study (Table 25). Although there is a statistically significant relationship between the value network component and digital business success, this component is not statistically significant in influencing digital business success compared with the four components (value delivery, value capture, value architecture and resources and competencies) that form part of the final multivariate linear regression four component model in Table 25.

The results from the research contradict the findings of Clarysse et al. (2014), Lusch et al. (2010) and Pagani (2013), who suggested that the value network is of strategic significance for organisations and that the network perspective is more suited for the digital economy. The value network allows for the exploitation of resources that are already available through the value relationships (Pagani, 2013). The authors further suggested that the DBS of an organisation requires collaboration across firms regarding products, processes and service domains to create a more dynamic ecosystem in which organisations are able to create innovative value propositions and value capture components. Organisations that are able to combine their internal value architecture with their external value networks will be able to leverage all the cumulative resources and competencies that will enable them to create unique digital products and services.

The results indicate that the organisations that formed part of the research are not able to leverage their value networks to influence the success of their digital BMs. Furthermore, the results indicate that these organisations possibly choose to develop their value propositions and value capture components in isolation. A possible explanation is that these organisations do not receive the cumulative benefits associated with their value network, because their value networks are not participating in the sharing of assets, skills or knowledge aimed at cumulative benefit for all the network partners. Organisations mistake their partnerships and relationships with their stakeholders as being a value network, but these relationships do not contribute to cumulative value sharing among all the network partners.

Another possible reason for the contradiction in the findings is that organisations do not know how to create these unique collaborative business ecosystems. Organisations might feel threatened by sharing their intellectual property, research, experience, assets and skills with other network partners for fear of being exploited by those network participants. The next section will discuss the implications for best practice.

6.4. Conclusion

The findings of this study have far reaching consequences for the design of digital BMs in organisations. The relationship between all six of the BM components and the success factor of the digital business was analysed. The results indicated that there was indeed a statistically significant relationship between all the variables individually and the success of the digital business.

In addition, two multivariate linear regression models were analysed in accordance with the results from Chapter 5. The first multivariate linear regression six component model (Table 18) indicated that only four of the six BM components were statistically significant in influencing the digital business success of an organisation. The implication of these results was then discussed. From these results, the final multivariate linear regression model four component model (Table 22) was proposed.

7 Chapter 7: Conclusion

7.1. Principle findings

The objectives of this study were to identify the extent to which a set of six digital BM components form part of the digital BM design that influences the success of the DBS. A secondary objective was to gain a deeper understanding of the extent to which these BM components individually and cumulatively influence the success of the DBS. The results that were obtained in chapter 5 of the research indicate that the researcher was able to meet the objectives set forth for this particular study. The study into the factors that result in a successful DBS is of particular importance, because Lopez (2015a, p2) stated that "by 2020, 75% of businesses will become or prepare to become a digital business".

Digital business in the new technology-enabled economy is driving disruption from across industries, which forces businesses to embrace digital strategies to remain competitive (Lopez, 2015b). In this regard, an ex-ante approach was selected to identify and analyse the various BM components that form part of the digital BM design. This research approach allowed analysis to be conducted across industries, and the changes in the BM components could be measured consistently across organisations (Siggelkow, 2002). By proposing a limited number of BM components to form part of the BM design, the research did not assume that all the BM components that were analysed are equally central to the success of a DBS (Demil & Lecocq, 2010; Osterwalder et al., 2005).

The findings of this research indicated that each of the six of the BM components (value delivery, value capture, value architecture, resources and competencies, data and data analytics and value network) that were postulated to form part of the digital BM design have a statistically significant relationship with the success of the digital business strategy. The research results indicate that the strength of these relationships vary between the different components and their relationship with the successful digital business.

In addition, the research analysed the cumulative effect these BM components have in determining the success of the DBS. The results indicated that cumulatively, four of the six BM components are statistically significant in influencing the success of the DBS. These four BM components are:

- The value delivery component
- The value capture component
- The value architecture of the organisation
- The resources and competencies available to the organisation

The data and data analytics component failed to cumulatively contribute to the success of the DBS whilst taking all the other five BM components into consideration. While the importance of data and analytics is well documented (Chen et al., 2012; George et al., 2014), these results from the research indicate that this component is not able to contribute to the success of the DBS relative to the other components that were studied. This may be because firstly, organisations may not be able to successfully capture the data from the business ecosystem they operate in. Secondly, these organisations might also be failing to accurately analyse the data captured from the organisation. A final explanation is that while these firms might be able to accurately capture and analyse the data, they are failing to communicate the information that is expected from the business ecosystem to the strategic units in an organisation to formulate the DBS.

The value network component is the second component that is not able to contribute to the success of the DBS relative to the other five components that were proposed for this research. This result indicates that organisations are not able to leverage the benefits from the value network partnerships within their respective business ecosystems (Pagani, 2013). The value network that formed part of this research is classified as the suppliers and the business partners of the firms. These clusters of economic actors are failing to create shared value amongst the participants in these network relationships. Firms might deliberately not form part of value networks, with the aim of creating value through not leveraging the resources and capabilities of their value partners. Organisations will have to leverage their value network to create shared value to influence the success of the DBS.

7.2. Implications for organisations

7.2.1. Ranking of the business model components

The results from the research enable the ranking of the various BM components regarding their importance in cumulatively influencing the success of the DBS. The results from the multivariate linear regression analysis indicate that four of the six BM components that were proposed are able to successfully influence the DBS (value delivery, value capture, value architecture and the resources and competencies available to the organisation). The BM components are ranked from most to least influential:

1. Value delivery component
2. Resources and competencies component
3. Value capture component
4. Value architecture component
5. Data and analytics (not significant)
6. Value network (not significant)

The value delivery component can be classified as the most important component in influencing the success of the DBS. If organisations are not able to develop an attractive digital value proposition for their clients and/or customers, their DBS will struggle to be competitive. The second most important component is the resources and competencies of the firm. In the changing digital economy, organisations will have to continuously develop their resources and competencies to create the digital value propositions required for a successful DBS. The third most important BM component is the ability of the organisation to capture the value created from their digital initiatives. The fourth component to consider in the digital BM design is the value architecture of the company. This value architecture ensures that the value generated through the DBS is realised throughout the entire organisation.

The ranking of the individual BM components in order of importance allows for strategic prioritisation within the digital BM design. Strategic units are able to evaluate their digital BM design according to the ranked BM components. In addition, the two BM components (data and analytics and the value network component) should not be omitted from the BM design, but should rather be developed further and integrated into the BM design of an organisation. The weak cumulative contribution of these two components (data and analytics and the value network component) simply indicates that the two components are currently underdeveloped and require significant investment for companies to realise the full value creating potential from their DBS.

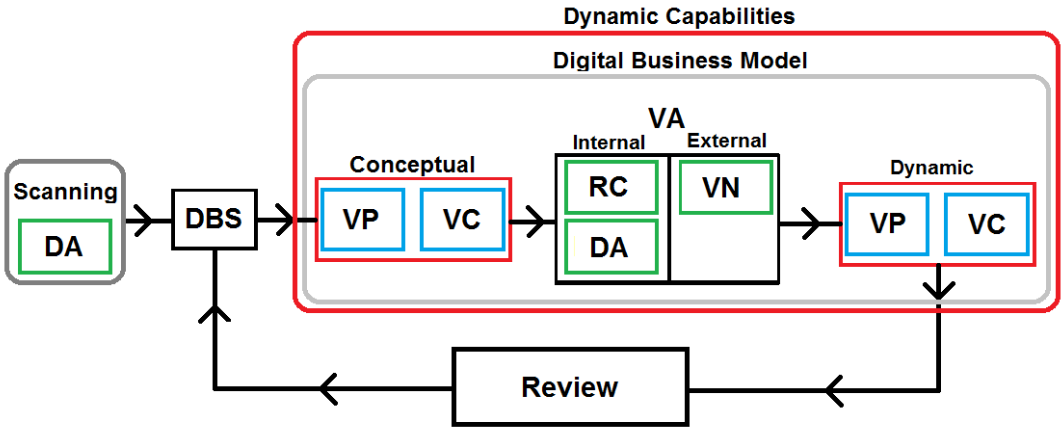
7.2.2. Business model design cycle component

In addition to the ranking of the individual BM components, the research proposes a *priori* digital BM design cycle model that can be used by organisations to assist in the evaluation of their BM design in accordance with the ranked BM components (Figure

20). The digital BM design cycle model depicts the stages in the development and execution of the DBS. The BM design cycle model starts with the value delivery components that are created in accordance with the value capture component. The model then utilises the value architecture component that comprises of the resources and competences, data and data analytics and value network components.

The model includes all six of the proposed digital BM design components and the sequential flow of the development of digital offerings in response to an identified opportunity. The digital BM design cycle model is an iterative and continuous model with no desired end state. The model introduces a sequence in which the various digital BM components can be analysed

Figure 20: Digital business model design cycle



DA: Data and data analytics component, VP: Value proposition component, VC: Values capture component, VA: Value architecture, RC: Resources and Competencies, VN: Value network, DBS: Digital business strategy

The digital BM design cycle initially starts with the creation of ideas by organisational staff, department(s) and/or initiatives. Through "sensing" (scanning) the environment, decision makers aim to interoperate the information that is gathered from the environment regarding the changing needs of their stakeholders that will affect the DBS (Teece, 2007, p1324). Keen and Williams (2013, p645) explained that digital BMs are primarily focused at "spotting opportunities" that are predominantly customer-led regarding their innovation. Data capture and data analytics capabilities play a pivotal role in accurately scanning the market environment for possible opportunities. Through successfully capturing and analysing data (DA – Figure 20), organisations will be able to pursue entirely new portfolios of digital opportunities (Bharadwaj et al., 2013a).

Scanning of the environment is a continuous process that will enable organisations to constantly generate new digital business models in the dynamic digital market.

The next step in the digital BM design cycle is the transfer of information regarding opportunities, ideas and possible projects into the organisational strategy development phase. Importantly, the information flows straight into the organisational strategy because there is no separation between the digital and the organisational strategy (Bharadwaj et al., 2013b; Woodard et al., 2013). The DBS is the organisational strategy, which interoperates the information received from the environment scanning phases and prioritises possible digital projects for the organisation. The most important premise is that the organisation does not prioritise these digital products based on the current resources and competencies of the organisation as in accordance with the RBV (Barney, 1991; Makadok, 2001). Instead, the DBS views the digital BM flow from the dynamic capabilities perspective where organisations are able to demonstrate rapid responsiveness regarding digital innovation, supported by managerial capabilities that are able to adapt to the changing business environment (Teece et al., 1997).

The next phase of the digital BM design cycle is the interaction between the DBS and the dynamic capabilities of an organisation. This proposed *a priori* digital BM design model builds on the dynamic capability posture by DaSilva and Trkman (2014). The model proposed by these authors positions the dynamic capabilities between the organisational strategy and the BM. To this extent, the digital BM cycle model elaborates on this preceding model by demonstrating the impact dynamic capabilities have on each of the BM components and how dynamic capabilities impact the overall digital BM design cycle. The digital BM is placed within the dynamic capabilities framework inside an organisation. The next step is the interaction between the dynamic capabilities and the various BM components.

The DBS will be formulated with a conceptual understanding of the possible value proposition (VP – Figure 20), which can be formed to explore or exploit an identified opportunity (hypotheses 1). This conceptual understanding of a possible value proposition is supported by the view of the potential benefits the value proposition holds for the organisation. Possible value from the proposed digital initiative is represented by the conceptual understanding of how value will be captured (VC – Figure 20) through the implementation of the digital initiative (hypotheses 2). The conceptual understanding of the value propositions and value capture is formed without taking into consideration the current resources or competencies the organisation possesses or has access to. Instead, the value proposition and the value capture strategies are formed from the perspective of what is digitally possible, and are not bound by the organisation's legacy structures, resources or expertise. Organisations must create totally unique digital offerings beyond the current boundaries of the organisations (Teece, 2014a).

The next step in the digital BM cycle after the conceptual understanding of the possible value proposition and value capture strategy has been formed is to create a value architecture (VA – Figure 20) that will describe how the organisation will develop the conceptual value proposition and value capture into a realised digital offering (hypotheses 3). The value architecture creates a framework throughout the entire organisation that allows for the alignment of current resources and competencies (RC – Figure 20) with the proposed digital value proposition (hypotheses 4). In addition, the value architecture creates a blueprint that allows the organisation to identify the resources and competencies that need to be developed or acquired in addition to what currently exists within the organisation (Keen & Williams, 2013). The resources, competencies, data capture and data analytical ability (hypotheses 5) forms part of the internal BM components within the value architecture (DA – figure 20). The value network (VN – Figure 20) forms the external BM component of the value architecture. If an organisation is not able to develop the conceptual value proposition from its current resources and competencies and data analytical capabilities, the organisation must leverage its value network partners to realise the conceptual value proposition. Organisations that are able to successfully integrate their value network (hypotheses 6) partners into their DBS and build on the cumulative knowledge of the entire ecosystem will be able to continuously create competitive digital value propositions to remain competitive (Pagani, 2013).

The development of the dynamic value proposition and value capture component is the next phase in the digital BM design cycle. Still inside the dynamic capabilities framework, the organisation creates the value proposition and value capture digital BM components that will be realised in the organisational environment. Of importance is the fact that the VP and VC components during this phase remain dynamic in nature. The digital initiatives will constantly evolve and change in accordance with the changing digital environment of the organisation. Inevitably, the value proposition and value capture components will cease to evolve and might be replaced by a new value proposition in an organisation. The digital offering must constantly be reviewed by the organisation to allow for the DBS to be adjusted in accordance to the changing demands in the digital market (Teece et al., 1997). The review process forms the premise for the digital BM to remain dynamic and constantly evolving and adapting. It allows organisations to respond to situational contingencies that may impact the components of the digital BM (DaSilva & Trkman, 2014). The digital BM design cycle continuously flows from the DBS to the development of digital initiatives by leveraging all the various digital BM components and constantly reviewing the dynamic value proposition and value capture component in the market to continuously restart the design cycle at the DBS.

7.3. Limitations of the study

The limitation to the methods that were used for this research include:

- The research was not industry specific

The research that was conducted was across multiple industries. To this extent, the digital BM design will undoubtedly be influenced by the type of industries that formed part of this study. In addition, the research results will also not be able to provide specific industry BM design characteristics.

- Distribution of the questionnaire

The research was conducted through the use of an online questionnaire that was completed via the internet. For this reason, only participants that had access to an internet connection during the time of the research could form part of the study.

- Measure of DBS success

In order to establish the degree of digital BM success for each of the organisations that formed part of this research, the respondents were required to indicate the level of DBS success. The digital DBS success was self-reported in accordance with the perceived success associated with their respective digital BMs, thus this self-reported success factor will not be free of biases. In addition, this self-reported DBS success factor is not determined or verified objectively. Because of data limitations, the research did not allow for the evaluation or measure of value creation directly at the BM level.

- Implementation of the DBS and the digital BM

The research study did not evaluate the quality level of the management that designed or implemented the DBS at the respective organisations that formed part of this study.

- Scope of theory

The scope of the theory that is presented in this research paper and the data that were used did not allow the researcher to draw generalisable conclusions regarding the digital BM design in the larger population of organisations.

- Research experience

In conducting the non-probability sampling techniques that were used during this research, the experience of the researcher plays a vital role. To this extent, the researcher may not have had the adequate level of experience required in this field.

7.4. Suggestions for future research

Through this study of digital BM design, the researcher identified six BM components to form part of the digital BM design. To this extent, further research can elaborate on the proposed BM design and include additional components into the design of the BM. Possible further BM design components can include the role of leadership in designing the digital BM and the impact of leadership on the success of the DBS. Additional components include cloud computing and digital security and how these components will possibly influence the success of the DBS.

In addition, further research in digital BM design could develop a DBS value criterion through which organisations can accurately measure the value that is created through their digital initiatives. Such a digital value measure will allow organisations to compare their DBS and BM design success with other companies to ensure that these firms fully leverage their digital initiatives.

Bibliography

Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.

Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firms performance in new technology generation. *Strategic Management Journal, 31(*3), 306–333.

Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal, 22*(6), 493–520.

Antes, a. L., & Schuelke, M. J. (2011). Leveraging technology to develop creative leadership capacity. *Advances in Developing Human Resources, 13*(3), 318–365.

Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning, 46*(6), 419–426.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Bennis, W. (2013). Leadership in a digital world: embracing transparency and adaptive capacity. *MIS Quarterly, 37*(2), 635–637.

Bharadwaj, A., Sawy, O. A. E., Pavlou, P. A., & Venkatraman, N. (2013a). Digital business strategy: towards the next generation of insights. *MIS Quarterly, 37*(2), 471–482.

Bharadwaj, A., Sawy, O. A. E., Pavlou, P. A., & Venkatraman, N. (2013b). Vision and voices on emerging challenges in digital business strategy. *MIS Quarterly, 37*(2), 633–661.

Bi, Z., Xu, L. Da, & Wang, C. (2014). Internet of things for enterprise systems of modern manufacturing. *IEEE Transactions on Industrial Informatics, 10*(2), 1537–1546.

Bijmolt, T. H. A., Leeflang, P. S. H., Block, F., Eisenbeiss, M., Hardie, B. G. S., Lemmens, A., & Saffert, P. (2010). Analytics for Customer Engagement. *Journal of Service Research, 13*(3), 341–356.

Bisschoff, D. W., Tyrer, N., & Louw, I. (2014). Digital everything: How South African consumers are gearing up for a digital lifestyle. Accenture. Retrieve from http://www.cas-ag.eu/SiteCollectionDocuments/Local_South_Africa/PDF/Accenture-Digital-Everything-How-South-African-consumers-Gearing-Up.pdf

Bohnsack, R., Pinkse, J., & Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles business models for sustainable technologies : Exploring business model evolution in the case of electric vehicles. *Research Policy, 43*(2), 284–300.

Boons, F., & Lüdeke-Freund, F. (2013). Business models for sustainable innovation: State-of-the-art and steps towards a research agenda. *Journal of Cleaner Production, 45*, 9–19.

Brace, I. (2008). *Questionnaire design: How to plan, structure and write survey material for effective market research*. London: Kogan Page Publishers.

Brynjolfsson, E., & McAfee, A. (2012). Winning the race with ever-smarter machines. *MIT Sloan Management Review, 53*(2), 53-60. Retrieved from http://search.proquest.com.ezp.waldenulibrary.org/abicomplete/docview/914408096/abstract/13CF90FFD8B7D173175/14?accountid=14872\nhttp://media.proquest.com.ezp.waldenulibrary.org/media/pq/classic/doc/2554587481/fmt/pi/rep/NONE?hl=creative,destructions,dest

Chatterjee, S. (Author). (2013). Simple rules for designing business models. *California Management Review, 55(*2), 97–124.

Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly, 36*(4), 1165–1188.

Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning, 43*(2-3), 354–363.

Clarysse, B., Wright, M., Bruneel, J., & Mahajan, A. (2014). Creating value in ecosystems: Crossing the chasm between knowledge and business ecosystems. *Research Policy, 43*(7), 1164–1176.

Clemons, E. K. (2009). Business models for monetizing internet applications and web sites: Experience, theory, and predictions. *Journal of Management Information Systems, 26*(2), 15–41.

Cox, L., & Eli, P. (1980). The optimal number of response alternatives for a scale: A review. *Journal of Marketing Research, 17*(4), 407 – 422.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334.

D'aveni, R. A., Dagnino, G. B., & Smith, K. G. (2010). The age of temporary advantage. *Strategic Management Journal, 31*(13), 1371–1385.

DaSilva, C. M., & Trkman, P. (2014). Business model: What it is and what it is not. *Long Range Planning, 47*(6), 379–389.

Daugherty, P., Banerjee, P., & Blitz, M. J. (2015). Digital business era: Stretch your boundaries. Accenture, 1–20. Retrieved from http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MjcxMDgxfENoaWxkSUQ9LTF8VHlwZT0z&t=1

Decoster, J. (1998). Overview of factor analysis. In Practice, 1 – 10.

Demil, B., & Lecocq, X. (2010). Business model evolution: In search of dynamic consistency. *Long Range Planning, 43*(2-3), 227–246.

Dijkman, R. M., Sprenkels, B., Peeters, T., & Jansses, A. (2015). Business models for the internet of things. *International Journal of Information Management, 35*(6), 672 – 678.

Dmitriev, V., Simmons, G., Truong, Y., Palmer, M., & Schneckenberg, D. (2014). An exploration of business model development in the commercialization of technology innovations. *R & D Management, 44*(3), 306–321.

Doganova, L., & Eyquem-Renault, M. (2009). What do business models do?. Innovation devices in technology entrepreneurship. *Research Policy, 38*(10), 1559–1570.

Drnevich, P. L., & Croson, D. C. (2013). Information technology and business-level strategy: towards an integrated theoretical perspective. *MIS Quarterly, 37*(2), 483–509.

Dutta, A., Lee, H., & Yasai-Ardekani, M. (2014). Digital systems and competitive responsiveness: The dynamics of IT business value. *Information Management, 51*(6), 762–773.

El Sawy, O. A., Malhotra, A., Park, Y., & Pavlou, P. A. (2010). Seeking the configurations of digital ecodynamics: It takes three to tango. *Information Systems Research, 21*(4), 835–848.

Fichman, R., Dos Santos, B. L., & Zheng, Z. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS Quarterly, 38*(2), 329–353.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. London: Sage Publishing.

George, G., Haas, M. R., & Pentland, A. (2014). Big data and management. *Academy of Management Journal, 57(*2), 321–326.

Green, P. E. (2014). *Mathematical tools for applied multivariate analysis*. London: Academic Press.

Grover, V., & Kohli, R. (2013). Revealing your hand: Caveats in implementing digital business strategy. *MIS Quarterly, 37*(2), 655–663.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*(1), 31 – 36.

Karimi, J., & Walter, Z. (2015). The role of dynamic capabilities in responding to digital disruption: a factor-based study of the newspaper industry. *Journal of Management Information Systems, 32*(1), 39–81.

Keen, P., & Williams, R. (2013). Value architecture for digital business: Beyond the business model. *MIS Quarterly, 37*(2), 643–648.

Kim, W. C., & Mauborgne, R. (2008). Blue ocean strategy. *Harvard Business Review, 86*(12), 57-68.

Lichtenthaler, U. (2011). Open innovation: Past research, current debates, and future directions. *Academy of Management Perspectives, 25*(1), 75–93.

Lopez, J. (2015a). Digital business is here now. Granter, 10–12. Retrieved from https://www.gartner.com/doc/3009418/digital-business-

Lopez, J. (2015b). Putting digital business to work in 2015. Garnter, 1–7. Retrieved from https://www.gartner.com/doc/2959518/putting-digital-business-work-

Lu, J., Niu, L., & Zhang, G. (2013). A situation retrieval model for cognitive decision support in digital business ecosystems. *IEEE Transactions on Industrial Electronics, 60*(3), 1059–1069.

Lusch, R. F., Vargo, S. L., & Tanniru, M. (2010). Service, value networks and learning. *Journal of the Academy of Marketing Science, 38(*1), 19–31.

Makadok, R. (2001). Toward a synthesis of the resource based and dynamic capability views of rent creation. *Strategic Management Journal, 22*(5), 387–401.

Markus, M. L., & Loebbecke, C. (2013). Commoditized digital processes and business community platforms: New opportunities and challenges for digital business strategies. *MIS Quarterly, 37*(2), 649–654.

McAfee, A., & Brynjolfsson, E. (2012). Big data: The management revolution. *Harvard Business Review, 90*(10), 60–68.

McDonald, M., McManus, R., & Henneborn, L. (2014). Digital double-down: How far will leaders lead ahead? Accenture. Retrieved from https://www.accenture.com/t20150708T060458__w__/tr-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub3/Accenture-Doubling-Down-Drive-Digital-Transformation-Stay-Ahead.pdf

Mithas, S., Tafti, A., & Mitchell, W. (2013). How a firm's comparative environment and digital strategic posture influences digital business strategy. *MIS Quarterly, 37*(2), 511–536.

Murry, S. (2014). CEO briefings 2014: The global agenda. Accenture. Retrieved from https://www.accenture.com/t20150527T211355__w__/jp-ja/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Local/ja-jp/PDF_2/Accenture-Global-Agenda-CEO-Briefing-2014-Competing-Digital-World.pdf

Nathan, M., & Rosso, A. (2015). Mapping digital businesses with big data: Some early findings from the UK. *Research Policy, 44*(9), 1714–1733.

National Small Business Act. (1996). Retrieved from https://www.thedti.gov.za/sme_development/docs/act.pdf

O'Reilly III, C. A., & Tushman, M. L. (2011). Organizational ambidexterity in action: How managers explore and exploit. *California Management Review, 53*(4), 5–22.

Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: origins, present, and future of the concept. *Communications of the Association for Information Systems, 16*(1), 1–40.

Pagani, M. (2013). Digital business strategy and value creation: Framing the dynamic cycle and control points. *MIS Quarterly, 37*(2), 617–632.

Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of Consumer Research, 21*(2), 381 – 389.

Picardi, C. A., & Masick, K. D. (2013). *Research methods: designing and conducting research with a real-world focus*. London: SAGE Publications.

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.

Porter, M. E. (2001). Strategy and the internet. *Harvard Business Review, 79*(3), 62–78, 164.

Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review, 92*(11), 11-64.

Ravichandran, T., & Lertwongsatien, C. (2005). Effects of information system resources and capabilities on firm performance: A resource-based view. *Journal of Management Information Systems, 21*(4), 237–276.

Rigby, D. (2014). Digital-physical mashups. *Harvard Business Review, 92*(9), 84-92.

Saunders, M., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project*. Essex: Financial Times Prentice Hall.

Siggelkow, N. (2002). Evolution toward fit. *Administrative Science Quarterly, 47*(1), 125–159.

Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.

Tapscott, D. (1997). The digital economy: Promise and peril in the age of networked intelligence. New York: McGraw-Hill Publishing.

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319 – 1350.

Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning, 43*(2-3), 172–194.

Teece, D. J. (2014a). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. *Journal of International Business Studies, 45*(1), 8–37.

Teece, D. J. (2014b). The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. *Academy of Management Perspectives, 28*(4), 328 – 352.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533.

Tinsley, H. E., & Brown, S. D. (2000). *Handbook of applied multivariate statistics and mathematical modelling.* California: Academic Press.

Vaccaro, I. G., Jansen, J. J. P., Van den Bosch, F. a J., & Volberda, H. W. (2012). Management innovation and leadership: The moderating role of organizational size. *Journal of Management Studies, 49*(1), 28–51.

Varadarajan, R., Yadav, M. S., & Shankar, V. (2008). First-mover advantage in an internet-enabled market environment: Conceptual framework and propositions. *Journal of the Academy of Marketing Science, 36*(3), 293–308.

Waller, M. A., & Fawcett, S. E. (2013). Data science, predictive analytics, and big data: A revolution that will transform supply chain design and management. *Journal of Business Logistics, 34*(2), 77–84.

Wasko, M., Teigland, R., Leidner, D., & Jarvenpaa, S. (2011). Stepping into the internet: New ventures in virtual worlds. *MIS Quarterly, 35*(3), 645–652.

Westerman, G., & Mcafee, A. (2012). The digital advantage: How digital leaders outperform their peers in every industry. *MIT Sloan Management and Capgemini Consulting*, MA, 2-23.

William J. Wales, Vinit Parida, & Patel, P. C. (2013). Too much of a good thing? absorptive capacity, firm performance, and the moderating role of entrepreneurial orientation. *Strategic Management Journal, 34*(5), 622-633.

Williams, C. (2007). Research methods. *Journal of Business & Economic Research, 5*(3), 65–72.

Wold, S., Esbensen, K., & Geladi, P. (1987). Principal component analysis. *Chemometrics and Intelligent Laboratory Systems, 2*(1), 37–52.

Woodard, C. J., Tschang, F. T., Ramasubbu, N., & Sambamurthy, V. (2013). Design capital and design moves: The logic of digital business strategy. *MIS Quarterly, 37*(2), 537–564.

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The new organising logic of digital innovation: An agenda for information systems research. *Information Systems Research, 21*(4), 724–735.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2012). Business research methods (8th edition). Mason, OH: South-Western Cengage Learning.

Zott, C., & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science, 18*(2), 181–199.

Zott, C., & Amit, R. (2010). Business model design: An activity system perspective. *Long Range Planning, 43*(2-3), 216–226.

Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management, 37*(4), 1019–1042.

Appendices

Appendix A - Questionnaire

This is a sample of the questionnaire that was used for this research. The references indicate the source of the questions that were formulated for this research.

Preamble

I am doing research to understand the critical components in a digital business model design. To that end you are asked to complete a survey on a set number of questions. This will help us understand if your organisation incorporates the identified components in the design of your digital business model. The questionnaire should take no longer than 15 minutes of your time to complete. Your participation is voluntary and you can withdraw at any time without penalty. Of course, all data will be kept confidential and anonymous. By completing the survey, you indicate that you voluntarily participate in this research. If you have any concerns, please contact me or my supervisor. Our details are provided below:

Researcher:	Supervisor:
Abri Vosloo	Manoj Chiba
447012@mygibs.co.za	ChibaM@gibs.co.za
+27 83 407 9115	+27 82 784 5769

Dear Participant,

I am a 2015 MBA student at the Gordon Institute of Business Science (GIBS), the Business School of the University of Pretoria. You are invited to participate in my research project that focuses on the critical components of a digital business model design.

This consent page provides information that will assist you in deciding whether you would like to participate in this study. If you do not understand the information or have any other questions, please do not hesitate to contact me. You should not agree to take part unless you are completely satisfied with what is expected from you.

The purpose of my study is to identify, on a strategic level, whether a set of business model design components, are incorporated by organisations during the design of their respective digital business models. There is a need to understand the extent to which these components form part of the digital business strategy in the organisation. Organisations have to design digital business strategies that enable them to not only remain competitive, but to also capitalise on the new digital opportunities available in the new digital economy.

To this extent, I would like you to complete the following online questionnaire. This will take approximately 10 minutes to complete. The questionnaire will be in the form of an online questionnaire and your responses will be captured automatically upon completion. The information collected will be kept in a safe place to ensure confidentiality. You will remain anonymous and all responses will remain confidential. I will be available to assist you with the questionnaire or to complete it on your behalf upon request.

The Research Ethics Committee of the University of Pretoria granted written approval for this study. Your participation in this study is voluntary. You can refuse to participate or stop at any time. Your name will not be captured in the online questionnaire and all the information will be kept anonymously. Once you have completed the online questionnaire, you cannot recall your consent. I will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.

Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus any information derived from your form (which will be totally anonymous) may be used for e.g. publication, by the researchers.

Sincerely,

Abri

Online Questionnaire:

Demographic questions:

Nr:	**Question:**	**Type of Question:**
Q1	Age	Ranges [0-30], [31-40], [41-50], [51 and older]
Q2	Job level	Ranges [Lower level management], [Middle-level management], [Top-level management]
Q3	Number of employees in the organisation	Ranges [0-50], [51-200], [More than 200]
Q4	How long have you been employed at the current organisation?	Ranges [0-2], [3-7], [8 or more]

Construct: 1

Organisations have the appropriate resources and competencies during the design of the digital business model.

To what extent do you agree with the following statements? (1: Do not agree; 7: Agree completely)

No:	Adapted From:	Adaptation of Question:	Type of Question:
Q1	Ravichandran, T., & Lertwongsatien, C. (2005). Effects of information system resources and capabilities on firm performance: A resource-based view. *Journal of Management Information Systems, 21*(4), 237–276.	My organisation has sufficient technological infrastructure to operate effectively in the digital world today.	Likert Scale (1-5)
Q2	Ravichandran, T., & Lertwongsatien, C. (2005). Effects of information system resources and capabilities on firm performance: A resource-based view. *Journal of Management Information Systems, 21*(4), 237–276.	My organisation allocates sufficient amounts of capital towards the digital products, services and/or systems currently offered in the digital world today.	Likert Scale (1-5)
Q3	Ravichandran, T., & Lertwongsatien, C. (2005). Effects of information system resources and capabilities on firm performance: A resource-based view. *Journal of Management Information Systems, 21*(4), 237–276.	Our staff has sufficient skills and knowledge to work effectively in the digital work environment.	Likert Scale (1-5)
Q4	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	My organisation is able to effectively identify digital opportunities.	Likert Scale (1-5)
Q5	Ravichandran, T., & Lertwongsatien, C. (2005). Effects of information system resources and capabilities on firm performance: A resource-based	Our organisational staff have the ability to quickly learn and apply	Likert Scale (1-5)

	view. *Journal of Management Information Systems, 21*(4), 237–276.	new technological skills.	

Construct: 2

Data and data analytics forms part of the digital business model design.

To what extent do you agree with the following statements? (1: Do not agree; 5: Agree completely)

	Adapted From:	**Adaptation of Question:**	**Type of Question:**
Q1	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	Remote users can seamlessly access centralised data.	Likert Scale (1-5)
Q2	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	The information generated by data analytics are effectively communicated back to the various business units.	Likert Scale (1-5)
Q3	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	Our organisation has the ability [technological; individual skills; team skills; technology leadership] to take advantage of data and information that is captured.	Likert Scale (1-5)
Q4	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	Data is captured across all the business units.	Likert Scale (1-5)

Q5	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	My organisation is able to correctly analyse the captured data.	Likert Scale (1-5)
Q6	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	The information that is generated by the data analytics is useful to the business units.	Likert Scale (1-5)

<u>Construct: 3</u>

Organisations entrench the value architecture throughout the entire organisation during the digital business model design

To what extent do you agree with the following statements? (1: Do not agree; 5: Agree completely)

	Adapted From:	**Adaptation of Question:**	**Type of Question:**
Q1	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	All the business units contribute to the digital initiatives of the organisation.	Likert Scale (1-5)
Q2	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	All the business units contribute continuously to the execution of the digital initiatives.	Likert Scale (1-5)
Q3	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	All the business units receive continuous feedback regarding the success / failures of the digital initiatives.	Likert Scale (1-5)
Q4	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	The digital business strategy is able to create value throughout all the business units.	Likert Scale (1-5)
Q5	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	It is clear to all the business units where value is created by the digital business strategy.	Likert Scale (1-5)

Do you agree with the following statements? (YES / NO / UNSURE)

Q6	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	Our organisation has a formal digital strategy plan.	YES/NO/UNSURE
Q7	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37(*2), 471–482.	The digital business strategy includes all the business units.	YES/NO/UNSURE

Construct: 4

The value networks forms part of the digital business model design.

To what extent do you agree with the following statements? (1: Do not agree; 5: Agree completely)

Nr:	Adapted From:	Adaptation of Question:	Type of Question:
Q1	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	Our suppliers play a vital role that enables our organisation to compete in the digital world.	Likert Scale (1-5)
Q2	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	Our partnerships play a vital role that enables our organisation to compete in the digital world.	Likert Scale (1-5)
Q3	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	Our company has a high degree of systems interconnectivity with our external suppliers / partners.	Likert Scale (1-5)

<u>Construct: 5</u>

Value delivery forms part of the digital business model design

To what extent do you agree with the following statements? (1: Do not agree; 5: Agree completely)

Nr:	Adapted From:	Adaptation of Question:	Type of Question:
Q1	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	My organisation has the ability to respond to changes in aggregate consumer demand.	Likert Scale (1-5)
Q2	Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insight from a mediation model. *MIS Quarterly, 35*(2), 463–486.	My organisation has the ability to react to new digital product or service launches by competitors.	Likert Scale (1-5)
Q3	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. *MIS Quarterly, 37*(2), 471–482.	Our organisation has the ability to adjust prices in response to changes in competitors' prices.	Likert Scale (1-5)
Q4	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Our organisation focuses on duplicating the digital products or services offered by its competitors in the creation of its own products and services.	Likert Scale (1-5)
Q5	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	My organisation can successfully meet the customer's needs with the digital	Likert Scale (1-5)

		initiatives.	

Construct: 6

Monetisation forms part of the digital business model design

Does your digital products and services generate revenue for your organisation (Qualifying question for Q2 & Q3)

Nr:	Adapted From:	Adaptation of Question:	Type of Question:
Q1	Bharadwaj, A., Sawy, O. A. El, Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: towards the next generation of insight. MIS Quarterly, 37(2), 471–482.	Does your digital products and services generate revenue for your organisation?	Yes / No
Which of the following options are most applicable to the digital products and services sold by your organisation?			
Q2	Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning, 46*(6), 419–426.	The organisation receives money upfront before delivery of the digital product or service.	YES/NO
Q3	Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning, 46*(6), 419–426.	The organisation receives money during delivery of the digital product or service.	YES/NO
Q4	Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning, 46*(6), 419–426.	The organisation receives money after delivering the digital product or service.	YES/NO

Construct: 7

Which of the following options are most applicable to the digital products and services offered by your organisation?

Q1	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Are the digital initiatives from the organisation focused at increasing efficiencies in the operations of the organisation?	Yes / No

If yes, to what extent do you agree with the following statements? (1: Do not agree; 10: Agree completely)

Q1.1	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Our organisation is successful in increasing efficiencies with the digital initiatives.	Likert Scale (1-10)

Which of the following options are most applicable to the digital products and services offered by your organisation?

Q2	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Are the digital initiatives from the organisation focused at creating new revenue streams for the organisation?	Yes / No

If yes, to what extent do you agree with the following statements? (1: Do not agree; 10: Agree completely)

Q2.1	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Our organisation is successful in generating revenue with the digital initiatives.	Likert Scale (1-10)

Which of the following options are most applicable to the digital products and services offered by your organisation?

Q3	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Are the digital initiatives from the organisation focused at improving the quality of existing products and services offered?	Yes / No

If yes, to what extent do you agree with the following statements? (1: Do not agree; 10: Agree completely)

Q3.1	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Our organisation is successful in improving the quality of products and services offered with the digital initiatives.	Likert Scale (1-10)

To what extent do you agree with the following statements? (1: Do not agree; 10: Agree completely)

Q4	Achtenhagen, L., Melin, L., & Naldi, L. (2013). Dynamics of business models - strategizing, critical capabilities and activities for sustained value creation. *Long Range Planning, 46*(6), 427–442.	Our organisation is successful in its overall digital initiatives.	Likert Scale (1-10)

Appendix B - Statistical output

B 1: Value delivery - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure.

B 2: Value delivery - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.810	.810	4

B 3: Value delivery - Item Statistics

	Mean	Std. Deviation	N
Demand Response	3.5876	.99742	97
Digital Response	3.4845	1.02178	97
Price Response	3.7526	.97927	97
Customer Needs	3.7835	1.00236	97

B 4: Value delivery - Inter-Item Correlation Matrix

	Demand Response	Digital Response	Price Response	Customer Needs
Demand Response	1.000	.597	.492	.587
Digital Response	.597	1.000	.350	.632
Price Response	.492	.350	1.000	.433
Customer Needs	.587	.632	.433	1.000

B 5: Value delivery - Inter-Item Covariance Matrix

	Demand Response	Digital Response	Price Response	Customer Needs
Demand Response	.995	.608	.480	.587
Digital Response	.608	1.044	.350	.648
Price Response	.480	.350	.959	.425
Customer Needs	.587	.648	.425	1.005

B 6: Value Delivery - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Demand Response	11.0206	5.854	.694	.484	.729
Digital Response	11.1237	5.943	.645	.478	.753
Price Response	10.8557	6.729	.494	.274	.822
Customer Needs	10.8247	5.875	.683	.487	.735

B 7: Value Delivery - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
14.6082	10.199	3.19360	4

B 8: Value Delivery - Correlation Matrix

		Demand Response	Digital Response	Price Response	Customer Needs
Correlation	Demand Response	1.000	.597	.492	.587
	Digital Response	.597	1.000	.350	.632
	Price Response	.492	.350	1.000	.433
	Customer Needs	.587	.632	.433	1.000
Sig. (1-tailed)	Demand Response		.000	.000	.000
	Digital Response	.000		.000	.000
	Price Response	.000	.000		.000
	Customer Needs	.000	.000	.000	

a. Determinant = .249

B 9: Value Delivery - KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.768
Bartlett's Test of Sphericity	Approx. Chi-Square	130.545
	df	6
	Sig.	.000

B 10: Value Delivery - Anti-image Matrices

		Demand Response	Digital Response	Price Response	Customer Needs
Anti-image Covariance	Demand Response	.516	-.179	-.189	-.132
	Digital Response	-.179	.522	.005	-.222
	Price Response	-.189	.005	.726	-.115
	Customer Needs	-.132	-.222	-.115	.513
Anti-image Correlation	Demand Response	.771[a]	-.345	-.309	-.257
	Digital Response	-.345	.744[a]	.009	-.428
	Price Response	-.309	.009	.808[a]	-.189
	Customer Needs	-.257	-.428	-.189	.766[a]

a. Measures of Sampling Adequacy(MSA)

B 11: Value Delivery – Communalities

	Initial	Extraction
Demand Response	1.000	.715
Digital Response	1.000	.670
Price Response	1.000	.468
Customer Needs	1.000	.706

Extraction Method: Principal Component Analysis.

B 12: Value delivery - Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.559	63.967	63.967	2.559	63.967	63.967
2	.687	17.164	81.132			
3	.406	10.140	91.272			
4	.349	8.728	100.000			

Extraction Method: Principal Component Analysis.

B 13: Value delivery - Component Matrix[a]

	Component
	1
Demand Response	.846
Digital Response	.818
Price Response	.684
Customer Needs	.840

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

B 14: Value delivery - Descriptive Statistics

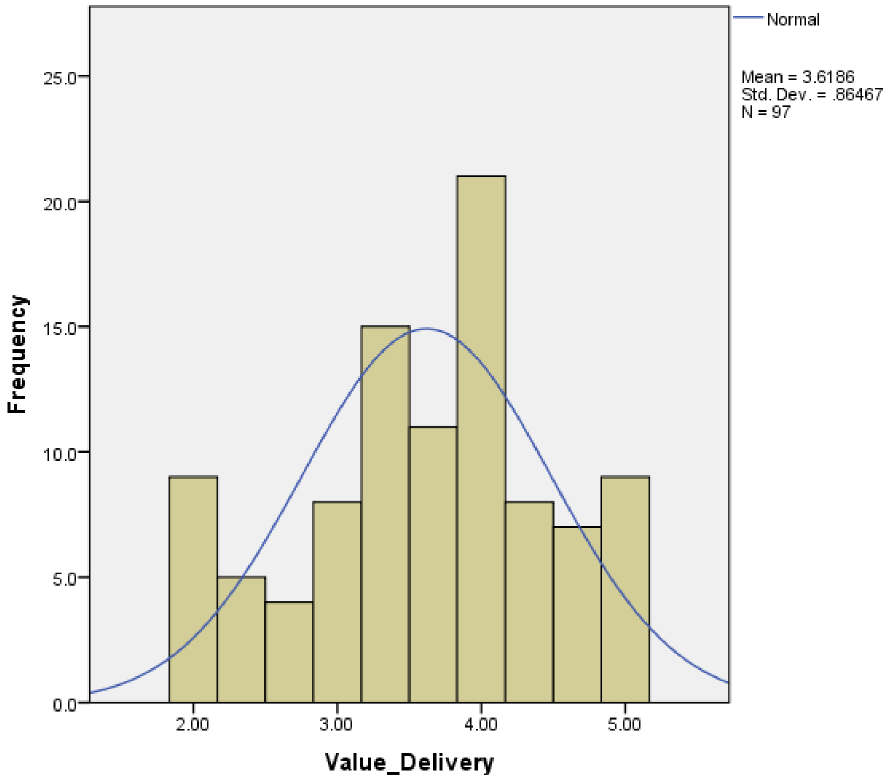
	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Value Delivery	3.6186	.86467	97

B 15: Value delivery – Correlations

		Digital Business Success	Value Delivery
Digital Business Success	Pearson Correlation	1	.772**
	Sig. (2-tailed)		.000
	N	97	97
Value Delivery	Pearson Correlation	.772**	1
	Sig. (2-tailed)	.000	
	N	97	97

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

B 16: Value delivery – Histogram



B 17: Value capture - Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Value Capture	97	.00	1.00	.8454	.36344	-1.941	.245	1.802	.485
Valid N (listwise)	97								

B 18: Value capture – Descriptives

			Statistic	Std. Error
Value Capture	Mean		.8454	.03690
	95% Confidence Interval for Mean	Lower Bound	.7721	
		Upper Bound	.9186	
	5% Trimmed Mean		.8837	
	Median		1.0000	
	Variance		.132	
	Std. Deviation		.36344	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		.00	
	Skewness		-1.941	.245
	Kurtosis		1.802	.485

B 19: Value capture: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Value Capture	.510	97	.000	.433	97	.000

a. Lilliefors Significance Correction

B 20: Value Architecture - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure.

B 21: Value Architecture - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.861	.860	5

B 22: Value Architecture - Item Statistics

	Mean	Std. Deviation	N
Contribution	3.2680	1.09464	97
Continuous Contribution	3.0309	1.14067	97
Feedback	3.3299	1.05792	97
Value Reach	3.7216	.95462	97
Digital Value	3.2062	1.00973	97

B 23: Value Architecture - Inter-Item Correlation Matrix

	Contribution	Continuous Contribution	Feedback	Value Reach	Digital Value
Contribution	1.000	.819	.526	.511	.496
Continuous Contribution	.819	1.000	.527	.496	.573
Feedback	.526	.527	1.000	.515	.540
Value Reach	.511	.496	.515	1.000	.503
Digital Value	.496	.573	.540	.503	1.000

B 24: Value Architecture - Inter-Item Covariance Matrix

	Contribution	Continuous Contribution	Feedback	Value Reach	Digital Value
Contribution	1.198	1.023	.609	.534	.548
Continuous Contribution	1.023	1.301	.636	.540	.660
Feedback	.609	.636	1.119	.520	.577
Value Reach	.534	.540	.520	.911	.485
Digital Value	.548	.660	.577	.485	1.020

B 25: Value Architecture - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Contribution	13.2887	11.187	.741	.692	.815
Continuous Contribution	13.5258	10.794	.763	.710	.809
Feedback	13.2268	12.011	.639	.419	.842
Value Reach	12.8351	12.743	.610	.382	.848
Digital Value	13.3505	12.251	.643	.436	.840

B 26: Value Architecture - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
16.5567	17.812	4.22041	5

B 27: Value Architecture - Correlation Matrix[a]

		Contribution	Continuous Contribution	Feedback	Value Reach	Digital Value
Correlation	Contribution	1.000	.819	.526	.511	.496
	Continuous Contribution	.819	1.000	.527	.496	.573
	Feedback	.526	.527	1.000	.515	.540
	Value Reach	.511	.496	.515	1.000	.503
	Digital Value	.496	.573	.540	.503	1.000
Sig. (1-tailed)	Contribution		.000	.000	.000	.000
	Continuous Contribution	.000		.000	.000	.000
	Feedback	.000	.000		.000	.000
	Value Reach	.000	.000	.000		.000
	Digital Value	.000	.000	.000	.000	

a. Determinant = .084

B 28: Value Architecture - Inverse of Correlation Matrix

	Contribution	Continuous Contribution	Feedback	Value Reach	Digital Value
Contribution	3.243	-2.363	-.328	-.371	.110
Continuous Contribution	-2.363	3.451	-.172	-.076	-.675
Feedback	-.328	-.172	1.720	-.397	-.468
Value Reach	-.371	-.076	-.397	1.619	-.373
Digital Value	.110	-.675	-.468	-.373	1.773

B 29: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	231.858
	Df	10
	Sig.	.000

B 30: Value Architecture - Anti-image Matrices

		Contribution	Continuous Contribution	Feedback	Value Reach	Digital Value
Anti-image Covariance	Contribution	.308	-.211	-.059	-.071	.019
	Continuous Contribution	-.211	.290	-.029	-.014	-.110
	Feedback	-.059	-.029	.581	-.143	-.154
	Value Reach	-.071	-.014	-.143	.618	-.130
	Digital Value	.019	-.110	-.154	-.130	.564
Anti-image Correlation	Contribution	.727[a]	-.706	-.139	-.162	.046
	Continuous Contribution	-.706	.724[a]	-.071	-.032	-.273
	Feedback	-.139	-.071	.879[a]	-.238	-.268
	Value Reach	-.162	-.032	-.238	.886[a]	-.220
	Digital Value	.046	-.273	-.268	-.220	.851[a]

a. Measures of Sampling Adequacy(MSA)

B 31: Value Architecture - Communalities

	Initial	Extraction
Contribution	1.000	.720
Continuous Contribution	1.000	.748
Feedback	1.000	.592
Value Reach	1.000	.555
Digital Value	1.000	.596

Extraction Method: Principal Component Analysis.

B 32: Value Architecture - Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.211	64.226	64.226	3.211	64.226	64.226
2	.649	12.986	77.212			
3	.505	10.107	87.318			
4	.462	9.240	96.559			
5	.172	3.441	100.000			

Extraction Method: Principal Component Analysis.

B 33: Value Architecture - Component Matrix[a]

	Component
	1
Contribution	.849
Continuous Contribution	.865
Feedback	.770
Value Reach	.745
Digital Value	.772

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

B 34: Value Architecture - Descriptive Statistics

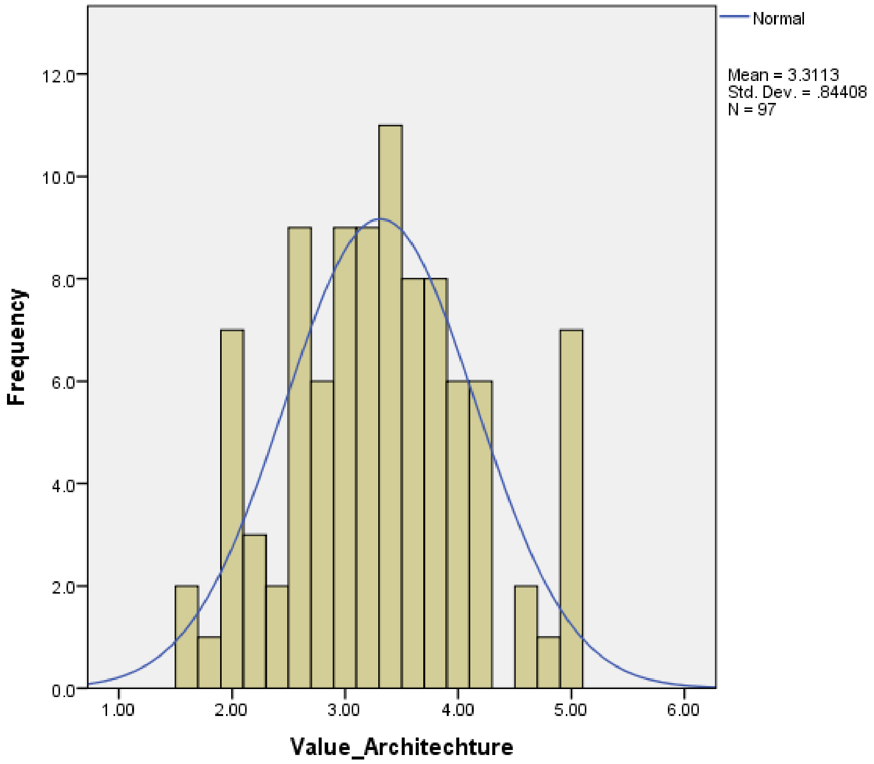
	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Value Architecture	3.3113	.84408	97

B 35: Value Architecture - Correlations

		Digital Business Success	Value Architecture
Digital Business Success	Pearson Correlation	1	.643**
	Sig. (2-tailed)		.000
	N	97	97
Value Architecture	Pearson Correlation	.643**	1
	Sig. (2-tailed)	.000	
	N	97	97

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

B 36: Value Architecture - Histogram



B 37: Resources and Competencies - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure.

B 38: Resources and Competencies - Case Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.841	.846	5

B 39: Resources and Competencies - Case Item Statistics

	Mean	Std. Deviation	N
Technological Infrastructure	3.9794	.98931	97
Capital	3.7113	1.13614	97
Skills and Knowledge	3.6186	1.03525	97
Environmental Scanning	4.0206	.81623	97
Skill Adaptability	3.7113	1.03036	97

B 40: Resources and Competencies - Case Inter-Item Correlation Matrix

	Technological Infrastructure	Capital	Skills and Knowledge	Environmental Scanning	Skill Adaptability
Technological Infrastructure	1.000	.736	.440	.504	.485
Capital	.736	1.000	.339	.467	.417
Skills and Knowledge	.440	.339	1.000	.564	.687
Environmental Scanning	.504	.467	.564	1.000	.589
Skill Adaptability	.485	.417	.687	.589	1.000

B 41: Resources and Competencies - Case Inter-Item Covariance Matrix

	Technological Infrastructure	Capital	Skills and Knowledge	Environmental Scanning	Skill Adaptability
Technological Infrastructure	.979	.827	.450	.407	.494
Capital	.827	1.291	.399	.433	.489
Skills and Knowledge	.450	.399	1.072	.477	.732
Environmental Scanning	.407	.433	.477	.666	.496
Skill Adaptability	.494	.489	.732	.496	1.062

B 42: Resources and Competencies - Case Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Technological Infrastructure	15.0619	10.142	.691	.595	.796
Capital	15.3299	9.890	.601	.557	.824
Skills and Knowledge	15.4227	10.288	.620	.518	.815
Environmental Scanning	15.0206	11.187	.664	.454	.809
Skill Adaptability	15.3299	9.994	.679	.549	.799

B 43: Resources and Competencies - Case Scale Statistics

Mean	Variance	Std. Deviation	N of Items
19.0412	15.477	3.93414	5

B 44: Resources and Competencies - Case Correlation Matrix[a]

		Technological Infrastructure	Capital	Skills and Knowledge	Environmental Scanning	Skill Adaptability
Correlation	Technological Infrastructure	1.000	.736	.440	.504	.485
	Capital	.736	1.000	.339	.467	.417
	Skills and Knowledge	.440	.339	1.000	.564	.687
	Environmental Scanning	.504	.467	.564	1.000	.589
	Skill Adaptability	.485	.417	.687	.589	1.000
Sig. (1-tailed)	Technological Infrastructure		.000	.000	.000	.000
	Capital	.000		.000	.000	.000
	Skills and Knowledge	.000	.000		.000	.000
	Environmental Scanning	.000	.000	.000		.000
	Skill Adaptability	.000	.000	.000	.000	

a. Determinant = .097

B 45: Resources and Competencies - Case Inverse of Correlation Matrix

	Technological Infrastructure	Capital	Skills and Knowledge	Environmental Scanning	Skill Adaptability
Technological Infrastructure	2.472	-1.514	-.275	-.246	-.232
Capital	-1.514	2.260	.172	-.301	-.150
Skills and Knowledge	-.275	.172	2.074	-.473	-1.084
Environmental Scanning	-.246	-.301	-.473	1.832	-.510
Skill Adaptability	-.232	-.150	-1.084	-.510	2.220

B 46: Resources and Competencies - Case KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.769
Bartlett's Test of Sphericity	Approx. Chi-Square	218.088
	df	10
	Sig.	.000

B 47: Resources and Competencies - Case Anti-image Matrices

		Technological Infrastructure	Capital	Skills and Knowledge	Environmental Scanning	Skill Adaptability
Anti-image Covariance	Technological Infrastructure	.405	-.271	-.054	-.054	-.042
	Capital	-.271	.443	.037	-.073	-.030
	Skills and Knowledge	-.054	.037	.482	-.125	-.235
	Environmental Scanning	-.054	-.073	-.125	.546	-.125
	Skill Adaptability	-.042	-.030	-.235	-.125	.451
Anti-image Correlation	Technological Infrastructure	.732[a]	-.641	-.122	-.115	-.099
	Capital	-.641	.703[a]	.080	-.148	-.067
	Skills and Knowledge	-.122	.080	.766[a]	-.243	-.505
	Environmental Scanning	-.115	-.148	-.243	.878[a]	-.253
	Skill Adaptability	-.099	-.067	-.505	-.253	.786[a]

B 48: Resources and Competencies - Case Communalities

	Initial	Extraction
Technological Infrastructure	1.000	.647
Capital	1.000	.558
Skills and Knowledge	1.000	.594
Environmental Scanning	1.000	.634
Skill Adaptability	1.000	.660

B 49: Resources and Competencies - Case Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.094	61.875	61.875	3.094	61.875	61.875
2	.899	17.982	79.857			
3	.442	8.848	88.705			
4	.312	6.237	94.942			
5	.253	5.058	100.000			

Extraction Method: Principal Component Analysis

B 50: Resources and Competencies - Case Component Matrix[a]

	Component
	1
Technological Infrastructure	.804
Capital	.747
Skills and Knowledge	.771
Environmental Scanning	.796
Skill Adaptability	.812

Extraction Method: Principal Component Analysis

a. 1 components extracted

B 51: Resources and Competencies - Case Descriptive Statistics

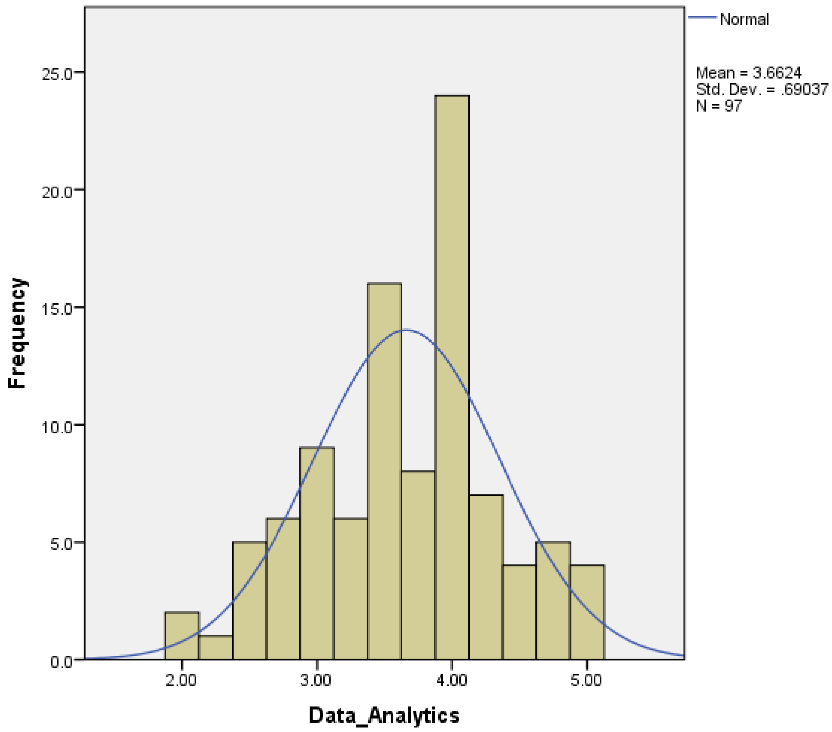
	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Resources Competencies	3.8082	.78683	97

B 52: Resources and Competencies - Case Correlations

		Digital Business Success	Resources Competencies
Digital Business Success	Pearson Correlation	1	.710**
	Sig. (2-tailed)		.000
	N	97	97
Resources Competencies	Pearson Correlation	.710**	1
	Sig. (2-tailed)	.000	
	N	97	97

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

B 53: Resources and Competencies - Histogram



B 54: Data and analytics - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure.

B 55: Data and analytics - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.813	6

B 56: Data and analytics - Item Statistics

	Mean	Std. Deviation	N
Data Access	3.7938	1.10810	97
Communication	3.3711	1.04403	97
Organisational Ability	3.6289	.85780	97
Data Capture	3.6804	.98474	97
Data Analytics	3.6289	.96090	97
Information Quality	3.9691	.80950	97

B 57: Data and analytics - Inter-Item Correlation Matrix

	Data Access	Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Data Access	1.000	.418	.291	.330	.328	.202
Communication	.418	1.000	.481	.400	.513	.371
Organisational Ability	.291	.481	1.000	.475	.564	.313
Data Capture	.330	.400	.475	1.000	.578	.393
Data Analytics	.328	.513	.564	.578	1.000	.655
Information Quality	.202	.371	.313	.393	.655	1.000

B 58: Data and analytics - Inter-Item Covariance Matrix

	Data Access	Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Data Access	1.228	.484	.277	.361	.350	.181
Communication	.484	1.090	.431	.412	.514	.314
Organisational Ability	.277	.431	.736	.401	.465	.218
Data Capture	.361	.412	.401	.970	.547	.313
Data Analytics	.350	.514	.465	.547	.923	.509
Information Quality	.181	.314	.218	.313	.509	.655

B 59: Data and analytics - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Data Access	18.2784	12.620	.420	.211	.817
Communication	18.7010	11.753	.602	.378	.770
Organisational Ability	18.4433	12.833	.583	.399	.776
Data Capture	18.3918	12.116	.593	.385	.772
Data Analytics	18.4433	11.458	.733	.632	.740
Information Quality	18.1031	13.427	.517	.439	.789

B 60: Data and analytics - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
22.0722	17.151	4.14138	6

B 70: Data and analytics - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure.

B 61: Data and analytics - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.817	.819	5

B 62: Data and analytics - Item Statistics

	Mean	Std. Deviation	N
Communication	3.3711	1.04403	97
Organisational Ability	3.6289	.85780	97
Data Capture	3.6804	.98474	97
Data Analytics	3.6289	.96090	97
Information Quality	3.9691	.80950	97

B 63: Data and analytics - Inter-Item Correlation Matrix

	Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Communication	1.000	.481	.400	.513	.371
Organisational Ability	.481	1.000	.475	.564	.313
Data Capture	.400	.475	1.000	.578	.393
Data Analytics	.513	.564	.578	1.000	.655

Information Quality	.371	.313	.393	.655	1.000

B 64: Data and analytics - Inter-Item Covariance Matrix

	Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Communication	1.090	.431	.412	.514	.314
Organisational Ability	.431	.736	.401	.465	.218
Data Capture	.412	.401	.970	.547	.313
Data Analytics	.514	.465	.547	.923	.509
Information Quality	.314	.218	.313	.509	.655

B 65: Data and analytics - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Communication	14.9072	8.189	.559	.327	.799
Organisational Ability	14.6495	8.855	.593	.399	.785
Data Capture	14.5979	8.305	.589	.373	.787
Data Analytics	14.6495	7.626	.767	.631	.730
Information Quality	14.3093	9.258	.550	.438	.798

B 66: Data and analytics - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.2784	12.620	3.55241	5

B 67: Data and analytics - Correlation Matrix[a]

		Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Correlation	Communication	1.000	.481	.400	.513	.371
	Organisational Ability	.481	1.000	.475	.564	.313
	Data Capture	.400	.475	1.000	.578	.393
	Data Analytics	.513	.564	.578	1.000	.655
	Information Quality	.371	.313	.393	.655	1.000
Sig. (1-tailed)	Communication		.000	.000	.000	.000
	Organisational Ability	.000		.000	.000	.001
	Data Capture	.000	.000		.000	.000
	Data Analytics	.000	.000	.000		.000
	Information Quality	.000	.001	.000	.000	

a. Determinant = .164

B 68: Data and analytics - Inverse of Correlation Matrix

	Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Communication	1.486	-.398	-.141	-.372	-.128
Organisational Ability	-.398	1.663	-.313	-.681	.196
Data Capture	-.141	-.313	1.595	-.632	-.062
Data Analytics	-.372	-.681	-.632	2.709	-1.174
Information Quality	-.128	.196	-.062	-1.174	1.779

B 69: Data and analytics - KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	168.785
	df	10
	Sig.	.000

B 70: Data and analytics - Anti-image Matrices

		Communication	Organisational Ability	Data Capture	Data Analytics	Information Quality
Anti-image Covariance	Communication	.673	-.161	-.059	-.092	-.048
	Organisational Ability	-.161	.601	-.118	-.151	.066
	Data Capture	-.059	-.118	.627	-.146	-.022
	Data Analytics	-.092	-.151	-.146	.369	-.244
	Information Quality	-.048	.066	-.022	-.244	.562
Anti-image Correlation	Communication	.875[a]	-.253	-.091	-.185	-.079
	Organisational Ability	-.253	.801[a]	-.192	-.321	.114
	Data Capture	-.091	-.192	.863[a]	-.304	-.037
	Data Analytics	-.185	-.321	-.304	.723[a]	-.535
	Information Quality	-.079	.114	-.037	-.535	.728[a]

a. Measures of Sampling Adequacy(MSA)

B 71: Data and analytics - Communalities

	Initial	Extraction
Communication	1.000	.515
Organisational Ability	1.000	.552
Data Capture	1.000	.558
Data Analytics	1.000	.777
Information Quality	1.000	.512

Extraction Method: Principal Component Analysis.

B 72: Data and analytics - Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.914	58.279	58.279	2.914	58.279	58.279
2	.740	14.808	73.087			
3	.599	11.971	85.058			
4	.484	9.680	94.738			
5	.263	5.262	100.000			

Extraction Method: Principal Component Analysis.

B 73: Data and analytics - Component Matrix[a]

	Component
	1
Communication	.718
Organisational Ability	.743
Data Capture	.747
Data Analytics	.881
Information Quality	.716

Extraction Method: Principal Component Analysis.

a. 1 components extracted

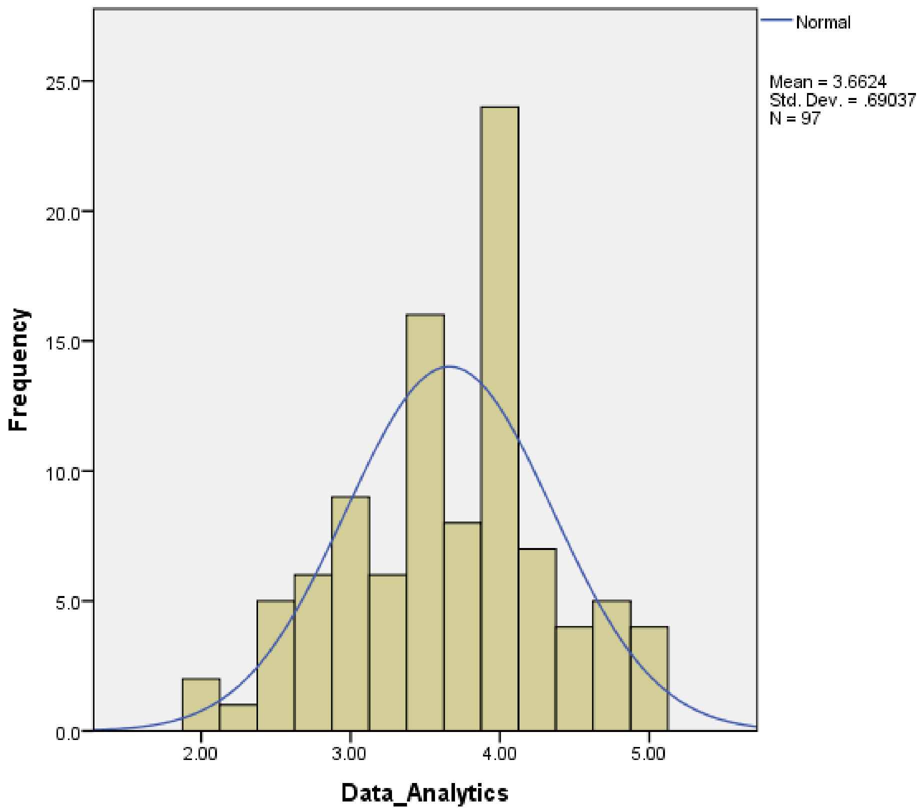
B 74: Data and analytics - Descriptive Statistics

	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Data Analytics	3.6624	.69037	97

B 75: Data and analytics – Correlations

		Digital Business Success	Data Analytics
Digital Business Success	Pearson Correlation	1	.679**
	Sig. (2-tailed)		.000
	N	97	97
Data Analytics	Pearson Correlation	.679**	1
	Sig. (2-tailed)	.000	
	N	97	97

B 76: Data and analytics - Histogram



B 77: Value network - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure

B 78: Value network - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.632	.680	3

B 79: Value network - Item Statistics

	Mean	Std. Deviation	N
Suppliers	3.9794	.81623	97
Partners	4.0825	.81228	97
System Inter-connectivity	3.5979	1.18726	97

B 80: Value network - Inter-Item Correlation Matrix

	Suppliers	Partners	System Inter-connectivity
Suppliers	1.000	.678	.206
Partners	.678	1.000	.359
System Inter-connectivity	.206	.359	1.000

B 81: Value network - Inter-Item Covariance Matrix

	Suppliers	Partners	System Inter-connectivity
Suppliers	.666	.450	.200
Partners	.450	.660	.346
System Inter-connectivity	.200	.346	1.410

B 82: Value network - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Suppliers	7.6804	2.761	.479	.461	.501
Partners	7.5773	2.476	.623	.510	.323
System Inter-connectivity	8.0619	2.225	.308	.131	.808

B 83: Value network - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.6598	4.727	2.17412	3

B 84: Value network - Case Processing Summary

		N	%
Cases	Valid	97	100.0
	Excluded[a]	0	.0
	Total	97	100.0

a. Listwise deletion based on all variables in the procedure

B 85: Value network - Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.808	.808	2

B 86: Value network - Item Statistics

	Mean	Std. Deviation	N
Suppliers	3.9794	.81623	97
Partners	4.0825	.81228	97

B 87: Value network - Inter-Item Correlation Matrix

	Suppliers	Partners
Suppliers	1.000	.678
Partners	.678	1.000

B 88: Value network - Inter-Item Covariance Matrix

	Suppliers	Partners
Suppliers	.666	.450
Partners	.450	.660

B 89: Value network - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Suppliers	4.0825	.660	.678	.460	.
Partners	3.9794	.666	.678	.460	.

B 90: Value network - Scale Statistics

Mean	Variance	Std. Deviation	N of Items
8.0619	2.225	1.49174	2

B 91: Value network - Correlation Matrix[a]

		Suppliers	Partners
Correlation	Suppliers	1.000	.678
	Partners	.678	1.000
Sig. (1-tailed)	Suppliers		.000
	Partners	.000	

a. Determinant = .540

B 92: Value network - Inverse of Correlation Matrix

	Suppliers	Partners
Suppliers	1.852	-1.256
Partners	-1.256	1.852

B 93: Value network - KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	58.216
	Df	1
	Sig.	.000

B 94: Value network - Anti-image Matrices

		Suppliers	Partners
Anti-image Covariance	Suppliers	.540	-.366
	Partners	-.366	.540
Anti-image Correlation	Suppliers	.500[a]	-.678
	Partners	-.678	.500[a]

a. Measures of Sampling Adequacy(MSA)

B 95: Value network – Communalities

	Initial	Extraction
Suppliers	1.000	.839
Partners	1.000	.839

Extraction Method: Principal Component Analysis

B 96: Value network - Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.678	83.909	83.909	1.678	83.909	83.909
2	.322	16.091	100.000			

Extraction Method: Principal Component Analysis

B 97: Value network - Component Matrix[a]

	Component
	1
Suppliers	.916
Partners	.916

Extraction Method: Principal Component Analysis

a. 1 component extracted

B 98: Value network - Descriptive Statistics

	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Value_Network	4.0309	.74587	97

B 99: Value network – Correlations

		Digital Business Success	Value Network
Digital Business Success	Pearson Correlation	1	.211*
	Sig. (2-tailed)		.038
	N	97	97
Value Network	Pearson Correlation	.211*	1
	Sig. (2-tailed)	.038	
	N	97	97

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

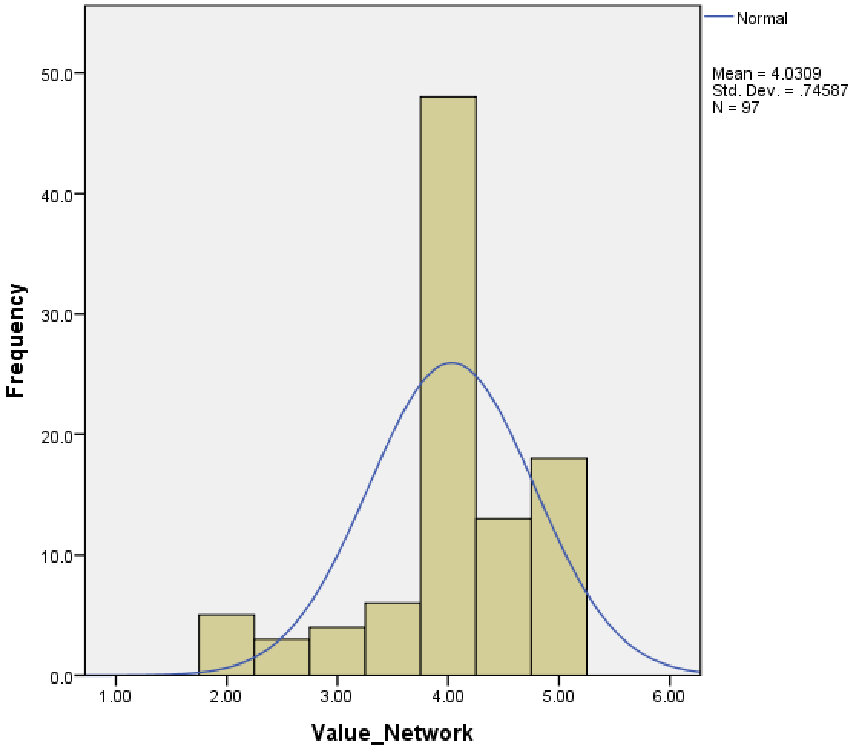
B 100: Correlations – Five Components

		Digital Business Success	Value Network	Resources Competencies	Data Analytics	Value Architecture	Value Delivery
Digital Business Success	Pearson Correlation	1	.211*	.710**	.679**	.643**	.772**
	Sig. (2-tailed)		.038	.000	.000	.000	.000
	N	97	97	97	97	97	97
Value Network	Pearson Correlation	.211*	1	.202*	.240*	.258*	.266**
	Sig. (2-tailed)	.038		.047	.018	.011	.008
	N	97	97	97	97	97	97
Resources Competencies	Pearson Correlation	.710**	.202*	1	.690**	.619**	.654**
	Sig. (2-tailed)	.000	.047		.000	.000	.000
	N	97	97	97	97	97	97
Data Analytics	Pearson Correlation	.679**	.240*	.690**	1	.645**	.701**
	Sig. (2-tailed)	.000	.018	.000		.000	.000
	N	97	97	97	97	97	97
Value Architecture	Pearson Correlation	.643**	.258*	.619**	.645**	1	.597**
	Sig. (2-tailed)	.000	.011	.000	.000		.000
	N	97	97	97	97	97	97
Value Delivery	Pearson Correlation	.772**	.266**	.654**	.701**	.597**	1
	Sig. (2-tailed)	.000	.008	.000	.000	.000	
	N	97	97	97	97	97	97

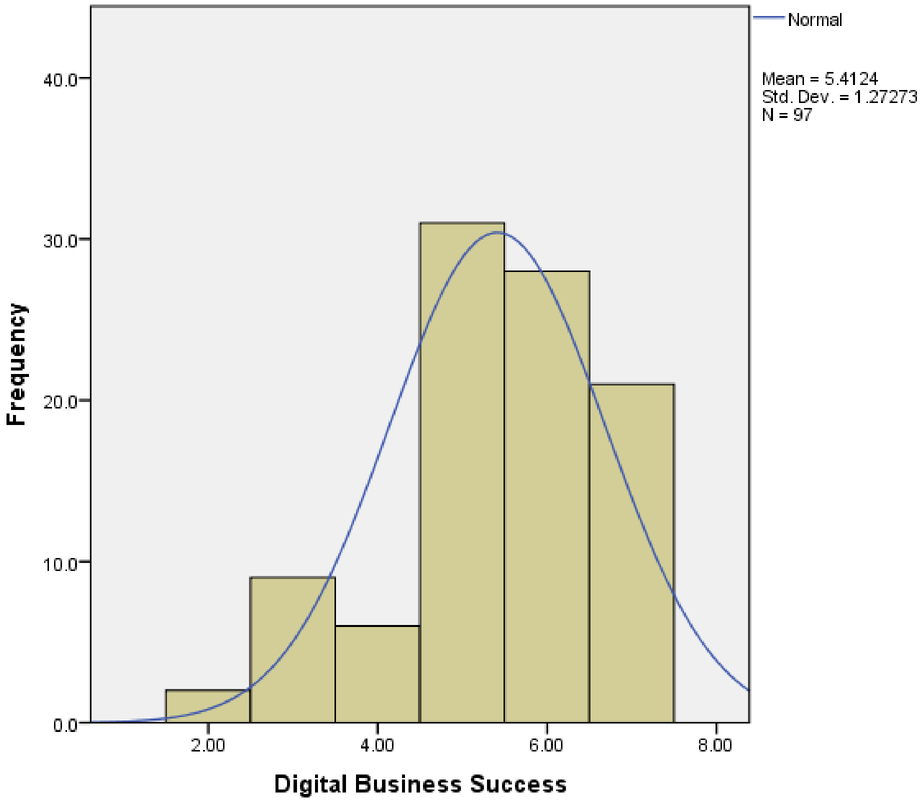
*. Correlation is significant at the 0.05 level (2-tailed)

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

B 101: Value network - Histogram



B 102: Digital business success - Histogram



B 103: Six component model - Descriptive Statistics

	Mean	Std. Deviation	N
Digital Business Success	5.4124	1.27273	97
Value Capture	.8454	.36344	97
Resources Competencies	3.8082	.78683	97
Data Analytics	3.6624	.69037	97
Value Architecture	3.3113	.84408	97
Value Network	4.0309	.74587	97
Value Delivery	3.6186	.86467	97

B 104: Six component model – Correlations

		Digital Business Success	Value Capture	Resources Competencies	Data Analytics	Value Architecture	Value Network	Value Delivery
Pearson Correlation	Digital Business Success	1.000	.364	.710	.679	.643	.211	.772
	Value Capture	.364	1.000	.230	.111	.152	-.040	.297
	Resources Competencies	.710	.230	1.000	.690	.619	.202	.654
	Data Analytics	.679	.111	.690	1.000	.645	.240	.701
	Value Architecture	.643	.152	.619	.645	1.000	.258	.597
	Value Network	.211	-.040	.202	.240	.258	1.000	.266
	Value Delivery	.772	.297	.654	.701	.597	.266	1.000
Sig. (1-tailed)	Digital Business Success	.	.000	.000	.000	.000	.019	.000
	Value Capture	.000	.	.012	.138	.069	.349	.002
	Resources Competencies	.000	.012	.	.000	.000	.024	.000
	Data Analytics	.000	.138	.000	.	.000	.009	.000
	Value Architecture	.000	.069	.000	.000	.	.005	.000
	Value Network	.019	.349	.024	.009	.005	.	.004
	Value Delivery	.000	.002	.000	.000	.000	.004	.
N	Digital Business Success	97	97	97	97	97	97	97
	Value Capture	97	97	97	97	97	97	97
	Resources Competencies	97	97	97	97	97	97	97
	Data Analytics	97	97	97	97	97	97	97
	Value Architecture	97	97	97	97	97	97	97
	Value Network	97	97	97	97	97	97	97
	Value Delivery	97	97	97	97	97	97	97

B 105: Six component model - Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.844[a]	.712	.693	.70536	2.321

a. Predictors: (Constant), Value_Delivery, Value_Network, Value Capture, Value_Architechture, Resources_Competencies, Data_Analytics

b. Dependent Variable: Digital Business Success

B 106: Six component model - ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	110.728	6	18.455	37.093	.000[b]
	Residual	44.778	90	.498		
	Total	155.505	96			

a. Dependent Variable: Digital Business Success

b. Predictors: (Constant), Value_Delivery, Value_Network, Value Capture, Value_Architechture, Resources_Competencies, Data_Analytics

B 107: Six component model - Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.176	0.526		-0.335	0.739
	Value Capture	0.546	0.213	0.156	2.564	0.012
	Resources Competencies	0.379	0.139	0.235	2.724	0.008
	Data Analytics	0.222	0.171	0.12	1.296	0.198
	Value Architecture	0.248	0.12	0.164	2.058	0.042
	Value Network	-0.009	0.102	-0.005	-0.088	0.93
	Value Delivery	0.577	0.131	0.392	4.391	0

B 108: Six component model (Nr 2) - Coefficients[a]

Model		95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1.221	0.869					
	Value Capture	0.123	0.968	0.364	0.261	0.145	0.867	1.153
	Resources Competencies	0.103	0.656	0.71	0.276	0.154	0.432	2.317
	Data Analytics	-0.118	0.562	0.679	0.135	0.073	0.371	2.695
	Value Architecture	0.009	0.487	0.643	0.212	0.116	0.503	1.989
	Value Network	-0.211	0.193	0.211	-0.009	-0.005	0.899	1.112
	Value Delivery	0.316	0.837	0.772	0.42	0.248	0.402	2.487

B 109: Six component model - Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index
1	1	6.757	1
	2	0.133	7.135
	3	0.046	12.059
	4	0.023	17.095
	5	0.019	19.002
	6	0.013	22.869
	7	0.009	27.01

a. Dependent Variable: Digital Business Success

B 110: Six component model (Nr 2)- Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions						
		(Constant)	Value Capture	Resources Competencies	Data Analytics	Value Architecture	Value Network	Value Delivery
1	1	0	0	0	0	0	0	0
	2	0	0.86	0	0	0.01	0.01	0
	3	0.08	0	0.02	0.01	0.12	0.27	0.05
	4	0	0.03	0.04	0.03	0.79	0.04	0.24
	5	0.22	0	0.18	0.03	0.01	0.32	0.39
	6	0.36	0.01	0.69	0.07	0.03	0.27	0.07
	7	0.34	0.09	0.07	0.87	0.04	0.09	0.25

B 111: Six component model - Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.8231	7.4515	5.4124	1.07397	97
Std. Predicted Value	-2.411	1.899	.000	1.000	97
Standard Error of Predicted Value	.093	.290	.183	.051	97
Adjusted Predicted Value	2.7872	7.4831	5.4111	1.07134	97
Residual	-1.75007	1.48579	.00000	.68296	97
Std. Residual	-2.481	2.106	.000	.968	97
Stud. Residual	-2.566	2.242	.001	1.006	97
Deleted Residual	-1.87176	1.68364	.00123	.73776	97
Stud. Deleted Residual	-2.650	2.295	-.001	1.016	97
Mahal. Distance	.689	15.226	5.938	3.784	97
Cook's Distance	.000	.096	.012	.019	97
Centered Leverage Value	.007	.159	.062	.039	97

a. Dependent Variable: Digital Business Success

B 112: Four component model - Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Value Delivery, Value Capture, Value Architecture, Resources Competencies	.	Enter

a. Dependent Variable: Digital Business Success

b. All requested variables entered.

B 113: Four component model - Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.841[a]	.707	.694	.70414	2.248

a. Predictors: (Constant), Value_Delivery, Value Capture, Value_Architechture, Resources_Competencies

b. Dependent Variable: Digital Business Success

B 114: Four component model - ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	109.890	4	27.472	55.408	.000[b]
	Residual	45.615	92	.496		
	Total	155.505	96			

a. Dependent Variable: Digital Business Success

b. Predictors: (Constant), Value_Delivery, Value Capture, Value_Architechture, Resources_Competencies

B 115: Four component model (Nr 1) - Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.024	0.38		0.063	0.95
	Value Capture	0.501	0.208	0.143	2.411	0.018
	Resources Competencies	0.441	0.131	0.273	3.378	0.001
	Value Architecture	0.289	0.115	0.192	2.518	0.014
	Value Delivery	0.643	0.119	0.437	5.422	0

a. Dependent Variable: Digital Business Success

116: Four component model (Nr 2) - Coefficients[a]

Model		95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-0.731	0.778					
	Value Capture	0.088	0.913	0.364	0.244	0.136	0.907	1.103
	Resources Competencies	0.182	0.701	0.71	0.332	0.191	0.489	2.045
	Value Architecture	0.061	0.517	0.643	0.254	0.142	0.55	1.817
	Value Delivery	0.408	0.879	0.772	0.492	0.306	0.491	2.038

B 117: Four component model - Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Value Capture	Resources Competencies	Value Architecture	Value_Delivery
1	1	4.812	1.000	.00	.01	.00	.00	.00
	2	.120	6.332	.01	.94	.01	.03	.01
	3	.031	12.509	.77	.02	.00	.28	.06
	4	.022	14.739	.05	.03	.03	.63	.61
	5	.015	18.061	.17	.00	.96	.07	.32

a. Dependent Variable: Digital Business Success

B 118: Four component model - Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.7710	7.3924	5.4124	1.06990	97
Std. Predicted Value	-2.469	1.851	.000	1.000	97
Standard Error of Predicted Value	.080	.281	.153	.047	97
Adjusted Predicted Value	2.7453	7.4151	5.4127	1.06949	97
Residual	-1.66892	1.60024	.00000	.68932	97
Std. Residual	-2.370	2.273	.000	.979	97
Stud. Residual	-2.410	2.307	.000	1.005	97
Deleted Residual	-1.73524	1.64921	-.00029	.72634	97
Stud. Deleted Residual	-2.476	2.364	-.002	1.015	97
Mahal. Distance	.250	14.304	3.959	3.046	97
Cook's Distance	.000	.071	.011	.016	97
Centered Leverage Value	.003	.149	.041	.032	97

a. Dependent Variable: Digital Business Success

Appendix C - Ethical clearance

Gordon Institute of Business Science
University of Pretoria

Dear Mr Abraham Vosloo

Protocol Number: **Temp2015-00948**

Title: **CRITICAL COMPONENTS IN A DIGITAL BUSINESS MODEL DESIGN**

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 Ethics Administrator