Exploring the Impact on a Firms Agility through Centralised Technology Capabilities: A Quantitative Research Approach

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Abstract

The value generated from information technology (IT) has long been discussed in both research studies and organisations. Organisations demand cost efficiencies from their IT functions, combined with greater agility to react rapidly to market opportunities. Traditionally, IT functions have been centralised; however, given the perceived low performance of centralised functions, some organisations have decentralised their IT capabilities.

Despite there being many research studies on IT performance and IT organisations theory, research gaps remain in identifying whether IT performance influences an organisation's decision-making, specifically around IT organisational structure. While it has been highlighted that IT can enable firms to be agile, little is known of the elements and the contexts in which IT enhances business value through its capabilities. The limited understanding of the value that centralised technology capabilities generate can skew perceptions within firms as to the real value that technology provides to an organisation's ability to operate in a marketplace. Perception-based decision-making by business executives may lead to organisational structures being incorporated, which may not essentially address the root cause of the technology performance gaps; rather, it merely provides a short-sighted resolution to a problem that different means could address. By better understanding technological capabilities and their value within an organisation, firms can address and enhance a firm's key assets of people, process and technology, while designing an organisational model representing the firm's strategic vision, goals and goodness-of-fit.

This study assessed whether IT capabilities in centralised IT functions affect a firm's market and operational agility, while also exploring whether a relationship exists between centralised IT performance and a firm's decision to decentralise their IT organisations by devolving IT capabilities to individual business units. The study used quantitative analysis and online survey data collection methods. The online survey attracted 212 participant responses, resulting in a 60% response rate, overall. Survey participants were primarily from retail organisations (39%), with the remaining participants predominantly from other industries. The study adopts an existing agility model to understand the perception of a firm's employees regarding the value generated through centralised IT functions. A combination of Pearson

correlation and multiple linear regression parametric tests were used to accept or reject the hypotheses. The study identifies that centralised IT organisations can no longer act as a silo function within the overall organisation, with the threat of decentralising IT functions a stark reality. Firms depend intrinsically on technology, and the expectations and needs technology serves in a firm's growth increase continuously. Market competitiveness and increases in customer demand and expectations fuel this increase. As a result, executive and business leaders expect IT organisations to adapt to the agility of the markets and to provide measurable value generated through IT. The study highlighted that IT capabilities are related to a firm's ability to react to market needs and can prove influential in decentralising IT capabilities. The study made recommendations for IT organisations to adopt technological advances in the areas of Cloud computing, API-Microservices architectures and improvements in project delivery through Agile delivery practices, enhanced governance and greater strategic alignment between IT and business functions.

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You are often told before starting a research study that you will endure a rollercoaster of a ride, and this is true. It has been a long road. Since I started this research, I have had two children; I was promoted twice at work; I lost most of my hair and, like the rest of the world, I had to adapt to new norms and ways of working caused by the pandemic. Above all, I am thankful to God that I am still here to write this acknowledgment. I was privileged to pursue my dream and write about something for which I have a true passion. However, without my support network, this would never have been possible. I would first like to thank my supervisors, Professor Amin Hosseinian-Far and Professor Nick Petford, who supported me throughout this process with their invaluable advice and wisdom. I would like to thank my family and especially my wife for her relentless support. Above all, I would like to dedicate this study to a few people. First, to my parents, for their continuous encouragement and hard work, which gave me the opportunity to pursue higher education. Second, I would also like to dedicate this study to my grandmother, who sadly passed away before I completed my research. She always prayed that I would complete my research, and it seems her prayers finally came true.

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Abbreviations

API	Application programming interface
CAPEX	Capital expenditure
CIO	Chief Information Officer
CSAT	Customer satisfaction score
ERP	Enterprise resource planning
FTE	Full time equivalent
IaaS	Infrastructure as a service
IBV	Information behaviours and value
IMP	Information management practice
IRR	Internal rate of return
IT	Information technology
ITP	Information technology practice
KBV	Knowledge based view
KM	Knowledge management
KPI	Key performance indicator
MVP	Minimum viable product
NPV	Net present value
PaaS	Platform as a service
PM	Project management
PMO	Project management office
R&D	Research and development
RBV	Resource based view
ROI	Return on investment
SaaS	Software as a service
SOA	Service orientated architecture
TAM	Technology adoption model

Chapter 1 Research Introduction

1.1 Introduction

As businesses jostle with one another for their competitive edge and dominant market share, it has become clear that information technology (IT) can play a crucial role in enabling firms to meet their strategic objectives (Panda & Rath, 2018). Firms may have to increase their investments in IT to remain efficient, innovative and agile and to outperform their market competitors. As Pajic et al. (2014) highlight, the increasing use of information technology has resulted in firms needing to evaluate the productivity impact of IT investments through IT value measures (Shea et al., 2019; Lynn et al., 2020; Panda & Rath, 2021).
However, IT value has been a source of continuous discussion for organisations. Lei and Huifan (2017) suggest that organisations face the challenge of determining the overall organisational performance generated by IT capabilities. In turn, the effect of information technology on an organisation's performance has been debated for many years (Chen et al., 2019; Panda & Rath, 2021). While several IT value studies have attributed strategic organisational performance improvements, others have suggested that IT may not have direct effects on an organisation's performance (Ramamurthy, 2011; Shea et al., 2019). According to Shea et al. (2019), despite uncertainty within organisations over the true value produced through IT investment, IT spend has steadily increased over the years. According to the Gartner group (see Figure 1), worldwide IT spend grew by 6.2% in 2021, taking total IT spending to about $3.9 trillion. For the year 2022, a further 4.6% increase is predicted year-on-year.

	2020 Spending	2020 Growth (%)	2021 Spending	2021 Growth (%)	2022 Spending	2022 Growth (%)
Data Center Systems	214,985	0.0	228,360	6.2	236,043	3.4
Enterprise Software	465,023	-2.4	505,724	8.8	557,406	10.2
Devices	653,172	-8.2	705,423	8.0	714,762	1.3
IT Services	1,011,795	-2.7	1,072,581	6.0	1,140,057	6.3
Communications Services	1,349,891	-1.7	1,410,745	4.5	1,456,637	3.3
Overall IT	**3,694,867**	**-3.2**	**3,922,833**	**6.2**	**4,104,906**	**4.6**

Figure 1. Gartner growth spend analysis (Gartner,2021)

Considering this continuous rate of growth in technology, companies are often challenged as to whether such investments will result in business value (Shea et al., 2019). A paradoxical problem arises here: change is the only constant, so firms are obliged to continuously change to keep pace with consumer needs and demands. This challenge has been amplified in the recent COVID-19 pandemic; according to Gabrylczyk (2020), the pandemic has undoubtedly caused organisational changes, forced a redefinition of business strategies and acted as a catalyst for digital transformation in many sectors. This opinion is supported by Dannenberg et al. (2020), as well as the reports of advisory consultancy groups such as Boston Consultancy Group (BCG), who report that in 2020, at the height of the first surge of the pandemic, 83% of companies stated that COVID-19 served as a wake-up call to accelerate their digital transformation efforts (Forth et al., 2021).

Strassman (1997) stresses that considering IT to increase a firm's productivity is deceptive, arguing that no such relationship exists between IT investment and corporate profits. Likewise, Brynjolfsson (1996) suggests that the relationship between IT and competitive advantage is undetectable. On the contrary, Cao (2008) highlights that to improve productivity, IT primarily depends on seven complementary organisational practices: digital processes, open information access, empowered employees, merit-based incentives, corporate culture, recruiting the right people and investing in human capital. Shea et al. (2019) argue that in earlier studies of IT spend, such as those of Strassman (1997) and Brynjolfsson (1996), such spend did not appear to result in significant increases in a firm's productivity

since their effects took much longer to realise (Hitt & Brynjolfsson, 1996). Indeed, the authors contend that many firms with substantial investments in IT reported significant increases in firm value in the late 1990s (Shea et al., 2019).

IT professionals have long looked at IT investments through the lens of capitalised budgeting or expenditure (CAPEX). Capital budgeting involves an initial capital outlay that is associated with a set of financial returns (for example, NPV, ROI and IRR) over a defined period, while finance-based outcomes serve the purpose of computing and articulating the business value of IT. Lynn et al. (2020) highlight that the often intangible nature of some IT benefits – such as enhanced customer satisfaction, customer loyalty or improved efficiencies – present cash flow measurement challenges, making it progressively difficult for IT executives and their business partners to accurately determine IT business value.

Cao (2005) further suggests that IT increases a firm's financial performance indirectly by enhancing its enabling functions, such as organisational processes, structures and culture. One such indirect enabler is the IT organisational ability to play a crucial contributory role in the overall firm's agility through people, processes and technology. Ramamurthy (2011) highlights that market changes, market threats and the ability to capitalise on market opportunities are critical factors in why modern businesses need to be agile. Moreover, such agility can be defined in various ways. One such definition is an organisation's ability to cope with rapid, relentless and uncertain changes in a competitive environment of continually and unpredictably changing opportunities (Ramamurthy, 2011). Panda and Rath (2021) build on this importance of agility by suggesting that IT agility exhibits the intellectual characteristic, that is, a competitive and growth-oriented entrepreneurial mindset to transmit strategic decision-making in unanticipated market environments.

In this study, agility is defined as an organisation's ability to react to market changes by enhancing its IT capabilities in support of its strategic goals so that business value can be realised and competitive advantages can be attained. Shea et al. (2020) support this definition by arguing that firms that invest in technology may also gain a competitive advantage by adopting technologies that fit well with the firm's long-term goals and mission. Although the technology itself (i.e., its processes, standards, skill sets, etc.) may be replicable by its competitors, the technology is much more difficult to imitate when the technology matches the specific needs of a particular firm (Shea et al., 2019).

Ramamurthy (2011) conceptualises agility into three dimensions of IT capabilities: (a) IT architecture, (b) IT and business partnership, and (c) IT proactivity. The first capability, IT

architecture, represents an organisation's ability to provide technology platforms such as infrastructure hosting, networks and communications, data management, integration services and application portfolios. An organisation's IT architecture must reflect the ability to enable the organisation to adapt to market and strategic direction rapidly. However, some studies have shown that IT architectures can often hinder and impede organisational agility (Lowry & Wilson, 2016a). Legacy IT systems constrain organisations, while rigid and over-engineered architectures – or, as suggested by Van Oosterhout et al. (2006), multiple nests of disparate technology silos – soon become a disabler of agility.

The second capability emphasises IT and business partnership and the synergies between them. Ramamurthy et al. (2011) suggest that partnerships and synergy between IT and business managers lead to effective joint decision-making, more strategic applications and more significant agreement; they can therefore be useful in realising rapid responses to innovative initiatives. Ramamurthy (2011) further suggests that close interaction and collaboration between IT and business units foster a culture of knowledge sharing and joint responsibility, which plays an integral part in influencing an organisation's strategic use of IT (Abbasi, 2017).

The third capability, IT proactivity, focuses on the ability of IT resources to proactively embrace innovation to create business opportunities and counter existing or new threats. Cao et al. (2008) suggest that IT proactivity is measured by the organisation's proactivity in striving to be current with IT innovations, continuing to experiment with new IT as necessary, continually seeking new ways to enhance its effectiveness of IT use and fostering a climate that is supportive of trying out new ways of using IT.

In Ramamurthy's (2011) model, IT capability (IT architecture, IT and business, IT proactivity) determines whether direct effects on market capitalising agility and operational change agility are realised. Here, market capitalising agility is described as the firm's agility in processing extensive and variable amounts of information to identify and anticipate external changes while also continuously monitoring and quickly improving product/service offerings to address customer needs. In turn, operational adjustment agility highlights a firm's ability, through its internal business processes, to physically cope with and rapidly respond to market or demand changes; it is thus directed primarily at operational activities and reactivity (Ramamurthy, 2011).

Overall, the existing research highlights differences in opinions regarding the factors that

measure IT performance. Many studies have looked at IT value purely from an IT investment perspective; for example, Marcus and Soh (1995) developed a model aimed at understanding whether IT creates business value through IT investment. However, as argued above, a firm cannot realise the actual value of its IT investment because of the lack of fit between the business and its IT strategy. This is supported by Brynjolfsson (2003), who argues that IT makes little direct contribution to the overall performance of a company (or the wider economy) until it is combined with complementary investments in work practices, human capital and organisational restructuring.

While IT performance is widely debated, one commonality is that IT has a crucial role in organisations and therefore measuring its performance is vital in supporting organisations to meet their strategic objectives. Tallon et al. (2014) suggest that despite significant progress in recent years in evaluating the performance effects of information technology, executives remain frustrated by the lack of metrics to assess the real value of IT to their firms. The research further suggests that executives are evaluating IT effects by supplementing evidence-based decision-making with insight, intuition, perception or gut feeling to instinctively decide whether, and to what extent, IT is delivering on its promise (Tallon & Kraemer, 2007, 2014; Benaroch & Fink, 2021). Tallon and Kraemer (2014) foreground a convergence of the effects of IT performance with organisation design, while Brynjolfson (1994) explains that IT has the potential to affect the structure of organisations significantly. In the present day, the debate continues on how best to design the IT organisation within the context of the wider business environment, as seen in the 'merry-go-round' that has characterised the early popularity of centralisation, decentralisation in the 1980s and then recentralisation in the 1990s (Magnusson, 2013). In recent years, with the growing digitisation of organisations and the need for businesses to promote innovation and agility, organisations are seeking to centralise or decentralise their IT organisations to increase their competitive market edge (Timmermans, 2016).

Nault (1998) argues that centralisation promotes continuity in organisational operations because decisions are made at a single level but separate from their environment. Conversely, Nault (1998) also highlights that decentralisation forces decision-making right down to lower levels, possibly improving performance and encouraging innovation. In a practical context, decentralisation primarily refers to filtering decision-making authority and autonomy down to individual business units; business units would thus have the freedom to make technology-related decisions, such as innovation, strategy, software development, delivery, architecture,

security and other technology-related matters. However, problems in decentralisation arise if these lower levels are incompetent or unaccountable for their decisions (Nault, 1998).
Despite there being many research studies on IT performance and IT organisation theory, research gaps remain in identifying whether IT performance influences board-level decision-making, specifically around IT organisational structure. While we recognise that information technology can enable firms to be agile, limited understanding persists over the mechanisms through and the contexts in which IT enhances value through agility (Tallon & Kraemer, 2014; Ravichandran, 2018). In turn, the digital revolution has affected the firm's sustainability, with IT a key enabler in creating a firm's competitive edge, entry into new markets and radical disruption of existing markets. Weir et al. (2006) highlight that IT is embedded within a broader social context and that it can cause the transformation of the organisational and social structures in which they are embedded. Similarly, Ravichandran (2018) states that organisations in environments of dynamic hyper-competition need to be agile to adapt their strategies and actions if they are to be successful.
Although Weir's (2006) perspective implies how IT can influence the social organisation of a firm, there has so far been a gap in the research that bridges IT performance and a firm's IT organisation design. To date, research has focused on silos of IT performance within firms rather than identifying the organisational areas for change and delineating how to improve these areas to make organisations more agile (Lin & Chen, 2012; Nicolian et al., 2015; Cao et al., 2016; Lowry & Wilson, 2016; Tan et al., 2017; Nejatian et al., 2019; Tan et al., 2019; Lin et al., 2021). Likewise, IT organisation research contributions have focused on understanding and evaluating the centralised and decentralising theories (Richardson et al., 2002; McElheran, 2012; Magnusson, 2013), focusing little on what drives IT organisation design, specifically around IT performance. The primary contribution of such studies has been to understand the concepts of centralised and decentralised IT organisations not in concrete terms but more as a sensitising concept through IT performance. This chapter covers the main reasoning behind this study by discussing the research aims, objectives and how the research will be conducted by walking through the research method applied and subsequent ethical considerations. The chapter further highlights the contribution of the study to professional practice and academic knowledge.

1.2 Research Aims

Given the need to comprehensively assess the link between centralised IT performance and IT organisational structure, the proposed research work aims to (a) analyse whether IT capabilities in centralised IT organisations impact a firm's market and operational agility and (b) whether there is a relationship between centralised IT agility performance and a firm's decision to decentralise their IT organisations by devolving IT capabilities to individual business units.

1.3 Research Questions

This study will specifically attempt to answer the following questions:

1. Do IT capabilities through a centralised IT structure impact a firm's market and operational agility?
2. Do IT capabilities drive an organisation to decentralise its IT organisation?

1.4 Research Objectives

The four research objectives of this study are as follows:

1. Build on and apply an existing IT capabilities model to understand the perception of a firm's employees regarding the value generated by centralised IT capabilities towards a firm's strategic market capitalising and operational adjustment agility.
2. Assess whether centralised IT capabilities impact a firm's level of agility.
3. Analyse whether IT capabilities in centralised IT structures are an influencing factor in organisational decision-making in adopting a decentralised IT organisational structure.
4. Consider improvements to the agility of centralised IT capabilities to bolster a firm's market and operational agility. This study provides several recommendations for centralised IT organisations based on prior academic literature and industry knowledge from professional practices. The recommendations cover several detailed areas in IT architecture, IT delivery and IT business partnership.

1.5 Research Method

The most dominant research philosophy for technology adoption and IT-related studies is the positivist paradigm supported by survey questionnaires. This study embraces the positivist paradigm. Despite some arguments that the paradigm is incapable of representing the complexities of social realities, it matches well with the general approach to the aims and objectives of the overall study. We based the criteria for adoption on two key elements:

1. The studies' use of hypothesis testing; and
2. The studies' adopting/adapting of pre-defined conceptual models, which would require the use of a substantial amount of quantitative data collection methods and hypothesis testing.

To support the research paradigm, this study incorporates an online web-based survey method for data collection. The survey approach is correlational, meaning that it is used to identify relationships between variables in which they produce quantitative data about the social behaviour of people, specifically exploring people's behavioural views, opinions and characteristics. The initial sample size for this study was 400 participants, with an actual response total of 212. The participants came from a wide range of industries, including but not limited to retail, academia, banking, technology, healthcare and oil and gas.
The survey design comprised 31 questions. The average time taken to complete the survey was estimated at 10 to 20 minutes. The data collection then feeds into an instrument adapted from Ramamurthy's (2011) agility model; the study incorporated a fourth dimension (decentralisation) to complement the existing dimensions of IT capabilities, market capitalisation agility and operational adjustment agility. The study further adapts the first-order dimensions of the second-order construct of centralised IT capability.

This study focuses on evaluating the following three hypotheses:
H1 Centralised IT capabilities are positively associated with market capitalising agility.
H2 Centralised IT capabilities are positively associated with operational adjustment agility.
H3 Centralised IT capabilities are negatively associated with decentralisation.

1.6 Motivation

This research has been driven by working in the IT industry for over 21 years and experiencing the business changes and demands of IT spurred by consumer and market needs. The central theme over the years has often been for IT to prove its value and – more so in recent years – the agility that it can provide to organisations. This has been frustrating for both the people who work in IT and their business counterparts. With the recent focus on organisations driving digitisation through online commerce, omnichannel marketing and customer service, the industry has seen various organisational models ranging from the centralisation of technology to its complete decentralisation or a hybrid of both; such models have proven to be cyclical. Ultimately, there is no such thing as a good organisational model; it is more a question of what is appropriate or inappropriate for a particular organisation (Lowry & Wilson, 2016b). The key premise that inspired this research was to understand the link between IT agility and centralised IT models and whether this is a key driver for organisations to decentralise. While both models present advantages and disadvantages, the study is further driven by the prospect of centralised IT departments falling short in providing the level of agility that organisations require and what they can practically do to alter the perception of IT value.

1.7 Ethics

Given the importance of the research method in providing an accurate representation of the sample population for this study, it is equally significant to consider its ethical aspects. Quantitative analysis was conducted through an online survey. An online survey form was used to capture the consent of the participants and organisations before they could complete the survey. In addition, a full description of the research – explaining the purpose of the research, description of the procedure, risks, confidentiality and the right to withdrawal – was presented to all participants.

1.7.1 Data Collection

The survey platform used was https://www.onlinesurveys.ac.uk/, formerly known as Bristol Online (BOS). The survey link was communicated over two mediums: (a) LinkedIn for social media and (b) email using the researcher's official university email account. Before taking part in the research, each participant was provided – both online through the online survey and via email – with a participant information sheet outlining the purpose of the research, its aims and objectives, a description of the procedure, risks, confidentiality and the right to withdrawal prior to their participation. The survey did not allow for blank responses in the data collection of the Likert scale questions, these were mandatory fields that required a response.

1.7.2 Confidentiality

In the online data collection method, gathering personal data was optional for those participants who wished to remain anonymous. For participants who provided their names and emails (i.e., identifiable data), in the event that the participant withdrew from the research, all identifiable information of the participants was identified and removed from the data sample.

Overall, it was essential that the participants were informed that all data would be analysed at the group level, thereby de-identifying individual participants. Identifying numbers were not presented in the results of the analyses, and no reference to people or organisations was referenced in the research. The data were collected confidentially and participants were informed that the collected data would be kept secure to ensure anonymity.

The data collection process was underpinned by the ethical guidelines provided by the University of Northampton (UoN). The university's ethics committee approved the ethics application to proceed with the research (**ETH1920-0195**).

1.8 Contribution to Professional Practice

The key research gap identified from the literature review is that scarce empirical research has been conducted on the sensing of agility in centralised IT organisational structures. Only

a limited number of studies have considered the causal link between low agility in centralised IT organisations and the decision by certain businesses to decentralise their IT functions. While it is understood that IT can enable firms to be competitive in an open market through enhanced technology capabilities, understanding is limited around the mechanisms through and the context in which IT enables this competitiveness. This study examines two critical elements of organisational agility: the IT capabilities of a firm and their impact on market and operational agility. Hence, this study aims to build on prior research to understand two key research questions:

1. Do IT capabilities through a centralised IT structure impact a firm's market and operational agility?
2. Do IT capabilities drive firms to decentralise their IT organisation?

This study provides centralised IT organisations with greater insight into the impact of their performance on the overall organisation. The study highlights four key dimensions (*IT architecture*, *IT delivery*, *IT business spanning* and *IT proactivity*) that contribute to overall IT capability performance.

With the insights of this study, IT organisations can evaluate and transform their operating models to align with the overall organisation's goals and strategy, thus enhancing their competitive advantage while increasing the perception of IT value throughout the wider organisation.

1.9 Contribution to Academic Knowledge

This study provides initial research on which future work on IT capabilities can be built. It highlights key impactful attributes for centralised IT capabilities, such as IT architecture, business and strategic alignment and agile delivery mechanisms. The study is based on the work of Ramamurthy (2011), expanding its scope by introducing a new dimensional construct of *decentralisation*. The study adds to academic understanding by not only highlighting the impact of centralised IT capabilities on a firm's performance, but also how IT capabilities can influence a firm to structure their IT organisation.

Whereas much of the existing literature is focused on defining the general attributes that make up IT value, this study offers a great opportunity to explore business impacts that are affected by IT capabilities at a more granular level, including revenue, profit and margins. Furthermore, it moves away from financial effects and presents opportunities for further

research to assess IT capability effects on the end consumer through an analysis of end consumer and marketing measures. Several areas of future research arise from this study. The importance of measuring and comparing centralised versus decentralised IT capabilities to a firm's performance could be beneficial. This could inform which model provides firms with a greater ability to generate the maximum value from technology. A longitudinal study that benchmarks the performance of both models over a given period and assesses overall impact, or a set of case studies and lessons learned from organisations that have implemented both models, could provide a valuable set of comparisons.

1.10 Structure of the Study

This remainder of this study is divided into the following five components:

- **Chapter 2 – Literature Review** – This chapter discusses the golden threads between those elements that constitute IT value and its impact on a firm's performance. These include the concepts of IT value, IT agility and centralised and decentralised IT organisation models. The literature review also discusses prior research and models used in IT value studies. The chapter also explores the latest IT practices and trends, as well as the literature review protocol that provided the framework for the literature research and review.
- **Chapter 3 – Methodology** – This chapter explains the actual methods used in the collection and analysis of the primary data gathered for this study. It discusses the various techniques of data collection, population samples and pilot approaches. The chapter also examines the rationale for why certain techniques were adopted in this study and the guiding principles behind the ethical considerations.
- **Chapter 4 – Analysis and Results** – This chapter provides analyses, in both written and graphical form, of the raw data collected under the guidelines from the methodology chapter. The chapter then highlights the results of the hypotheses set out in this study, along with other key findings observed through the analysis phase of this study.
- **Chapter 5 – Critical Discussion** – This chapter discusses the key findings of this study based on the data analysis results, supported by a set of recommendations for IT organisations and firms. The chapter covers recommendations for technology

architecture aligned to modern-day practices, areas where IT organisations and their business counterparts could collaborate more effectively, improvements in the delivery of IT projects, how IT investments affect a firm's technology capabilities and the services they offer and finally a broader discussion of centralised and decentralised IT.

- **Chapter 6 – Conclusion** – This chapter closes the study with a set of main conclusions, academic and professional contributions, limitations of the study and future work that could use this study to build further understanding of the key areas of IT performance.

Chapter 2 Literature Review

2.1 Chapter Introduction

Technology, more than ever, has become a key enabler for modern-day organisations to compete in a competitive market often faced with unpredictable market changes and consumer trends (Panda & Rath, 2021). IT organisations have been questioned in terms of the extent to which IT value can contribute to an organisation's growth and ability to react or pivot in the face of organisational change. Indeed, the IT organisational model itself has come into question, particularly regarding whether a centralised or decentralised model can drive higher levels of IT value for firms.

Although IT value encompasses a broad domain, it can be described as the value generated by IT against the firm's investment as a means to boost a firm's productivity, profitability and consumer value. One driver of IT value is agility, that is, the firm's ability to react rapidly to change. Previous research has identified many models of IT agility with various differing dimensions (Van Oosterhout et al., 2006; Glaser, 2008; Jia et al., 2016; Lowry & Wilson, 2016; Tan et al., 2017; Abdelilah et al., 2018; Shea et al., 2019; Panda & Rath, 2021; Tsilionis & Wautelet, 2022). Most of the common dimensions focus on aspects of the organisation, such as people, products and strategies, as well as external aspects, such as environment and technology.

Chapter 2 discusses the challenges facing organisations in determining the value of IT, the different IT value models appearing in prior research, IT agility in IT value and, finally, the difference between centralised and decentralised organisation models in IT. The chapter also discusses the capabilities that comprise IT value and its impact on a firm's performance, including the concepts of IT value, IT agility and centralised and decentralised IT organisation models. It further discusses the latest IT practices and trends and the literature review protocols, providing the framework for the literature research and review.

2.2 IT Value

In today's ever-changing business environment, firms find themselves in a never-ending battle to grow and capture a dominant market share. Technology and IT departments have become key enablers for firms to compete with and differentiate themselves from their competitors. However, many firms find themselves unable to quantify the real extent to which IT departments play in terms of value when firms are required to capitalise on market changes, demand and opportunities. Thus, the debate around IT value is ongoing. As Lei (2017) and others (Shea et al., 2019; Abdurrahman, 2020; Panda & Rath, 2021; Takeda et al., 2021) suggest, both researchers and practitioners face critical issues in understanding and assessing the enterprise performance generated by IT (Lei & Huifen, 2017; Pereira et al., 2018; Panda & Rath, 2021). This view is echoed by Shea et al. (2019), who argue that even though a significant amount of money has been spent on IT, companies are often challenged whether such investments result in genuine business value.

The impact of IT on a firm's performance has long been debated. On the one hand, several IT value studies have strongly attributed large firm performance improvements or sustainable competitive advantages to IT (Cao, 2008; Takeda et al., 2021). On the other hand, a number have suggested that IT value cannot be measured independently of a variety of organisational factors, such as organisational size, processes, structure, culture, skills, knowledge and capabilities that operate within a firm and affect IT value positively or negatively (Lei & Huifen 2017). Ravichandran et al. (2009) have shown that IT may not directly affect a firm's performance but may do so indirectly by improving functional capabilities and leveraging these skills. Shin (2001) also corroborates that IT indirectly advances performance through pairing with business strategies (Cao, 2008).

Evidently, IT value studies have been characterised by a difference of opinions over the factors that measure IT performance. Yet, one commonality is that IT has an important role in most businesses and measuring its performance is essential to helping them grow. As mentioned by Pereira et al. (2018), the value of technology is of paramount importance to organisations; in the case of higher education, the authors highlight the need to regularly assess and renew their IT approach to adapt to business change, ensuring (a) business and IT

alignment on the institution-wide IT strategy, (b) balancing and rightsizing IT priorities and budget to support IT-enabled institutional efficiencies and innovations amid institutional funding realities, and (c) IT staffing and organisational models.

Despite the vast amount of research on evaluating the value offered by IT, executives remain unclear as to the tangible value gained from IT. As suggested by Tallon (2007), executives have instead derived the value of IT by supplementing perception, insight, personal experiences or gut feeling to instinctively decide whether, and the extent to which, IT is delivering on its promise. This sensemaking theory recognises that individuals sometimes fit information into preconceived notions of the world, often referred to as confirmation bias; they see only what they want to see so that what may seem obvious to one person can be readily dismissed by another, depending on how executives filter information on IT effects (Tallon & Kraemer, 2014). In turn, this behaviour can be attributed to the fact that executives are often muddled over what the exact question is being asked of IT value. Brynjolfsson (1996) suggests that IT value is not a single question; rather, it is composed of several distinct but somewhat related issues:

1. Have investments in IT increased productivity?
2. Have investments in IT improved a firm's profitability?
3. Have investments in IT created value for consumers?

In the first question, Brynjolfsson (1996) asks whether firms see a noticeable production of output generated from IT given a series of inputs. The second question asks whether firms obtain a competitive advantage through their IT investment, and the final question considers the size of the value gained by the end consumer. Brynjolfsson (1996) highlights that while these three questions are logically distinct, they map consistently to three frameworks: the theory of production, the theory of competitive strategy and the theory of the consumer (Hitt & Brynjolfsson, 1996).

2.2.1 Theory of Production

The theory of production posits the simple assessment that the contribution of each input to total output in terms of gross marginal product; in other words, firms will continue investing in the input until no more value can be derived from its costs. In this way, firms can hypothesise that IT spending either contributes to a positive marginal amount of output or that IT spending has zero net marginal output after all costs have been subtracted.

While the theory of production may suggest that lower investment in IT can produce lower production costs for a specified output, it nevertheless cannot answer whether a firm will gain any competitive advantage from this (Shea et al., 2019; Takeda et al., 2021). Some researchers have argued that IT indirectly increases a firm's performance through leveraging its knowledge management capability, which creates and exploits synergies from the product, customer and managerial knowledge, and resources (Tanriverdi, 2005; Pereira et al., 2018; Panda & Rath, 2021). Brynjolfsson (1996) supports this view by suggesting that IT investment alone is not enough to increase productivity. Rather, it must be underpinned by seven complementary IT capabilities: digital processes, open information access, empowered employees, merit-based incentives, corporate culture, recruiting the right people and investing in human capital (Hitt & Brynjolfsson, 1996). Panda et al. (2021) present a modern-day perspective on Hitt and Brynjolfsson's (1996) view, suggesting that while RBV considers knowledge as a source of competitiveness, it does not explain the firm's specific knowledge needed to effectively integrate, coordinate and mobilise its resources and capabilities and thus cannot differentiate between diverse knowledge-based capabilities. Hence, firms need to emphasise knowledge creation, application, protection and knowledge transfer to build up strategic assets for higher levels of performance (Panda & Rath, 2021).

2.2.2 Theory of Competitive Strategy

The theory of competitive strategy advances the concept that IT can have a direct impact on a firm's profitability by giving the firm a competitive advantage. However, this notion has been dismissed by many researchers; for example, Cao (2008) cites Strassman, who suggests that no relationship can be identified between IT productivity and corporate profits. However, while agreeing with Strassman's view on corporate profits, some researchers have shown that the relationship between IT and productivity and consumer value is positively correlated, with IT being more of a strategic necessity than a competitive advantage (Hitt & Brynjolfsson, 1996; Cepeda & Arias-Pérez, 2019; Shea et al., 2019; Takeda et al., 2021). Shin (2001) supports this view that while IT may facilitate an increase in productivity, these benefits rarely result in a competitive edge through financial performance. However, more recent research advocates a different perspective: Panda and Rath (2018) argue that given the market competitiveness generated due to technical advances, changing consumer demand and globalisation, organisations have started to acknowledge IT agility as a critical strategic

organisational competence that enables the firm to sense and seize market opportunities. Thus, it is indispensable that firms continually adjust their resources, infrastructure and strategies to remain adaptable to internal and external changes, enabling them to become more responsive by operating in an agile IT platform, whereby IT infrastructure, resources and processes can expand or contract to meet market demands (Panda & Rath, 2018).

2.2.3 Theory of Consumer

The theory of the consumer focuses on the total benefit that is passed on to consumers through IT. Hitt and Brynjolfsson (1996) suggest that a decline in the price of input through lower IT investment will lead to an increase in spending and an increase in consumer surplus. All of the above theories measure distinct elements of IT value slightly differently; however, there are relationships between them. To understand this, Hitt and Brynjolfsson (1996) refer to how value is treated in economics. Gaining value is described in two ways: it can either be created or redistributed by others. In turn, IT productivity is closely related to value creation. When IT is productive, more output can be realised, leading to increased IT value delivered to the firm, its business users and its end consumers. A firm's profitability and consumer surplus may also be affected by the distribution of value through the firm's ability to create and maintain IT value, leading to an increase in profitability.

Although Hitt and Brynjolfsson (1996) provide a good foundation, the definition of value is still somewhat vague. Nicolian et al. (2015) highlight that much of the weakness in the current research is that the definition of value is unclear, somewhat partisan and sometimes absent from the research discussion. This view is also supported by Delone and McLean (1992), who argue that previous studies have failed to define a dependent variable for IT value (McLean, 1992; DeLone & McLean, 2003)
In more recent research, Dal Zotto et al. (2018) highlight that successful firms have included consumers as key participants in the value creation process because they mobilize knowledge and other resources that affect the success of a value proposition in a way that the firm cannot develop internally. Co-creation – using consumers to partake in the design process, specify the service or build the service itself using a firm's resources – remains a challenging prospect for businesses. Nonetheless, the authors argue that the expected involvement of consumers in the co-creation process is a fundamental dimension of a firm's technology-

based value co-creation strategy. They highlight a key change in consumer behaviour in that customers are no longer simply consumers but often contributors to the production of goods and services. For example, in the case of Airbnb or BlaBlaCar, a customer who purposely uploads an offering is a contributor because the product is built on their contribution. Contributors also include customers who, after consuming a product or service, purposefully rate or comment based on their own specific experience, which directly influences the value proposition (Dal Zotto et al., 2018).

2.2.4 The Delone & McLean Model

Delone and McLean (1992) define a taxonomy to contribute to the end outcome of IT value. Their taxonomy comprises six dimensions (see Figure 2): system quality, information quality, use, user satisfaction, individual impact and organisational impact. The authors suggest that IT value is not defined by one value measure but by many; their taxonomy is interdependent and interrelated, forming an IT value model. The researchers argue that by following the interactions of the components of the taxonomy, a clearer picture is painted of what can be defined as IT value.

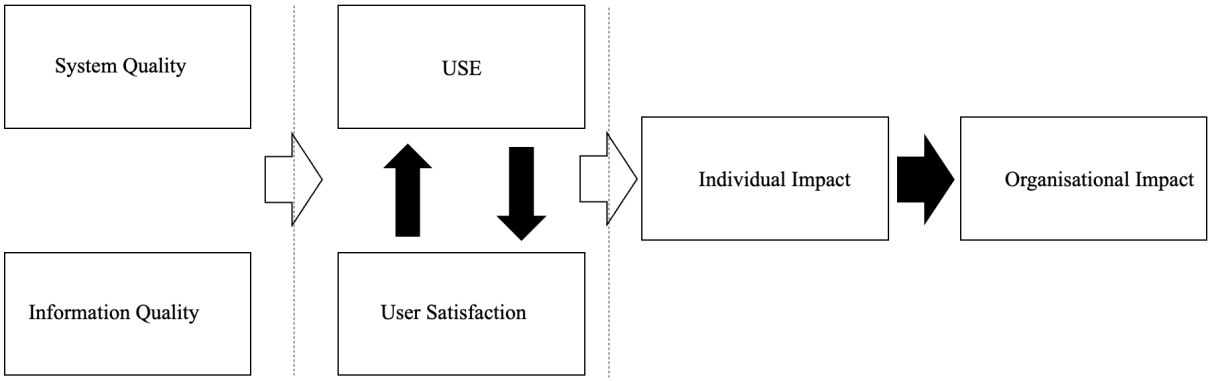

Figure 2. I.S./Success model, adapted from Delone & McLean (1992)

While Delone and McLean's (1992) model has been cited by many research studies, the authors have since updated the IT value model and evaluated its usefulness in line with the dramatic changes in IT practice, especially the advent and growth of e-commerce. As seen in Figure 3, they refine the model by first including an additional dimension of *service quality* to measure IT value, given the importance of IT operational support, where end-user support for

the firm's IT and commercial users is crucial. Second, individual and organisational impact are both removed and replaced by the IT value measure of *net benefits*, which represent the balance of positive and negative effects on customers, suppliers, employees, organisations, markets, industries, economies and even societies (DeLone & McLean, 2003).

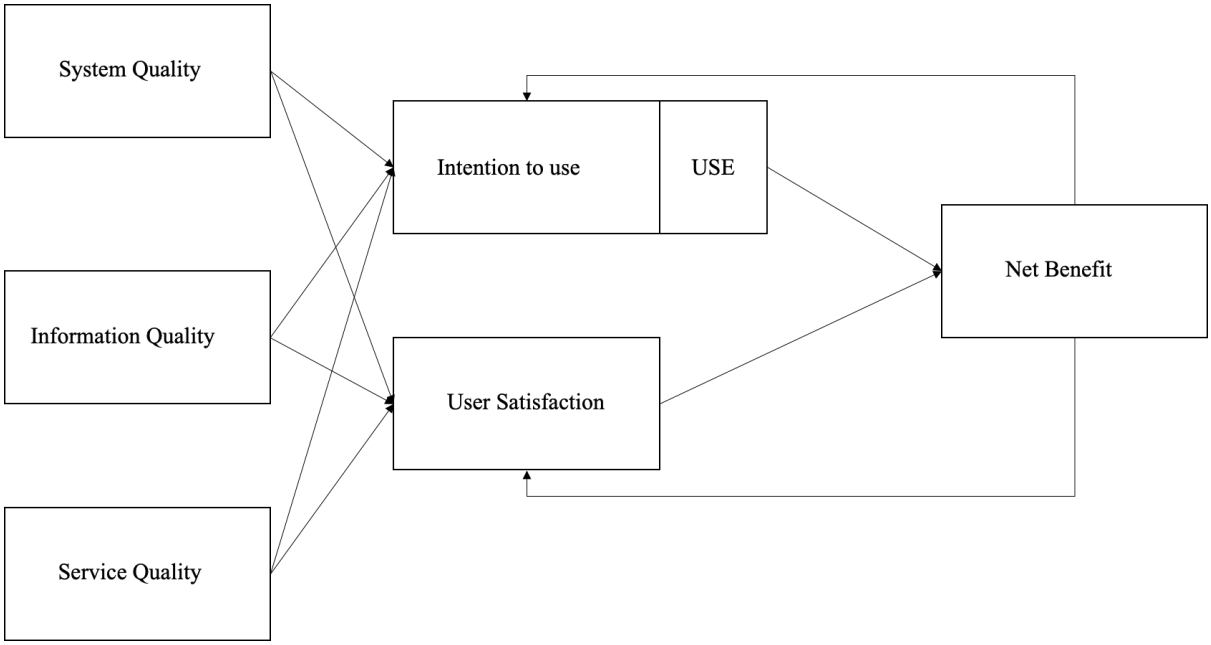

Figure 3. Updated I.S./Success model, adapted from Delone & McLean (2003)

However, Delone and McLean's (1992) model is not the only IT value model that has been defined in the literature. The remainder of this section will discuss the various other models.

2.2.5 The Panda & Rath Model

Panda and Rath's (2021) IT value model is built on previous research and comprises two key capabilities: IT capabilities and knowledge management (KM) capabilities. The IT capabilities are underpinned by the previous research of Lu and Ramamurthy (2011) and comprise three main constructs: IT infrastructure capability, IT business spanning capability and IT proactive stance. The authors of the model add the new capability of KM, which comprises a further three constructs: customer KM capability, product KM capability and managerial KM capability. The premise of KM capability is to add a dimension that explains the firm's specific knowledge needed to effectively integrate, coordinate and mobilise the

firm's resources and capabilities, resulting in the promotion of agility by creating and developing innovative responses to market uncertainty.

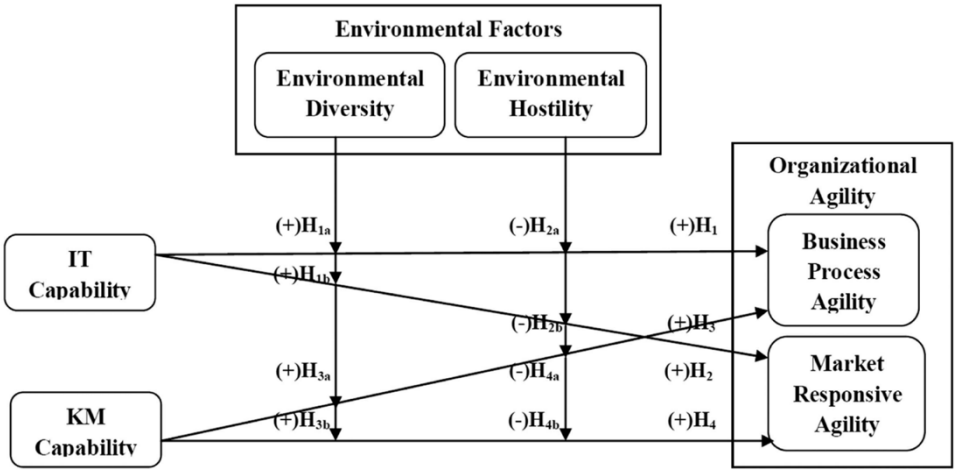

Figure 4. Framework of a KM IT value model (Panda & Rath, 2021)

The model (see Figure 4) posits that KM capability is positively associated with operational adjustment and market capitalising agility. The model underpins the importance of combining both IT and KM capabilities in establishing superior firm agility through investing in recruiting and retaining highly skilled IT staff with knowledge competencies, thereby attaining augmented performance. According to Panda and Rath (2021), well-developed knowledge capabilities certainly facilitate technology to make a firm agile, as well as fostering its ability to readily identify and respond to unprecedented changes in the business environment (Panda & Rath, 2021).

2.2.6 The Marchand Model

The Marchand (2002) IT value model is based on two years of research spanning 1,009 senior managers and 98 companies operating in 25 industries in 22 countries. The model comprises three basic elements of measuring value pertaining to information use (see Figure 5): information technology practice (ITP), information management practice (IMP) and, finally, information behaviours and value (IBV). Marchand (2002) defines these three elements as follows. ITP is a firm's ability to manage IT in the sense of applications,

networking and infrastructure to support the firm's operations, business processes, innovation and management information decision-making. IMP is a firm's ability to effectively capture information from various sources, collecting, organising, processing and maintaining it over the life cycle of information use. The importance of the IMP is to enable firms to have the best information available – from markets, customers, competitors and suppliers – to make competitive decisions. IBV describes a firm's ability to instil and promote behaviours and values in its human capital that underpin the effective use of the information. These values include integrity, formality, control, transparency, sharing and proactiveness.
The Marchand (2002) model links these three organisational capabilities (ITP, IMP and IBV) to organisational performance. The authors highlight that firms must develop these capabilities through their IT organisations if they are to improve their performance.

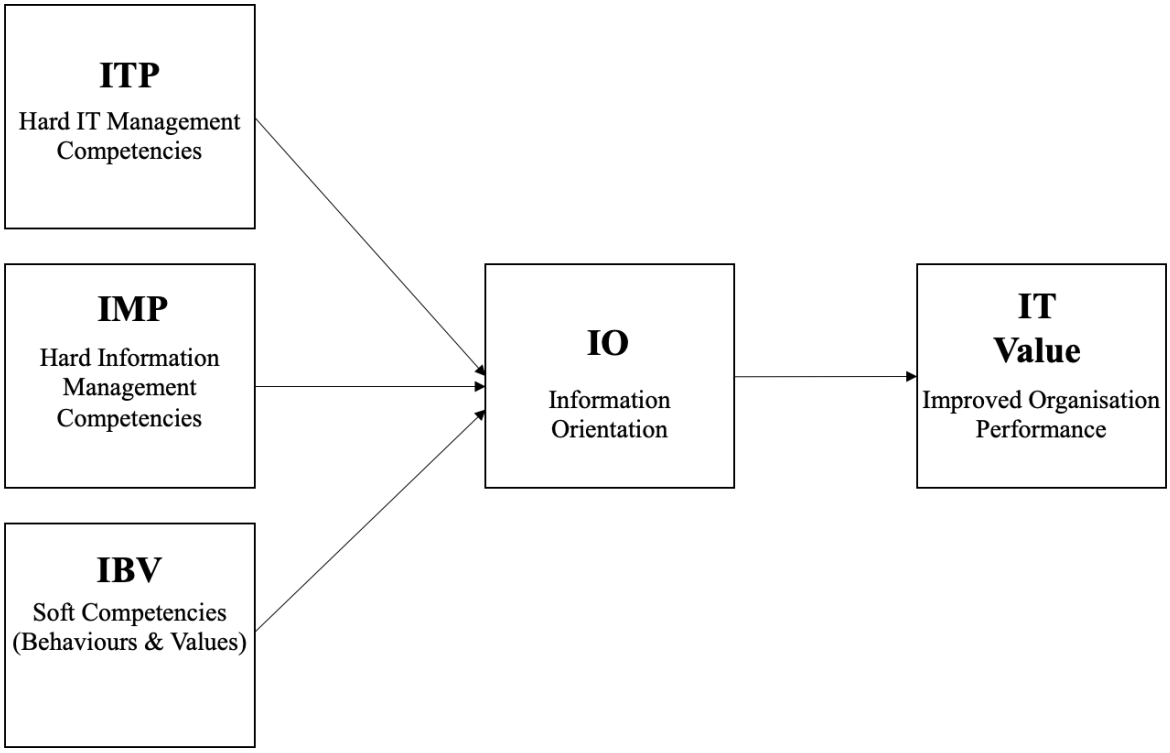

Figure 5. Framework of an IT value model, adapted from Marchand (2002)

2.2.7 The Soh & Markus Model

The Soh and Markus (1995) model attributes a firm's performance to its resources and capabilities, with IT capability being part of a firm's overall performance. Marshall et al.

(2005) highlight that a critical part of IT capability is forming the right set of business and management processes to supply, deliver and exploit IT systems through appropriately skilled and knowledgeable human resources, underpinned by excellent strategy and project processes. The model describes three inherently linked processes through a necessary chain of events to reach the desired outcome of delivering business performance through IT value, as shown in Figure 6.

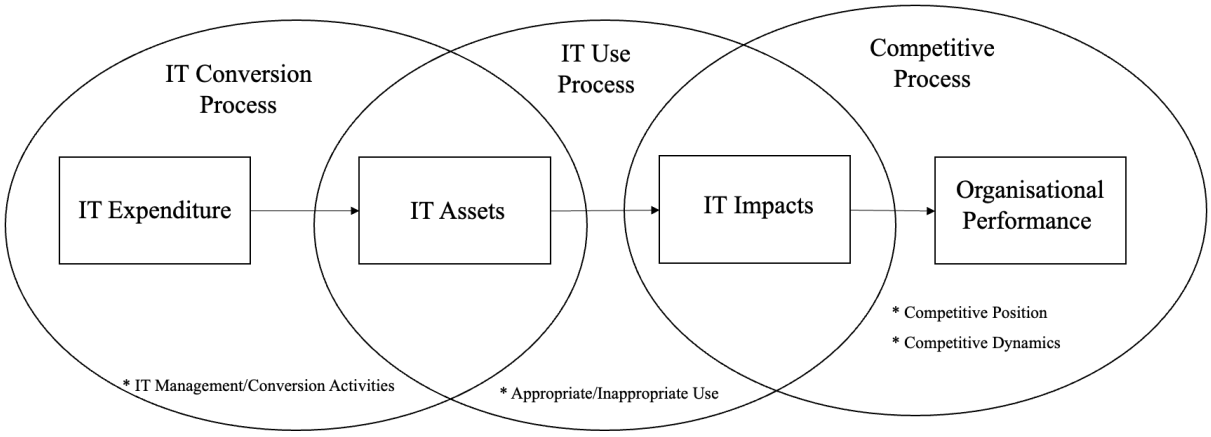

Figure 6. A process model for creating business value from IT, adapted from Soh & Markus (1995)

Figure 6 depicts the three processes in the model as the IT conversion process, the IT use process and the competitive process. Essentially, through IT expenditure, IT assets are created as artefacts. These artefacts may include resources, software and hardware. The effectiveness of these IT assets and their desired effects on the organisation depend on the ways in which they are appropriately or inappropriately used. Marshall et al. (2005) argue that ensuring appropriate IT uses in given contexts thus becomes the means by which IT assets create the desired IT effects on the organisation. The authors further suggest that the appropriate organisational fit, business processes, roles and responsibilities are key factors in the assets creating the right IT impact. This viewpoint emphasises how the model contains an element of variability and uncertainty, as each stage of the model relies on sound management practices for the process of producing IT value. Conversely, the model clearly highlights the roles and responsibilities that lie outside IT to gain value from IT investments. In addition, the model denotes that competitive position and dynamics are key factors in organisational performance. However, many of the market force factors – such as the state of the local and global economy, competitors' performance, global pandemics and geopolitical issues – are hardly within the firm's control. As a result, improvements in a firm's

performance through the effects of IT may result only when the overall market conditions are favourable (Soh & Markus, 1995). More recent research (e.g., Eikebrokk et al., 2018) argues that the Soh and Markus framework should be extended to incorporate an interorganisational perspective on co-creation. The authors suggest that business units can co-create IT value by (a) disseminating potential IT technologies and concepts in a business network and (b) joining efforts so they can also make investments in shared systems and services, making such investments more workable. Thus, this idea of co-creation within the interorganisational network can have positive implications for the overall group in terms of market competition and driving technology value (Eikebrokk et al., 2018).

2.2.8 The Marshall Model

Developing the research of Soh and Markus (1995), Marshall et al. (2005) set out to adjust the model by adding strategic imperatives as the first step in the process. The authors argue that while Soh and Markus (1995) highlight that IT expenditure entails a firm's strategy, the model cannot link the relationship between these two elements. Moreover, it explicitly cannot highlight the need for IT investment to be driven by business strategy, while finding that firms with more focused strategic goals for IT realised higher IT business value (see also Tallon & Kraemer, 2014). Marshall et al.'s (2005) new framework can be seen in Figure 7.

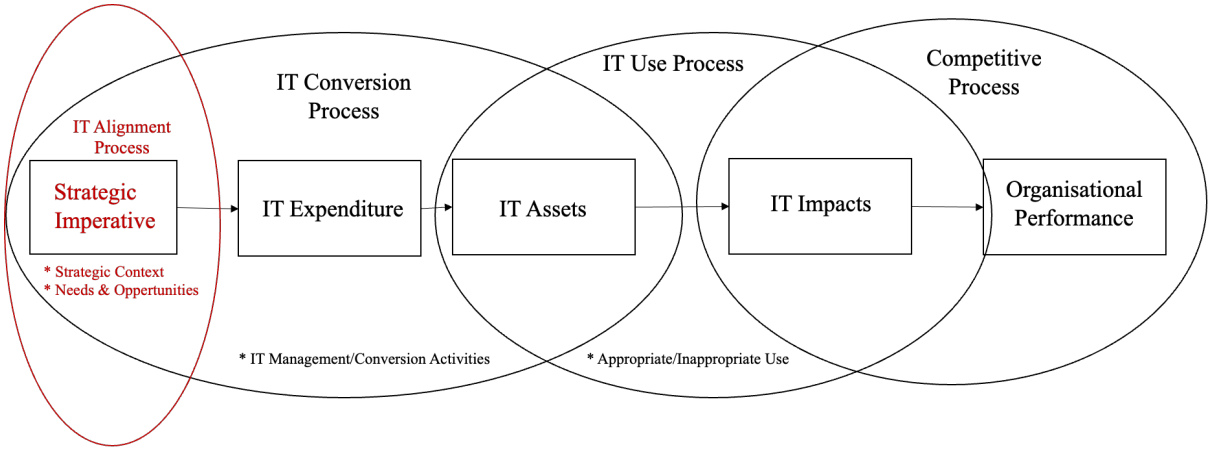

Figure 7. Marshall's updated process framework of IT, adapted from Soh & Markus (1995)

Here, Marshall et al. (2005) have created a closed-loop process by linking organisational performance to business strategy, thereby driving IT investment solely based on the firms' business opportunities and drivers. In turn, this creates a culture of value through technology,

as unnecessary IT projects, programmes and investments with minimal organisational value are filtered out at an early stage. The model also cements the notion of a strategic fit between IT and business. Marshall et al. (2005) highlight that IT initiatives may also come from perceptions of needs and wants from business executives, but another activity at this stage would be to match these perceptions of business initiatives once again to ensure alignment and to facilitate prioritisation via the formulation of an interesting and increasingly detailed and persuasive business case or through benefits realisation. Furthermore, Tallon and Kraemer (2014) support the view of IT perceptions being mapped to factual measures, so that if what executives perceive about IT effects are firmly grounded in reality, then their perceptions should correlate with objective measures of IT effects (Tallon & Kraemer, 2014).

2.2.9 Benefits Realisation Capability Model

A growing array of literature evidence argues that the adoption of benefits realisation practices enhances the likelihood of projects achieving organisational goals (Ashurst et al., 2008; Breese et al., 2015; Love & Matthews, 2019). Despite this, many organisations still fail to truly adopt a benefits realisation model (Breese et al., 2015).

Ashurt et al. (2008) devised a model of benefits realisation for IT-based investments. The authors argue that a considerable amount of time, money, effort and opportunity is wasted on IT investments that deliver no benefits. Whyte et al. (1997) highlight that despite the sizeable expenditure incurred, information systems have often failed to effectively support the business, with more than half of projects perceived as unsuccessful by their firms. Badewi (2021) argues that the success of a digital transformation project can therefore be defined not only as the successful deployment of technological artefacts on time and within budget, but also including the gain of the benefits expected from them. Benefits realisation can thus be defined as a firm's capability to generate value from its IT investments via the enactment of several distinct yet complementary competences.

Ashurt et al.'s (2008) model comprises four key competencies (see Figure 8) that contribute to the overall realisation of benefits when investing in IT: benefits planning, benefits delivery, benefits review and benefits exploitation. Benefits planning refers to the initial identification of the expected benefits to be realised from the given IT investment, such as an 11% increase in revenue or a 70% customer satisfaction (CSAT) score. Ashurt et al. (2008) highlight that when planning for benefits, realism needs to be applied from the outset to set

the right expectations for the organisation and its stakeholders. Often, faulty expectations can lead to a perceived failure of IT investment when, in fact, the initial benefits have been predicted wrongly or compromised by short-sighted vision, as opposed to long-term value. Benefits delivery can be described as the vehicle through which the defined benefits can be designed and executed through a programme of change. Black and Boal (1994) highlight that value is created by a firm's ability to mobilise, marshal and utilise resources through the application of capabilities and competencies. Although benefits delivery is not the only vehicle to implement the project or programme of work, its role remains well after the project to measure, review and report on the initial perceived benefits. Often, this point is overlooked since most projects focus on the design to delivery phase; once the project has gone live, project teams are disbanded and moved onto new projects, meaning that the business case and realisation measures are often forgotten and thus never realised.

Benefits review can be described as a firm's ability to measure the benefits of an IT investment against the backdrop of the initial benefits defined in the benefits planning phase (Ashurst et al., 2008; Love & Matthews, 2019). The realisation of benefits often requires a long-term view; for example, an increase of 20% in upselling due to a new e-commerce platform would require a sustained period of measurement. Thus, the review of benefits is an ongoing process that requires the organisation to measure, evaluate and react based on the results of the IT investment. In reality, however, projects are often judged on the standard project management metrics of cost, quality and schedule; thus, the review of benefits is often forgotten. As Ashurt et al. (2008) highlight, effective benefits realisation requires ongoing commitment; having identified the benefits to be delivered, project managers will need to start a proactive and ongoing benefits realisation programme that ensures that benefits remain the primary focal point for all respective decisions (Ashurst et al., 2008; Badewi, 2021; Breese et al., 2015; Love & Matthews, 2019).

Benefits exploitation can be similarly defined as benefits review. Essentially, it reflects a firm's ability to leverage the value of IT investment long after the programme of work has been completed. Ashurt et al. (2008) suggest that realisation rarely becomes apparent in the initial completion of IT investment programmes; the case is more often that their full potential rarely becomes apparent until the investment is fully operational and the firm has fully adopted a programme of organisational change needed to realise all the benefits specified in the benefits realisation plan (Ashurst et al., 2008).

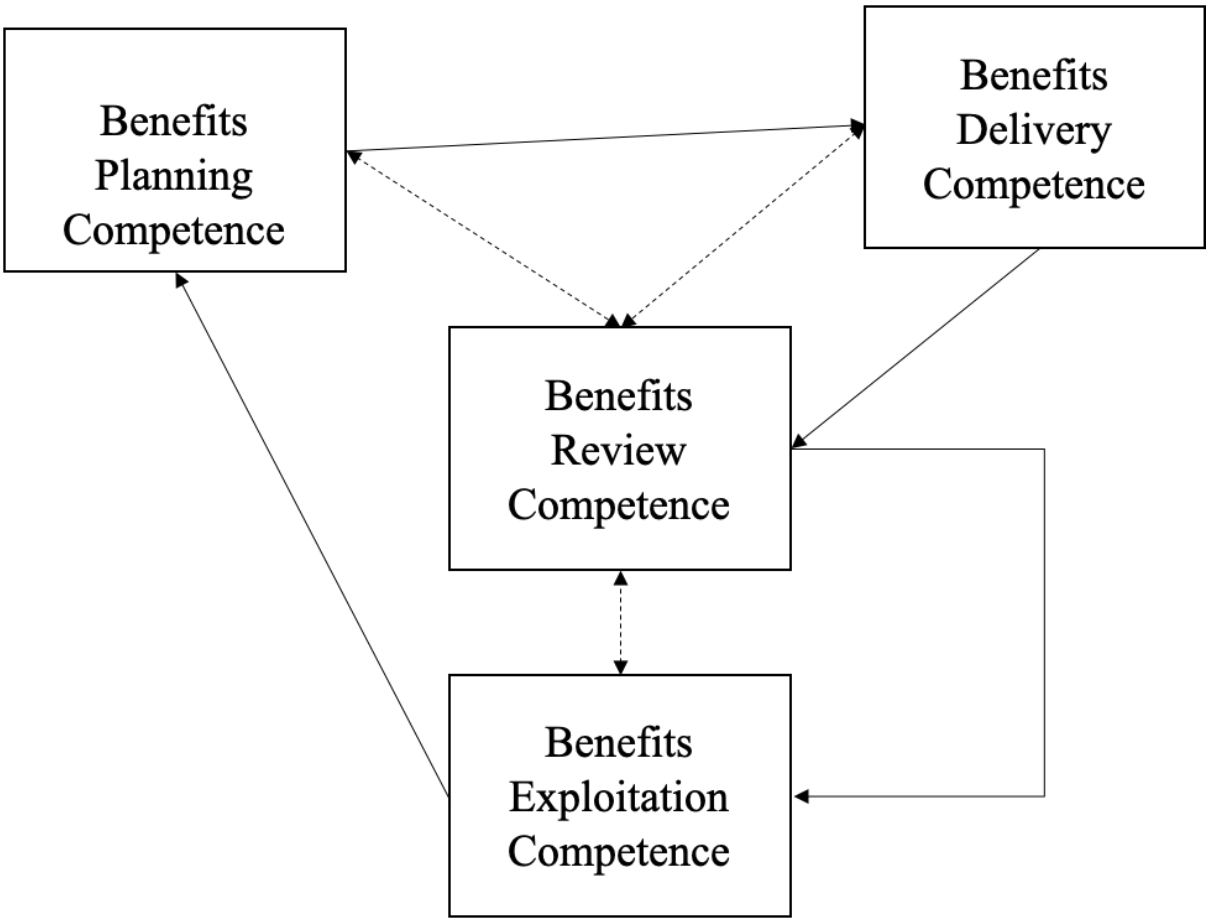

Figure 8. Model of benefits realisation, adapted from Ashurt et al. (2008)

The benefits realisation model provides solid ground for firms to establish a framework to recognise the benefits of IT investments. The framework also highlights three key factors:

1. The planning and setting of perceived benefits in the initial stages of the programme are essential metrics in the post-implementation phase.
2. Benefits are realised over a long period, and firms are therefore required to establish competencies that continue to measure the benefits post-completion.
3. Ultimately, IT should not be solely responsible for the benefits realisation but should instead be seen as an integral part of the organisational establishment.

More broadly, much of the contemporary work on benefits management remains built upon the basic framework, as illustrated in Figure 8. However, modern-day research has

highlighted the need to tightly incorporate the benefits framework into other frameworks, such as project management (PM) and building information modelling (BIM), as seen in Figure 9 (Love & Matthews, 2019; Badewi, 2021).

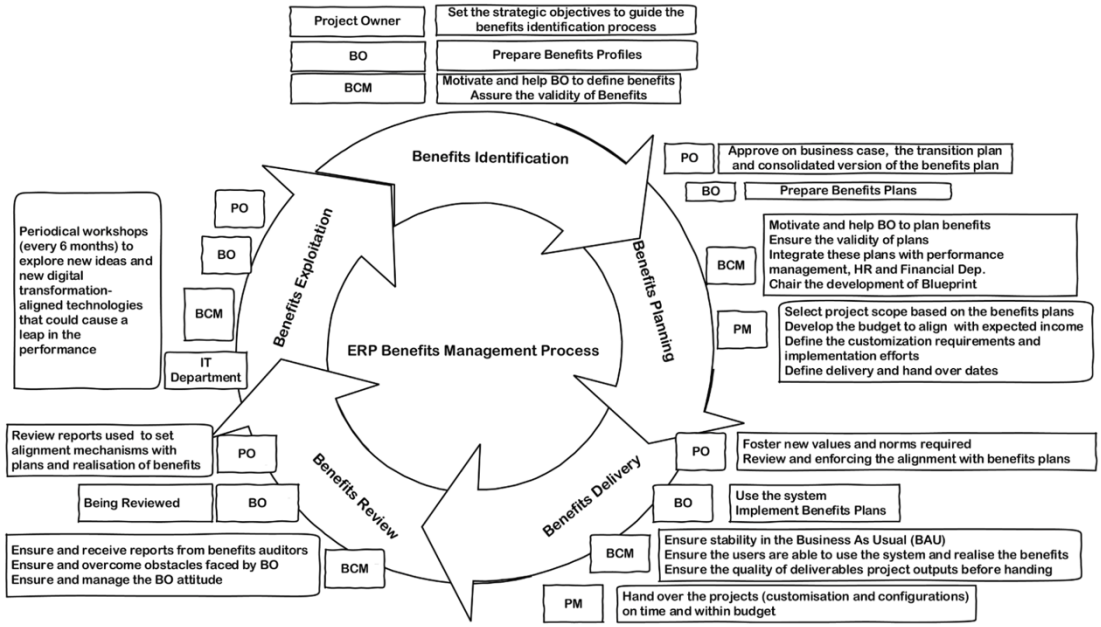

Figure 9. PM and BIM integrated transformation process (Badewi, 2020)

In summary, an enterprise-wide benefits realisation capability plays an important role in firms wanting to generate value from their IT investments. Love (2019) argues that incorporating benefits management strategies into an organisation ensures that the value and strategic relevance of digital technologies are made explicit. The need for strategic governance is essential so that organisations can ensure that the perceived benefits are measurable and obtained (Prat et al., 2015; Love & Matthews, 2019). The challenge for most organisations is to move away from the mindset that questions whether implementing technology will drive any benefit or create any value; in reality, the adoption and business use of technology will materialise true value and benefit because such benefits will arise when technology enables the organisation and its people to do things differently.

According to Love (2019), several factors may explain this mindset. First, the concepts of benefits and value are inherently problematic, which can be attributed to the multiple definitions of the area by different professional groups, which in turn results in a lack of agreement over how to classify the benefits. Second, focusing attention on the creation of value and the realisation of benefits has implications for the organisation, specifically in the

way it challenges the wider mindset in an organisation; hence, it may struggle to gain organisation-wide acceptance, meaning it is simply more convenient to focus attention on technology implementation as the sole contributor to value.

2.2.10 The Kholi & Sherer Model

The Kholi and Sherer (2003) framework focuses on how change management activities can affect the payoff from IT investment, defined here as an outcome that benefits the firm, such as increased profitability, increased productivity or reduced costs. The authors argue that creating an organisation that fosters a competency of change activities reduces resistance to change, which in turn facilitates the implementation process of IT investment and thus contributes to any potential IT payoffs. The model comprises five key components: investment in IT, IT implementation process, investment in change management, organisational change and payoff (Sherer et al., 2003; Sherer, 2014).
Here, the authors highlight that the management of change plays a vital role in the planning, organising and communication of IT investments and that IT-related change can improve user adoption and thus reduce the risk of resistance to change. The authors tested the model through a case study of implementing technology solutions at Cisco, California. The results of the study found that change management acted as a complementary factor in facilitating IT payoffs. The study established key metrics required for evaluating the effectiveness of change management activities that contribute to IT value.

2.2.11 The Benbasat & Zmud Model

Benbasat and Zmud's (2003) framework (see Figure 10) is built around conceptualising IT as an asset (e.g., application, hardware or resource) that supports a set of tasks embedded within a structure that itself is embedded within a context. The IT asset is encapsulated within a structure, routine, norms and values through which the IT asset can provide value.

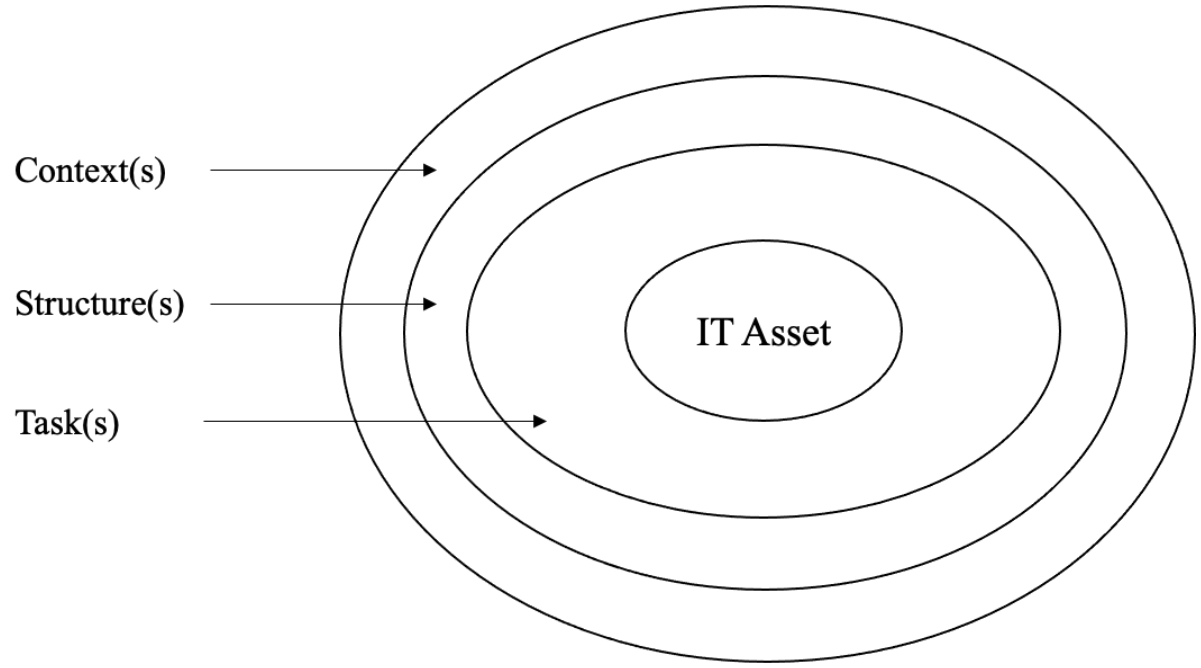

Figure 10. Conceptualising the IT asset, adapted from Benbasat and Zmud (2003)

The model aims to address a set of three core principles:

1. How IT assets are conceived, constructed and implemented;
2. How IT assets are used, supported and developed; and
3. How IT assets impact or are affected by the context in which they are embedded (Benbasat & Zmud, 2003; Kim et al., 2014).

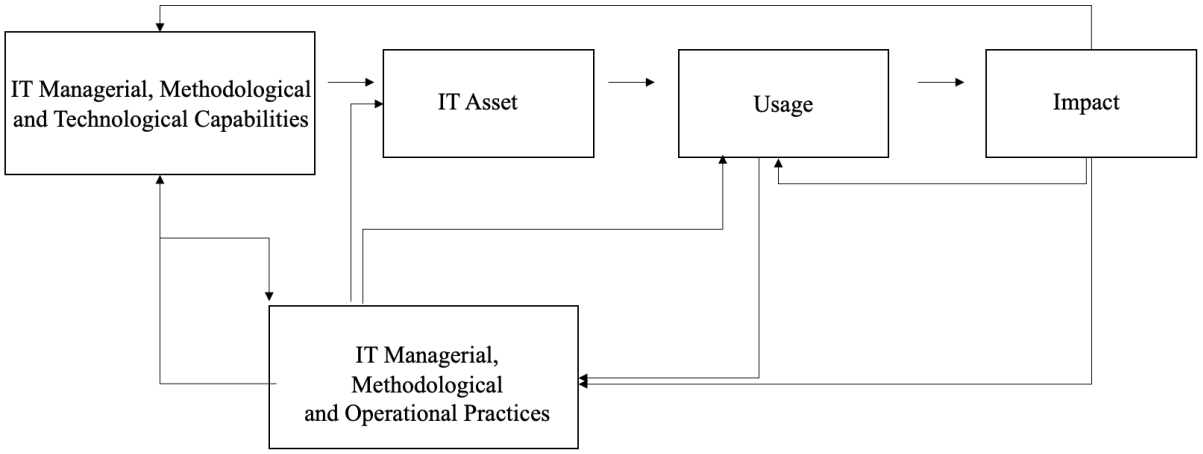

Figure 11. Conceptualising the IT asset flow, adapted from Benbasat and Zmud (2003)

The authors suggest (see Figure 11) a core set of principles whereby the constructs are first interrelated to the IT asset; for example, the greater the interrelated dependency between the technology capability and the operational practices, the greater the impact the IT asset will

have on users and the wider firm. Second, the model accounts for both forward and reverse causation, which enables continuous improvement of the IT asset.
The core principles of the model are described as follows:

- The managerial, methodological aspects of both the technical capabilities and operation practices are involved in designing, planning and implementing the IT asset;
- The human behaviours experienced and practised during the operating practices and technology capabilities are reflected in the usage of the IT asset, thus;
- The managerial, methodological and operational practices drive the IT asset's usage and evolution. Therefore, the impact of the IT assets on users, departments and the wider organisation are materialised as IT effects.

2.2.12 The Beimborn Model

Beinborn et al. (2009) argue for an interplay between process standardisation and IT business value. The authors posit that process standardisation enables firms to create reference standards, whereby multiple processes lead to similar outcomes within the firm. This ultimately creates a level of transparency and homogeneity within the firm, as different variants of the same processes are merged to create a standardised process with improved efficiency, time and quality, leading to a higher degree of IT performance (see also Muenstermann et al., 2010; Romero et al., 2015).

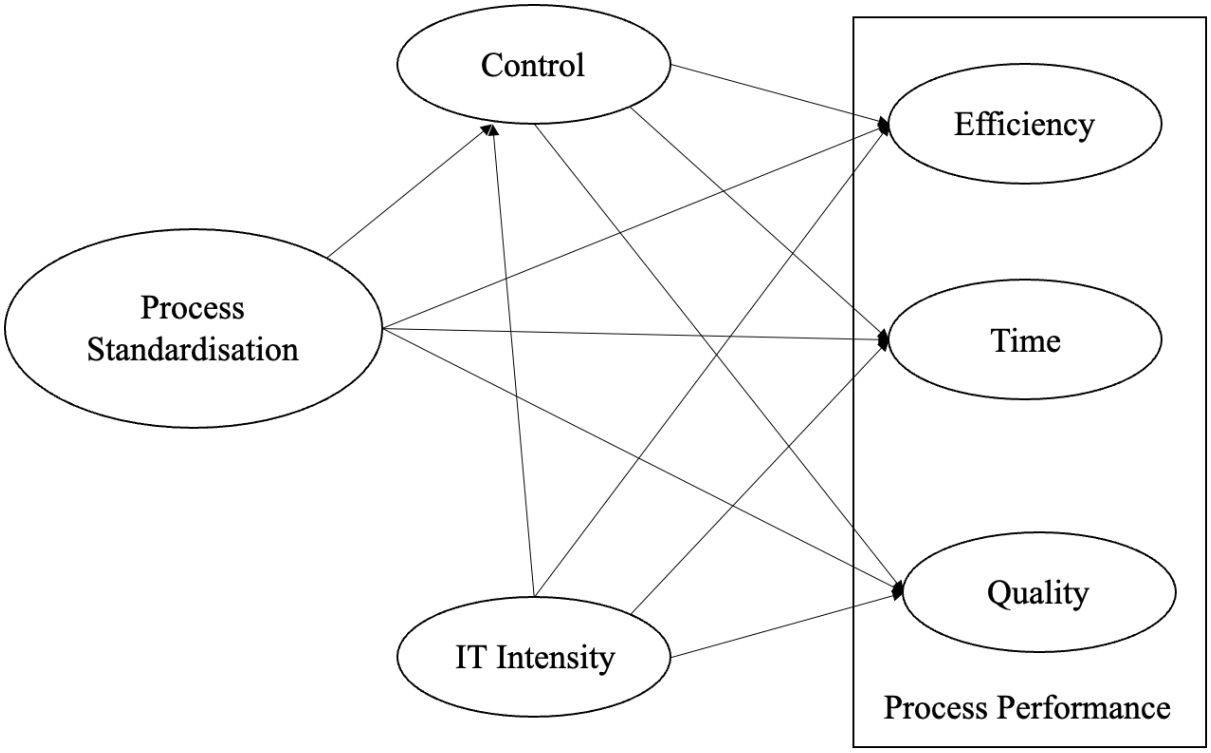

Figure 12. IT value process, adapted from Beinborn et al. (2009)

Beinborn et al.'s (2009) model (see Figure 12) comprises three constructs: process standardisation, control and IT intensity. Process standardisation is the premise that standardising processes in a firm will increase IT performance through efficiencies, quality and time. Process control refers to a firm's ability to create control mechanisms through standardisation. The authors suggest that standardisation allows easier definition and monitoring of KPIs, while enabling firms to react quickly to any negative changes to KPIs to maintain performance at the desired levels. The final construct is IT intensity, which refers to the actual use of IT to support the process. The authors argue that IT usage is positively correlated to process performance in terms of efficiency, time and quality, as well as process control (Beimborn et al., 2009).

2.2.13 The Melville & Kraemer Model

The Melville and Kraemer (2004) model is a value-generating descriptive model based on the theory of RBV. The authors argue that RBV is useful in the IT context since it provides a robust framework for analysing whether and how IT can be associated with a firm's competitive advantage (Melville & Kraemer, 2004). Studies by other researchers have also

contributed to the application of RBV as a primary method of research (Kearns, 2000; Cao el al, 2011; Pereira, 2021).

In their model, Melville and Kraemer (2004) consider earlier research to inform which design constructs to include and how to model their interrelationships. They argue that while the internal organisation in which the resources are deployed is a key contributor to generating organisational performance, external factors also play a role in shaping the extent of organisational performance. Thus, the model (see Figure 13) consists of three domains: focal firm, competitive environment and macro environment.

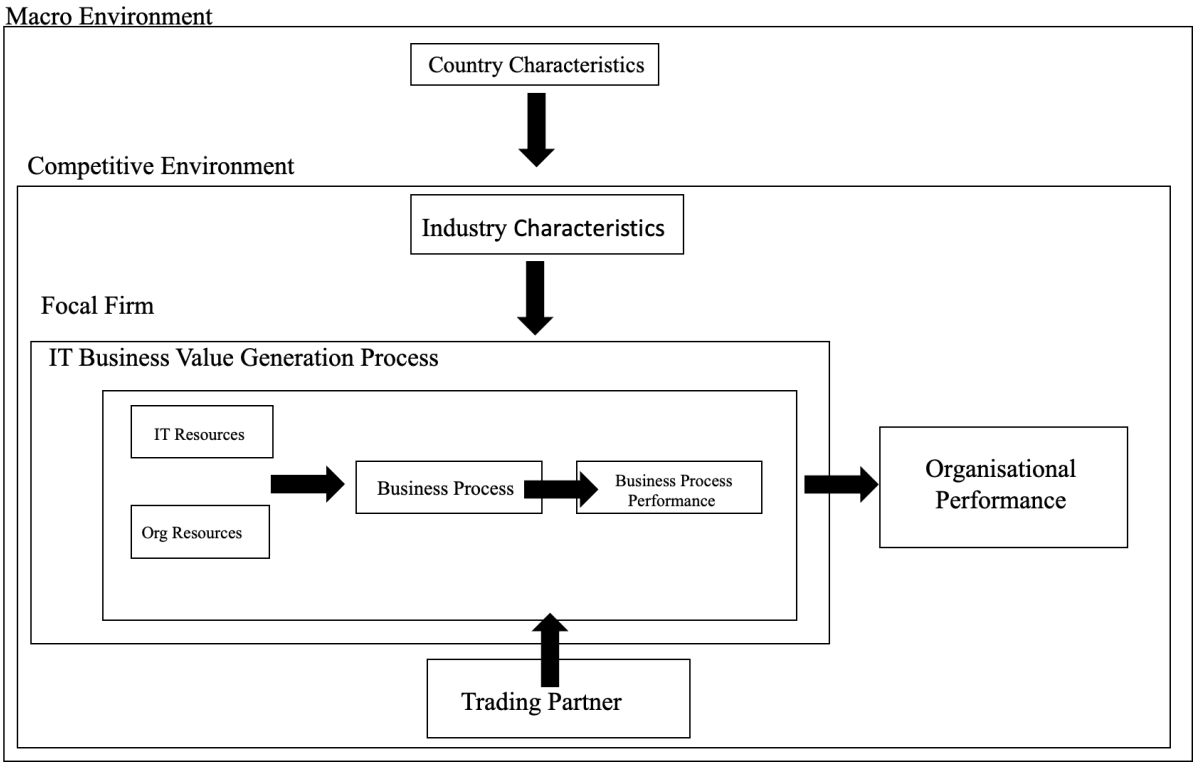

Figure 13. A resource-based view, adapted from Melville and Kraemer (2004)

Here, the focal firm is the organisation in which the resources live and are deployed. As per Figure 13 the domain comprises IT resources, complementary organisational resources, business processes, business process performance and organisational performance.

The focal firm generates IT business value through the use of IT and complementary organisational resources working within a set of defined and efficient processes.

The competitive environment focuses on two aspects: industry characteristics and trading partners. Industry characteristics include competitiveness, compliance, technology change

and trends, as well as other factors that drive the way IT is applied within the focal firm to derive business value. The trading partner aspect refers to the role of IT partners; with IT demand increasing offshoring, near shoring and scaling out, the concept of IT outsourcing has become an established option for IT executives to obtain IT resources and capabilities (Urbach & Würz, 2012). Thus, the IT partner is a key contributor to the IT value generated by the focal firm. Finally, the macro environment refers to the characteristics of the country in which the firm is trading, which can influence or affect the value generated from IT; such factors can include population growth, education, basic infrastructure, resource talent, culture and R&D investment.

Drawing on recent research by Panda and Rath (2021), RBV theory should be complemented by a knowledge-based view (KBV) that focuses on the acquisition of knowledge assets to realise enhanced business value, which is an important factor in organisational agility. The KBV perspective is that KM capabilities facilitate the effective deployment of resources to deliver superior business value and a competitive edge. Various research studies have argued that KM plays an important role in generating augmented business values and facilitating market and competitor knowledge, thus fostering agility (Kim et al., 2014; Mahdi et al., 2019; Pereira & Bamel, 2021).

2.3 IT Agility

In today's ever-changing competitive environment, firms need to adapt quickly to market changes, counter market threats and capitalise on business opportunities. An organisation's agility has been described in various ways. One such definition is an organisation's ability to cope with rapid, relentless and uncertain changes that thrive in a competitive environment of continually and unpredictably changing opportunities (Ramamurthy, 2011), while Neumann (1994) defined organisational agility as a measure of an organisation's ability to change and adapt to its new environment. Notably, such definitions stress the strategic dimension of organisational agility and downplay the significance of operational and informational dimensions (Fink & Neumann, 2007). Building on Neumann's (1994) definition, Nejatian et al. (2019) highlight that an organisation's strategic agility is incumbent on a set of actions taken by the organisation while operating in a volatile market. These actions and their subsequent organisational changes are distinct from routine changes in that they pertain to the strategic core of the organisation and entail systemic and continuous changes.

Nejatian et al. (2019) argue that three main organisational capabilities are essential to organisational agility: strategic sensitivity, collective commitment and resource fluidity. Strategic sensitivity refers to the intensity and perception of strategic development within an organisation. Collective commitment refers to the common engagement of interest, empathy and trust between the different actors within the organisation. Resource fluidity is an organisation's ability to reconfigure capabilities and redeploy resources rapidly (Nejatian et al., 2019). However, although these points are valid, organisations often become rigid over time because of high growth and performance, neglecting their ability to adapt rapidly to market change. Recently, the COVID-19 pandemic has shown how retail organisations were forced to quickly adapt their business strategies from offline to online selling, realigning their resources, capabilities and competencies accordingly. This trend highlights the importance for organisations to routinely refocus their attention on the three organisational capabilities defined by Nejatian et al. (2019). For example, Dannenberg et al. (2020) found that the pandemic created a surge in digitalisation and a sudden increase in online shopping throughout Germany. This enabled online grocery retail to capture larger market and growth rates of ca. 150%. A survey among customers of online food retail in Germany showed that 44% of customers had ordered groceries online for the first time in the preceding month. However, this situation impacted by supply chain bottlenecks with 22% of potential new customers unable to place an order because the desired products or delivery dates were not available.

In this study, agility is defined as an organisation's ability to react to market changes by enhancing its IT capabilities in support of its strategic goals so that business value can be realised and competitive advantages can be attained. Past research has suggested that IT capabilities have been seen as important resources that facilitate organisational agility (Radhakrishnan et al., 2021; Sreenivasan & Suresh, 2021; Jafari-Sadeghi et al., 2022).

Agility should not be confused with resilience and sustainability. Whilst agility maybe a supporting factor for organization resilience and sustainability, resilience is defined as a set of attributes or resources that are effectively enacted in situations of adversity, these qualities can include self-efficacy, outcome expectancy, optimism, hope, risk propensity, and self-esteem. Sustainability is defined in the context of an organization being able to operate in a

future context without comprising on future generations. This study does not explore the concepts of resilience and sustainability as they are much broader topics, however it's important to note that in a competitive landscape, organizations are operating in an increasing volatile, complex and uncertain context, as a result organizations are faced with high demand and dynamic situations. Raetze et al, (2021) highlight that over the last few decades organizations have had to face many other large-scale events, including pandemics, natural disasters, terrorist attacks, and global financial crises. Such events threaten organizational survival and that without adequate preparation including recovery plans, upwards of 40% of organizations go out of business within a few years after a major disaster (Raetze,2021)

In recent research by Licensors et al. (2020), survey respondents rated IT agility at 57% as the key factor in driving business growth. However, researchers have also highlighted that IT may inhibit organisational agility through legacy and rigid systems architecture, poor organisational design, lack of agile processes and a complex nest of disparate technology silos, so much so that IT may become a disabler for agility (Van Oosterhout et al., 2006; Quaadgras, 2014; El-Gazzar et al., 2016).

Many studies support the view that IT may inhibit organisational agility by highlighting that large business investments in process and IT can typically lead to unintended technology traps over time (Grover & Malhotra, 1999; Panda & Rath, 2021). Technology traps for example could be associated with the purchase of large monolithic integrated enterprise systems while enhancing business processes and simplifying operational support models can often introduce rigidity into the size and complexity of the application architecture. This issue has been foregrounded during the pandemic; for example, several government organisations in the US have failed to address the effects of the pandemic due to poor investment in legacy technology (Leslie, 2021).

Fink and Neuman (2007) define an agility model based on two key top-level constructs: IT personnel capabilities and IT-dependent organisational agility. The IT personnel capabilities comprise three sub-constructs: business capability, behavioural capability and technical capabilities. The authors argue that the experience and expertise of IT personnel may constrain the quality of other capabilities. They also suggest that human IT capabilities serve as the mortar that binds the physical IT components into robust and functional IT services. This multidimensional representation implies a cause-and-effect relationship between IT personnel capabilities and IT capabilities (Fink & Neumann, 2007). Meanwhile, IT-

dependent organisational agility comprises three sub-constructs: IT-dependent system agility, IT-dependent information agility and IT-dependent strategic agility.

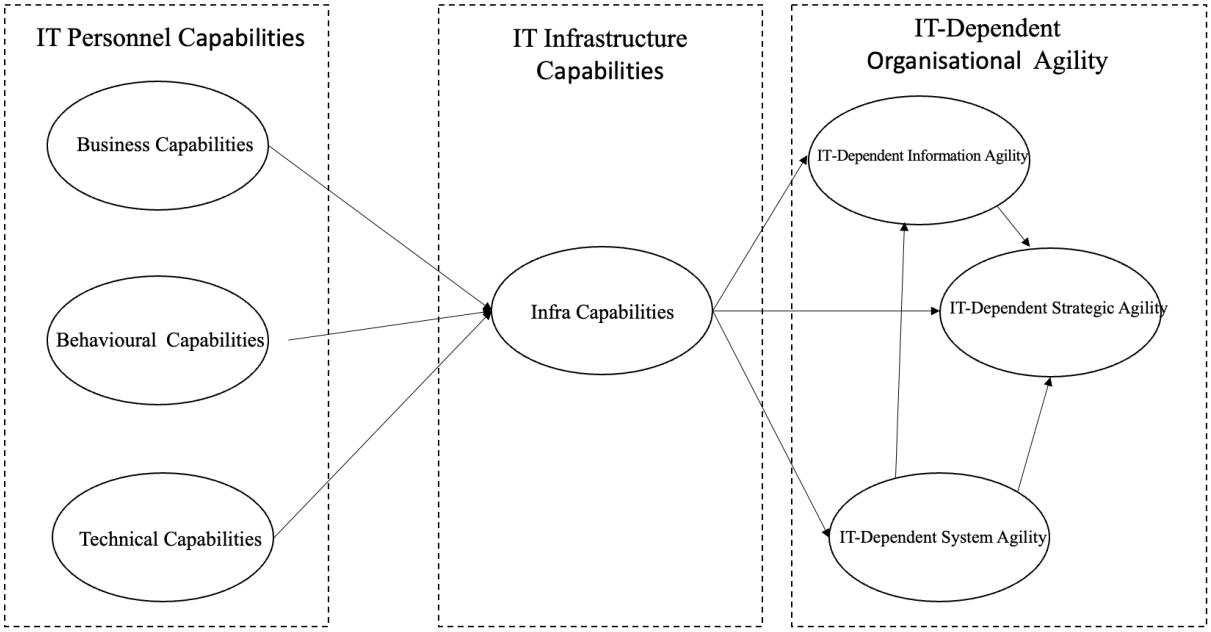

Figure 14. Agility model, adapted from Fink and Neuman (2007)

First, IT-dependent system agility (see Figure 14) refers to the ability to implement change in technology through capabilities such as engineering, system delivery, enhancements and system maintenance. Second, IT-dependent information agility reflects the ability of organisational users to access information resources efficiently. Third, IT-dependent strategic agility refers to the ability of organisations to react promptly to changes in markets and take advantage of market opportunities using their existing IT capabilities and their alignment to organisational goals and vision. The authors argue that the three dimensions of IT-dependent organisational agility are interrelated, so IT-dependent system agility and information agility positively affect IT-dependent strategic agility (Fink & Neumann, 2007).

In turn, Ramamurthy (2011) conceptualises agility into three dimensions of IT capabilities: IT architecture, IT and business partnership and IT proactivity. These are overlain by a higher-level general construct of IT capabilities, which are then mapped to see if they are positively associated with the organisation's overall agility construct of market capitalisation and operational adjustment (see Figure 15).

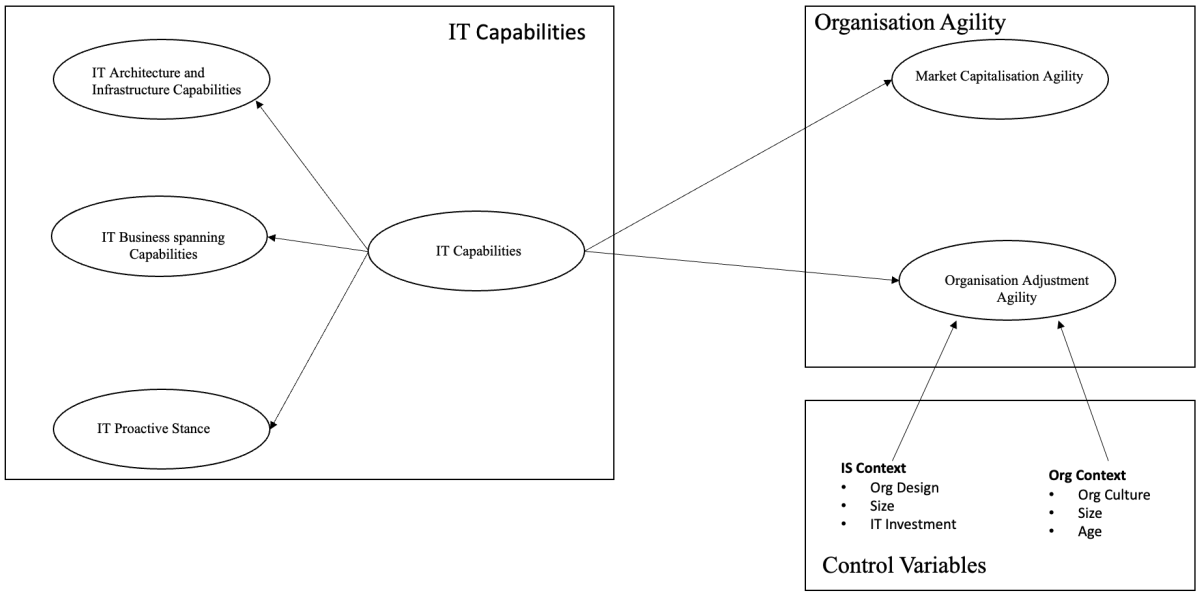

Figure 15. IT agility three-dimension model, adapted from Ramamurthy (2011)

The first capability, IT architecture, is an organisation's ability to provide technology platforms such as infrastructure hosting, networks and communications, data management, integration services and application portfolios. The organisation's IT architecture must offer the ability to adapt to market and strategic direction rapidly and impede it. The second capability, IT and business partnership, emphasises the synergies between these two areas. Ramamurthy et al. (2011) suggest that partnerships and synergy between IT and business managers lead to more effective joint decision-making, more strategic applications and more significant agreement. As a result, these synergies can be useful in realising rapid responses to innovative initiatives. Ramamurthy (2011) further suggests that close interaction and collaboration between IT and business units foster a culture of knowledge sharing and joint responsibility, which plays an integral part in influencing an organisation's strategic use of IT (Abbasi, 2017).

Corsaro (2020) discusses the notion that while this IT-business relationship is an important factor in driving value, satisfaction in business relationships relies strongly on the ability of each party to be recognised fairly and benefit from the value that has been co-created. However, such relationships have a tendency to become equivocal; while they can deliver specific objectives in time, they can also create a sense of burden and dissatisfaction for one or multiple parties, which may translate into the concept of value co-destruction whereby actors are affected by the diminution of the value appropriated from the relationship. Thus, striving for equity in value appropriation is of considerable importance, particularly given

that organisational models today are heavily built on multiple interorganisational relationships, driven by the emergence of digitalisation (Corsaro, 2020).

The third capability, IT proactivity, focuses on the ability of IT resources to proactively embrace innovation to create business opportunities and counter existing or new threats. Cao et al. (2008) suggest that IT proactivity is measured by the organisation's proactivity in striving to stay current with IT innovations, continuing to experiment with new IT as necessary, continually seeking new ways to enhance the effectiveness of IT use and fostering a climate that is supportive of trying out new ways of using IT.

In Ramamurthy's (2011) model, IT capability (IT architecture, IT and business partnership, and IT proactivity) is analysed to determine whether there are direct effects on market capitalising agility and operational adjustment agility. Abdelilah et al. (2018) build on previous research by synthesising agility as a function of multiple variables. Abdelilah et al. (2018) emphasise that flexibility should be a key attribute that complements agility models concentrating on technology and organisational practices, people and knowledge.

2.4 Prior Research: IT Value Model Comparison

Table 1 highlights the various IT capability value models and the dimensions used by the authors to derive IT value outcomes. Evidently, many of the models focused on the people, technology and process capabilities to determine IT value outcomes, while some added further dimensions, such as investment and knowledge management.

	IT Capability Dimensions Used in Prior Research Models						
Author	**People**	**Tech**	**Process**	**Org Structure**	**Change Management**	**Investment**	**KM**
Delone & McLean					✓		
Marchand	✓			✓			
Soh & Markus	✓	✓	✓			✓	
Sherer et al.					✓	✓	
Benbasat & Zmud	✓	✓	✓				
Beimborn			✓				
Melville & Kraemer	✓		✓	✓			
Fink & Neuman	✓	✓	✓		✓		
Ramamurthy	✓	✓	✓	✓		✓	
Panda & Rath	✓	✓	✓				✓

Table 1. IT value models – Dimension comparisons

2.5 Centralised and Decentralised IT

In his paper entitled "Information Assets, Technology and Organisation", Brynjolfson (1994) explains how IT has the potential to significantly affect the structure of organisations. Twenty-eight years later, the debate still rages about how best to plan the IT organization within the context of the wider business. We have witnessed a procedural merry-go-round, moving from the early popularity of centralisation to decentralisation in the 1980s and then back to recentralisation in the 1990s (Magnusson, 2013). More recently, with the growth of disruptive digital phenomena and organisational drivers that promote innovation and agility (Timmermans, 2016), businesses are again asking whether to centralise or decentralise their IT organisations.

King (1984) assumes that centralised IT benefits the organisation through economies of scale, whereas decentralised IT benefits through economies of scope. Broadly speaking, centralisation versus decentralisation of IT refers predominantly to three key aspects. The first is control over the autonomy of decision-making in the organisation. Centralised organisations largely concentrate their decision-making into a single business unit, person or group of individuals, while decentralisation primarily means devolving the decision-making authority and autonomy to individual departments and business units. This is supported by Richardson et al.'s (2002) report on a 1987 study by Przestrzelski, suggesting that decentralisation can be defined as "a dynamic, participative philosophy of organisational management that involves selective delegation of authority to the operational level". For decentralised IT, individual business units have the freedom to make their own IT-related decisions, such as the procurement and delivery of software, hardware or any other IT-related service.

Regarding the physical location of resources, centralisation often holds resources in one place, whereas decentralisation spreads resources across multiple locations within the organisation. In centralisation, control and governance of functional capabilities are driven from a central competency centre, while in decentralisation, the functional capabilities would be disseminated across a single or multiple business units. King (1984) offers the example of an accounting function to describe the two models, whereby centralised accounting would

require all departments and units to report financial data to a single unit, whereas decentralisation might establish several profit and cost centres with their own accounting activities and require that only aggregated data be passed up to the corporate headquarters. Previous research (Lowry & Wilson, 2016; Eikebrokk et al., 2018; Panda & Rath, 2018; Shea et al., 2019) has suggested that modern business organisations increasingly depend on their IT departments. These studies further highlight that IT organizations are not merely expected to provide supporting services; they are becoming strategic partners and providing value-added services, aligning their objectives and priorities with those of the departments' and the wider organisation's overall strategy (Lowry & Wilson, 2016c). Evidently, this view relies on the assumption that IT performance will be optimised to meet the business's demands and needs. In reality, IT performance is often criticised for its lack of service quality and agility to match the wider organisation (Lowry & Wilson, 2016c); as Whyte (1997) suggests, IT organisations have often failed to support businesses efficiently and, in particular, to change business attitudes and satisfy user needs (Sjödin et al., 2020). In turn, this can cause organisations to move towards outsourcing their IT services to third-party organisations or towards the decentralisation of their internal IT organisation.

King (1984) suggests that centralisation of control preserves top management prerogatives, capitalising on economies of scale and preserving organisational integrity in operations. These economies of scale emerge from exploiting the full potential of technologies, causing the outputs to increase more rapidly than the costs. As such, the costs of duplicating overheads and facilities can be avoided, and organisational protocols can be easier to enforce. On the other hand, decentralisation allows lower-level managers greater discretion and authority in decision-making, while also fostering a culture of innovation around new opportunities and responsibility for their decision-making, potentially improving their performance. However, decentralisation of control may lead to problems of accountability and decision-making if lower-level managers lack key competencies and are not held accountable for their decisions (King, 1984).

According to Lowry and Wilson (2016c), organisations that wish to remain agile must have information systems that are structured to allow for rapid change. Ramamurthy (2011) states that IT may hinder and sometimes even impede organisational agility, partly because of the relatively fixed physical and technological artefacts of information systems, with businesses often constrained by the limitations of inflexible legacy IT systems and organisations.

One such example of this are Enterprise Resource Planning systems (ERP). At their core, ERPs are a collection of applications that automate business processes and provide internal insights and controls drawing on centralised databases that collect data from financial, accounting, manufacturing, supply chain and HR departments. ERP is a centralized application architecture as much as in principle as well as in concept.

Many organisations rushed in the early 2000's to implement ERPs to consolidate and manage their distributed businesses process. Since then, organisations have struggled to realise what they planned to implement is not what the solutions can support effectively, even after a major investment. This has resulted in heavy customisation of ERP's which has reduced the level of agility for organisations to make quick changes. To put blankly ERPs are a centralising concept, it can be an effective model for standardisation of business process, hence it was never designed for a decentralized business architecture, some organizations have tried to implement a decentralized structure only to find that this didn't work very often (Jacobs, 2007)

Conversely, latest technologies such as blockchain are built around the concept of pure distribution and decentralisation. Blockchain is the system of recording information in a way that makes it difficult to or even impossible to hack, disrupt or change. In its essence, the blockchain is a set of transactions that are duplicated and distributed across a network of computer systems on the block chain. Blockchain is still a relatively new concept, with its focus today on Cryptocurrencies. Blockchain technologies are not considered as part of this study as today there are very few cases studies for its use in retail business, but more importantly its essences and value are built around decentralised computer systems, centralising the blockchain would defy its natural purpose.

This supports Richardson et al.'s (2002) view that the most successful organisations should be those that are neither so structured and rigid as to encourage little to no action nor so unstructured as to prevent purposive action. The overarching rationale here is that, with no form of structure, the possible actions are far too many, thus resulting in inaction; conversely, with too much structure, action can be less effective, and organisations can lose their ability to flexibly adapt to the demands of their business context. Richardson et al. (2002) further suggest that the optimal solution would be a hybrid one, with more structure at a minimum of

one level of the organisation, but less structure at other levels.

Lowry and Wilson (2016) posit that if centralised organisations meet or exceed the service qualities of their business partners, they are far likelier to derive IT-related benefits. Conversely, if IT quality is low, the organisation's ability to innovate and respond to market conditions will be hindered (Lowry & Wilson, 2016c), leading the business to pursue alternative IT models, such as decentralisation. Magnusson (2013) further supports this notion based on a case study of a large Swedish organisation in which the author notes how a low level of IT support quality had resulted in certain departments having to abdicate from IT altogether, decreasing their usage and even reneging on matters of organisational compliance. Significantly, this perception of IT service quality also harbours a contradictory element: despite acknowledging the lack of IT service quality, some organisations may refrain from outwardly recommending its decentralisation. This may be attributable to the market context; for example, concerns over skills in less developed economies may inhibit the desire to decentralise the IT organisation, or there may be a lack of agreement over the key organisational objectives that drive the centralisation/decentralisation of IT.
King (1984) sets out nine organisational measurements/objectives of IT that spark the discussion on centralisation versus decentralisation:

1. The need to provide computing capability to all organisational units that legitimately require it.
2. The need to contain the capital and operational costs in the provision of computing services within the organisation.
3. The need to satisfy special computing needs of user departments.
4. The need to maintain organisational integrity in operations that depend on computing (i.e., avoiding mismatches in operations) among departments.
5. The need to meet the information requirements of management.
6. The need to provide computing services in a reliable, professional and technically competent manner.
7. The need to allow organisational units sufficient autonomy in the conduct of their tasks to optimise creativity and performance at the unit level.
8. The need to preserve autonomy among organisational units and, if possible, to increase their importance and influence within the larger organisation.

9. The need, wherever possible, to make the work of employees enjoyable and productive.

Swartz & Hirshiem (2003), conducted case study of organisational design. Using six case studies conducted within the oil and gas industry, they explored differences in perceptions toward IT and in the organization of IT activities. The research highlighted differences and similarities between the firms, with respect to IT capabilities, relational and integration mechanisms, measures of success, and relationships with the business units.

The research suggests that organisations have evolved from focusing a one-way architectures within a centralization/decentralization context toward a two-way relationship-oriented approach to managing the IT structure. The authors suggest that there is there is no single 'best' IT organizational structure or governance arrangement because IT needs to respond to the unique environments within which it exists. Gonzalez et al, (2017), highlight that centralisation and decentralisation can occur in the sense of innovation where corporate exploration can be decentralised for greater agility and if concepts are proven then handed over to centralised functions for corporate exploitation, meaning organisation apply increased resources to grow the concept.

Clearly, rational arguments exist for both the centralisation and decentralisation of the IT function. Indeed, Magnusson (2013) argues that centralisation and decentralisation may not be opposites or alternatives, but mutually dependent instead. In turn, Magnusson refers to a hybridisation of IT at two levels: with strategy and policy at the central governance level and autonomy and decision at the departmental/business unit level. This model also supports Richardson et al.'s (2002) findings that high-performing organisations include those with simultaneous decentralisation and centralisation at two levels of the organisation. However, their study also shows that high decentralisation is beneficial in organisations with strong competition; if the business context is not highly competitive, the effort to achieve this may outweigh the gains (Richardson et al., 2002).
Taking prior research as an underpinning consideration, more modern research blurs the lines of organisational structures and emphasises the greater importance of good governance

regardless of the underlying organisational structure, be it centralised, decentralised or a hybrid form of both. Khali and Belitski (2020) highlight that integrating IT governance across the wider organisation allows firms to be more flexible and agile when using technologies, as well as when adapting, creating, modifying and implementing products and services, resulting in a cumulative impact on firm performance (see also Castellanos, 2021). The authors further highlight that regardless of organisational structures, strategic alignment between business-IT operational strategy and value delivery is essential, as this alignment ensures a framework between the various functions within an organisation, thus ensuring alignment to a firm's objectives and processes and ultimately generating value from IT investments. Turel et al. (2017) expand on this, suggesting that, as IT spans all business functions and departments, the organisational design requires alignment between business functions and IT, delivering internal fit within the organisation.

Khali and Belitski (2020) emphasise three key constructs to ensure effective cross-functional alignment: (a) strategic alignment and value delivery, (b) risk and resource management and (c) performance management. Strategic alignment and value delivery focus on the joint alignment of business and IT through agreed structures and joint decision-making, while risk and resource management focus on resilience in the face of a lack of skill depths within the organisation, time constraints and financial barriers. Resilience secures a firm's ability to allocate IT budgets and find the time and skills needed to recognise, adopt, adapt and use technology. Finally, performance management focuses on generating synergies between the various functions within the organisation, facilitating dynamic capabilities such as integration, learning and reconfiguration, ultimately leading to higher firm performance.

2.6 IT Practices

While there are many IT practices and considerations that organisations can implement, certain options to increase the agility that modern-day organisations require are discussed in the following sections. Although the intention is not to provide a detailed view of these technologies or approaches, they are highlighted in brief here. The associated benefits to organisations will then be discussed in Chapter 5.

2.6.1 Cloud Computing

Although cloud computing is not a new concept in the technology industry, its adoption has increased in recent years (Liu et al., 2018; Lynn et al., 2020; Deng et al., 2021). While cloud services such as web-email, Google and YouTube have been widely used by individual consumers for some time, it is only more recently that organisations have turned to cloud services as a strategic priority for meeting their IT needs (Lin & Chen, 2012; Deng et al., 2021).

In its simplest form, cloud computing is nothing more than a large pool of technology resources (hardware and software) that can be easily accessible through the internet. Hosseinian-Far et al. (2018) highlight that cloud computing has revolutionised software, changing it from a product-based to a service-oriented paradigm whereby cloud resources and software are offered as a service. Cloud computing comprises the following three primary services:

Software-as-a-Service (SaaS): SaaS replaced the conventional model of installing software on physical machines and devices. Instead, applications are made available over the internet for consumption by the end user and achieve economies of scale for organisations. Applications like Microsoft Office 365, Google Docs and Salesforce CRM are prime examples of SaaS solutions (Deng et al., 2021).

Platform-as-a-Service (PaaS): PaaS replaces the need for organisations to purchase software licences for operating systems, databases and middleware. These platforms and their associated development toolkits, APIs and SDKs are made available over the internet for technology professionals to consume and integrate into their architectures. AWS (Amazon Web Services), Google Big Query and Salesforce.com are all examples of vendors who provide PaaS services to organisations.

Infrastructure-as-a-Service (IaaS): IaaS refers to physical devices such as virtual computers, servers, network routers, switches and firewalls that are physically housed in central data centres and provided by cloud vendors such as AWS EC2, Microsoft Azure, Rackspace and Google. These resources are enabled and accessible over the internet. Ultimately, IaaS removes the need for organisations to spend time, cost and effort in building their own data centres (Hosseinian-Far et al., 2018).

2.6.2 IT Delivery

According to the Standish Group Report (2014), the US has spent over $250 billion annually on the IT application development of approximately 175,000 projects. The research showed that 31.1% of projects are cancelled before completion and 52.7% cost 189% of their original estimated budgets. On the success side, only 16.2% of software projects, on average, are completed on time and on budget. Moreover, projects completed by the largest American companies have only approximately 42% of their originally proposed features and functions. The corresponding lost opportunity costs are not measurable but could easily number trillions of dollars (Standish Group, 2014).

Conboy (2010) supports this argument by highlighting that most IT projects run drastically over-budget or fail altogether. Various studies have found that between 40% and 60% of IT projects cannot meet their budget estimates and that the degree of overspend can exceed 200% (Conboy, 2010). Several previous studies have discussed the factors that contribute to the success and failure of IT projects (Conboy, 2021; Wozniak, 2021). Wozniak (2021) argues that despite advanced IT project management methodologies and tools, or adaptations of methods from different classic approaches to many variations of the agile method, these have not resulted in any significant increase in success rates for IT projects in recent years (Wozniak, 2021). This foregrounds a further discussion of the specific success criteria of an IT project. Historically, traditional project management methods have focused on the “iron triangle” criteria of cost, quality and schedule since the 1970s. However, Pollack et al. (2018) highlight that project management has since undertaken considerable change (Pollack et al., 2018). Likewise, Van der Hoon and Whitty (2015) critique the ongoing validity of the iron triangle concept, suggesting that it creates an illusion of tangible progress by relying heavily on traditional on-time, on-budget and on-target measures without representing an accurate reflection on the lived experience of projects. This results in a simplistic perception of project work as experienced by project managers because of practitioner anxiety about the impossibility of complete control over project outcomes (Van der Hoorn & Whitty, 2015). The analysis highlighted that 74% of respondents were dissatisfied with the delivery of IT projects.

Wozniak (2021) identifies four key problems in IT project management:

1. Low utilisation and adoption of IT system functionalities delivered through projects;
2. Communication problems with the end users and stakeholders;
3. Increasing expectations from the business world regarding flexibility and willingness to change the mindset of the IT sector; and
4. It is not technical perfection that is the key skill but the ability to collaborate and build interpersonal relations within the company to enhance its competitive advantage.

These four key points reinforce the notion that cost, quality and schedule are not the only criteria that should be used to determine the success of IT projects. A key omission in today's climate is the impact on IT projects from the end users and key stakeholders. Significantly, the Standish Group Report (2014) highlights that stakeholder involvement (or lack thereof) constitutes a major risk to IT project success.

2.6.3 IT & Business Partnership

Prior research has argued that an organisation's agility is influenced by the extent of the relationship between IT and business strategy and processes (Ramamurthy, 2011; Lowry & Wilson, 2016c; Tan et al., 2017; Lorin, 2018). This highlights that if organisations are to capitalise on market changes and operational capabilities, the alignment between business and IT is a tactical necessity that provides direction and organisational flexibility. Indeed, Ramamurthy (2011) argues that close interaction and collaboration between IT and business foster mutual respect and trust over time, which encourages the sharing and exchange of knowledge between IT and line managers; such shared knowledge plays an important role in influencing an organisation's IT use.

The importance of IT and business partnership is supported by several other research studies. Glaser (2008) argues for the importance of alignment between IT and business functions to meet the overall business objectives. This is further supported by Cao et al. (2016), who suggest that IT creates business value when IT is aligned with or complementary to organisational strategy. Similarly, Lorin (2014) highlights that businesses are remodelling the role that IT plays, with a growing expectation from senior executives that solid partnerships are created between business and IT to work closely together to improve business productivity, reduce business expenses via business process re-engineering, and increase business agility and speed-to-market. Lorin's (2014) argument is further supported by more recent studies that argue that the alignment of IT capabilities and business strategy is essential

to truly realising IT agility, which is positively associated with firm performance (Lei & Huifen, 2017; Tan et al., 2017; Jafari-Sadeghi et al., 2022).

2.7 Research Gap

Despite the presence of many research studies on IT performance and IT organisational theory, research gaps persist in identifying whether IT performance influences an organisation's decision-making, specifically around IT organisational structure. While we recognise that IT can enable firms to be agile, understanding is limited around the mechanisms through and the contexts in which IT capabilities enhance business value. As a result, this limited understanding can lead to skewed perceptions within firms as to the real value that technology lends to an organisation's ability to operate in a marketplace. Perception-based decision-making by business executives may lead to organisational structures being incorporated, which may not essentially address the root cause of the technology performance gaps, merely providing a short-sighted resolution to a problem that different means could address. By better understanding technology capabilities and their value within an organisation, firms can either look to address and enhance their key assets of people, process and technology while designing an organisational model that represents the firm's strategic vision, goals and goodness-of-fit.

2.8 Literature Review Protocol

2.8.1 Research Keywords

The study used the keywords listed below when exploring previous related literature. The keywords were initially derived by conducting database searches of topics and themes related to the study; the resulting articles were then assessed for eligibility. Over time, the keywords were refined by reusing keywords from prior research that were observed through the initial search keywords, as well as keywords that proved to result in a good match in relation to the objectives of the study. Key themes were then formed from various similar keywords to create a structured and focused method of searching.

The main keywords used in the study were as follows, although this list is not exhaustive:

- IT business value
- IT agility
- Organisation theory
- Centralisation and decentralisation
- Agile project management
- IT investment
- IT trends
- Microservices and APIs
- Perceptions and attitudes
- Information technology management
- Technology impact of COVID-19
- Retail impact of COVID-19
- Resource and knowledge management-based theory
- IT flexibility
- Co-creation of IT value – business and IT alignment
- Strategic competitive performance
- IT competencies and IT challenges
- IT governance.

2.8.2 Timeframe

At the start of the study, a timeframe of 2000–2016 was used to review much of the literature. However, for certain areas such as centralisation and decentralisation theory, the post-2000 literature was limited, so a wider timeframe was used: 1980–2016. As the research progressed, a smaller timeframe of 2016–2022 was introduced to provide a more modern perspective on prior research.

2.8.3 Data Sources

The literature was mainly sourced through the Nelson platform provided by the University of Northampton. The original sources were taken from a plethora of providers. Below is a list of the key data providers that were used as part of this study, but not limited to:

- Science Direct
- IEEE Xplore
- Directory of Open Access Journals (DOAJ)
- Springer
- EBSCO
- PubMed
- ProQuest
- Scopus
- Emerald Insight
- Implementation Science.

2.9 Chapter Summary

Several studies have researched the subject of IT value, IT agility and IT organisational design. However, research has been limited on the interrelated variables that measure centralised IT agility performance and IT organisational design.

This literature review establishes that many of the relevant studies focus on a variety of independent variables – including process, people, IT management, technology and financial investment – to measure the IT performance of a firm. However, these variables are rarely truly independent; as some studies have identified, a multitude of dimensions (comprising people, process and technology) is required to form a higher-level general construct of IT capability. Together, these constructs can then be associated with overall IT performance and a firm's impact through technology.

Considering the different value models discussed in this chapter, Ramamurthy's (2011) model is deemed the most suitable within the context of IT agility and organisational performance effects, as it encompasses the main agility enablers regarding technology and

organisational practices, people and proactiveness. However, for this model to succeed in this study, adaptations are required to include a new independent variable for IT delivery and an additional dependent variable for IT organisation, as models based solely on specific independent variables (such as people, process, IT infrastructure and financial investment) would not be applicable to determining the overall performance of agility within a centralised IT organisation.

Chapter 3 Methodology

3.1 Chapter Introduction

This chapter outlines the approach taken to conduct the research to evaluate the link between centralised IT performance and organisational structure. Discussion areas will include the research questions, the selected method, the research process, a description of the research instruments used and data collection procedures. The research design, method and approach are driven by the problem statement in question. The research paradigm will influence the selection of an appropriate research method. To help plan the research method, Saunders (2007) research onion was used to inspire the foundations of the research method. Each layer of the research onion was taken into consideration to drive the outer to inner layers, starting from the research philosophy, research approach, methodological approach to the research strategy, time-horizon and finally data collection. The research onion (see Figure 16) provided the context and boundaries within which the techniques could be selected. It also provided the building blocks for the development of the research design, which was coherent with the objectives and research questions, thus enabling the research design to be justified and explained.

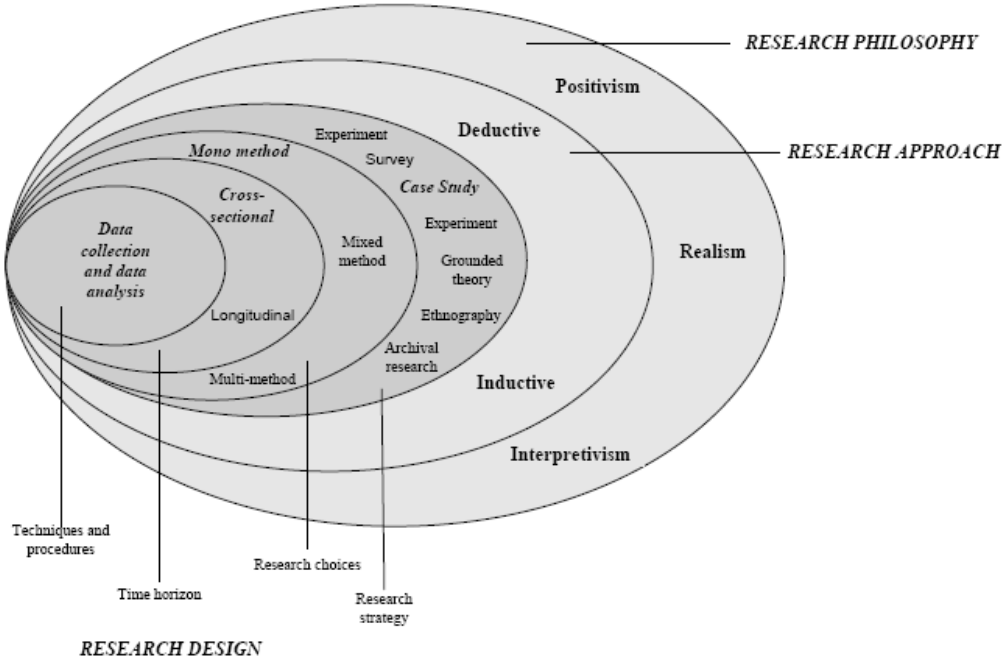

Figure 16. Analysis of Saunders Research Onion, Saunders (2007)

3.2 Research Paradigms: Positivist & Interpretivism

Most commonly, the research philosophies and methodologies adopted in a research study are driven by the research questions being examined. Certain research approaches and methods may be more relevant than other research domains, as highlighted by Creswell (1996) and Orlikowski and Baroudi (1991), who suggest that the various disciplines in social research contain a plethora of schools of thought, each with their own theoretical assumptions, research methodologies and practices.

The aim of this section is to identify the dominant research philosophies and methods used in information systems research. Roth and Meta (2002) argue that two different perspectives are available when trying to establish the meaning of truth and reality: the positivist paradigm and the interpretivism paradigm. While the aim of this section is not to give a narrow theoretical viewpoint of these two paradigms, in the context of this study, it is nevertheless important to clarify the definition of each.

Positivism typically entails a deductive style of reasoning; it is inherently grounded in the fact that social phenomena can be determined and described by the existence of objective reality and facts that can be linked by mathematical relationships (Roth & Mehta, 2002). The positivist approach is based on a systematic set of observations to understand social behaviour through the construction of hypotheses and the subsequent evaluation of causal inferences as a means of understanding social phenomena.

During the literature review, we found that the vast majority of IT-related research has adopted a positivist paradigm approach (Khor, 2014; Wallace & Sheetz, 2014; Butt et al., 2016; Mandal, 2019; Licensors et al., 2020). This viewpoint is also supported by Orlikowski and Baroudi (1991), who suggest that the positivist paradigm was used for 96.8% of studies focused on information technology research. The review of previous studies in timeframe of 2001 to 2020 also identified common research methods and techniques when gathering empirical evidence. Specifically, the positivist paradigm utilises quantitative data often taken from large samples; data is collected through experiments, questionnaires, content analysis and existing statistics.

Furthermore, cross-sectional sample surveys and controlled experiments were the dominant research methods used to understand causal relationships (Gupta et al., 2013; Wallace & Sheetz, 2014; Bousbahi & Alrazgan, 2015; Butt et al., 2016). Other key themes identified to understand the choice of philosophical and methodological approaches were:

- The studies' use of hypothesis testing; and
- The studies' use of adopting/adapting pre-defined conceptual models, requiring the use of a substantial amount of quantitative data collection methods and hypothesis testing.

The two points highlighted above are associated by nature in that the conceptual models used in many of the studies require the development of hypotheses, which follows the core theory of positivism, according to which hypotheses are used to draw inferences about a specific phenomenon (Hernadez & Jimeez, 2008; Gupta et al., 2013; Wallace & Sheetz, 2014).

In their study, Butt et al. (2016) used the positivist approach, adopting the technology adoption model (TAM) to understand the inhibitors of online adoption in South Asia. The study gathered data from 340 respondents using online questionnaires. The analysis was then conducted using an extended version of TAM, with the overall outcome of the study suggesting that trust and ease of use were the key factors affecting consumer attitudes and

subsequent intention to adopt online shopping. Similar studies using the positivist paradigm in the IT field include those by Hernadez and Jimeez (2008), Khor (2014), Bousbahi and Alrazgan (2015) and Mandal (2019).

Arguments against positivism – and in support of the interpretivism paradigm – are based on quantitative methods producing artificial and sterile results. These results, some argue, are incapable of representing the complexity of social realities. People are reduced to numbers, and abstract laws and formulas are arguably irrelevant to the actual lives of actual people and thus have low validity (Neuman, 2006). Interpretivism, in contrast, is grounded in a theory of defined subjective understanding. As Roth and Meta (2002) highlight, the analysis of social theory or culture cannot be an experimental science in search of law but more so an interpretive one in search of meaning (Püschel et al., 2015). Interpretivist researchers argue that the positivist theory of objective facts and data could never be truly objective; instead, the underlying data is merely a construction of people's subjective views, contrary to the positivist theory of deductive reasoning.

Corbin and Strauss (2012) relate interpretivism to interactionist philosophy, whereby interpretivism is an analysis of social actions through the observation of people in natural settings. In contrast to positivism, the interpretivism paradigm is more focused on qualitative data as opposed to quantitative data (Corbin & Strauss, 2012). The qualitative data approach is a method of extracting a rich set of data that can be examined for social context and meaning. Creswell (2003) points to the notion that important information and meaning about specific phenomena can be lost when reduced to numerical form (Roth & Mehta, 2002). In response, interpretivism aims to develop a deeper understanding that may then drive understanding in other contexts rather than a broad generalisation of a selected sample population. Conversely, one criticism of the qualitative research approach is that it lacks the nature of concrete social behaviour and the scientific rigour and validity that are associated with quantitative methods and which determine the causal relationships between variables (Hall & Frcpc, 2012).

3.3 Selected Research Paradigm

In the literature review, we identified that the positivist paradigm was the most dominant research philosophy for technology adoption and IT-related studies, supported by survey

questionnaires. This study embraces the positivist paradigm. Despite the arguments that this paradigm is incapable of representing the complexities of social realities, the general approach is well matched to the aims and objectives of the overall study, mainly because the study is based on hypothesis testing and the adaptation of a conceptual model using large amounts of data collected via surveys.

Hall and Frcpc (2012) highlight that most studies in IT research primarily use surveys within a single cross-section or a slice of time. This is mainly due to a few key factors. First, surveys produce quantitative data about the social behaviour of people; that is, they aim to explore people's behavioural views, opinions and characteristics. Second, Anderson (2001) states that the survey approach is correlational, meaning that it is used to identify relationships between variables (Spector, 2009). This is one of the key elements of this study: to identify the link between IT capabilities in centralised IT organisations and whether this causes organisations to subsequently decentralise their IT. Similar methods can be seen by researchers in the literature review; for example, Butt et al. (2016) surveyed 340 students in Pakistan to understand whether there was a relationship between consumer attitudes on perceived usefulness and ease of use in the adoption of e-commerce.

Various research methods can be applied in positivist research, ranging from forecasting and simulation to case studies and surveys. Many researchers have applied one of the above methods in IT research studies (O'Byrne, 2007). However, since each research method applies to the aim of the individual research question, the following section aims to discuss the selected research method – surveys – and to explain the reasoning for its application in this study.

3.4 Surveys

Surveys represent one of the most common forms of data collection methods in positivist research studies. In the literature review, surveys were the most common methods employed. According to some previous studies (Venkatesh, 2000; Porter & Donthu, 2006; Sadiq et al., 2012; Gangwar et al., 2015; Gemici & Alpkan, 2015; Gangwar & Date, 2016), the survey approach is correlational, meaning that it can be used to identify relationships between variables that produce quantitative data about the social behaviour of people, specifically their behavioural views, opinions and characteristics. As Calder (1998) highlights, descriptive studies focus on who, what, when and how types of questions. Explanatory studies focus on

the why questions or, to put it more formally, on identifying cause-and-effect relationships (Calder, 1998).

However, Raclaw et al. (2020) note that people activate human–human interaction strategies when engaging with technology, meaning that participants may engage with the survey items much as they would if they were in conversation with another person, following established patterns of responding in face-to-face and telephone interaction. Specifically, such engagement may orientate the survey as an accountable form of interaction, guided by the same principles of recipient design that shape other forms of face-to-face and telephone surveys and interviews (Raclaw et al., 2020). Given that this study is an explanatory study, the use of surveys is crucial, as one of its key aims is to understand the business perception of centralised IT agility and its relationship to the organisation's market, operational agility capabilities and IT organisation structure. Second, as Sills and Song (2002) highlight, online surveys are a practical and valuable resource for social scientists. For select populations who are connected and technologically savvy, the cost, ease, speed of delivery and response, ease of data cleaning and analysis all weigh in favour of the internet as a delivery method for survey research.

When selecting the research method for this study, several elements were considered. First, the existing literature was reviewed to identify the common research methods used in similar studies. Second, the ease of accessibility to the participants was gauged given the size of the sample population and its geographical spread across the world. Third, consideration was given to the previous studies' use of hypothesis testing and their adopting/adapting of pre-defined conceptual models that would require the use of a substantial amount of quantitative data collection methods and hypothesis testing. Finally, the survey method needed to enable a fast method of data collection, speed in designing the survey and the ability to identify attributes such as attitude, characteristics and behaviour (Sills and Song, 2002). After considering all of these elements, the research method that was deemed most appropriate for this study was the survey approach.

3.4.1 Survey Method Limitations

One of the key challenges with survey methods is that the question design can be complex and simple at the same time. Often, surveys can be complex for the participants and require the researcher to spend a vast amount of time on simplification while ensuring the relevance of the data that is being collected to the research questions being investigated. Without this, as Calder (1998) lists, participants may feel that the questions were intrusive; the answers provided failed to encompass their situation; they could not understand the question; the instructions made little sense; they became frustrated with completing something they were not interested in; or they suspect the underlying motives behind the request for information. Badly worded questions create two further challenges in terms of both the reliability and validity of the data captured. Here, reliability refers to the consistency of the data and its interpretation, while validity concerns the degree to which the data collected accurately reflect attributes or behaviour in line with the overall objectives of the study. In response, Walters (2021) highlights that three key limiters of the effectiveness of surveys should be considered: random error, bias and flawed survey design. Walters (2021) argues that careful survey design, random sampling and significance testing should be used to accomplish two main objectives: (a) to estimate and minimise bias and random error in measurement, and (b) to provide statistical support for claims that the results obtained for a sample can be extended to the corresponding population. Regarding survey design, Walters (2021) highlights that many methodological problems may be avoided through the consideration of only a few key points:

- Surveys are especially prone to response bias. However, bias can be minimised through careful survey design and by using other data-gathering methods that do not rely on individuals' subjective responses.
- Individuals' self-assessments of their abilities are strongly influenced by self-efficacy bias, and their self-assessments sometimes have little in common with their actual abilities.
- Leading survey questions should be avoided, as should response options that encourage respondents to view certain responses as normal. Response options should be labelled with terms that all respondents are likely to understand in the same way.

- Although perceptions guide behaviour and are therefore legitimate objects of study, it is important to distinguish between perceptions and reality when interpreting results.

The second challenge is the potential non-cooperation of participants, which results in a low response rate (Creswell, 1996; Calder, 1998; Sills & Song, 2002). Studies with low response rates may produce prevalence estimates that are biased by selective non-response (Meiklejohn et al., 2012). Moreover, a sizeable amount of time is required by the researcher to chase non-responses to attain a good sample response rate.

3.4.2 Selected Survey Tools

Several survey data collection methods are used in research studies, including telephone interviews, face-to-face interviews, email surveys and online surveys. This section aims to briefly outline some of these methods and provide reasoning for the selected method.

- **Face-to-face interviews** enable the researcher to be physically present to ask the survey questions and to assist the respondents in understanding the questions that are being asked of them. The researcher can also work with the respondents in the event of clarifications, rephrasing, adapting and repeating the question as appropriate. Doyle (2005) highlights that the ease of a personal presence makes face-to-face surveys more suited to populations that have difficulty answering mail, online or telephone surveys (Meiklejohn et al., 2012). Neuman (2006) also argues that face-to-face interviews have seen some of the highest response rates in data collection tools. In contrast, the challenges with face-to-face interviews are twofold. First, the researcher may inadvertently create biases in the respondents' answers by giving them nonverbal and verbal cues about how they should respond. Second, with a large sample population, the cost and time to interview each respondent would be high.
- **Telephone interviews** are like face-to-face interviews, except that they are conducted over the telephone rather than in person. The key benefit of telephone interviews is that they can be carried out where studies span a geographical range and a large population sample. Disadvantages include relatively high costs, limited interview length and the researcher's inability to see the respondents and read their non-verbal behaviour. Ward et

al. (2015) argue that the telephone as a data collection tool need not be relegated to second-best status; rather, researchers can consider telephone interviews a valuable first-choice option.

- **Online surveys** enable respondents to navigate to a web browser or mobile page where the survey can be completed. Scott (2011) highlights that while online survey methods can yield a 38% reduction in costs, this comes with the drawback that online surveys have low response rates compared with other types of survey methodologies. However, one of the key advantages of online surveys is the ability to design the survey at speed and to analyse or have pre-analysed information made available through the software package. This can reduce the time and resources required, especially when handling large datasets.

The chosen method of data collection for this study was an online survey. As the proposed sample size for this study is between 350 and 400 participants, data collection through online web-based surveys offers efficiencies in time and cost and enables easy administration for large-scale populations (Doyle, 2005). This method allows for an extensive collection of data and the ability to easily integrate the data collected for analysis into statistical tools like SPSS.

3.5 Population, Sample & Unit of Analysis

The population in the study comprises participants who work in medium to large organisations where technology is a key enabler within the organisation. The participants come from a wide range of industries, including but not limited to retail, academia, banking, technology, healthcare and oil and gas. While the responses were individual, the study's primary focus was on understanding individuals' experiences of centralised IT agility performance and its correlation with decentralising IT. Thus, the unit of analysis for this study will be individual. However, the variables in the analysis will be correlated to identify whether there is a relationship between centralised IT capabilities and decentralisation.
The sample population was taken from an array of industries and professions globally; it is not limited to any specific country, region or professional domain. The participants in the research were able to remain anonymous. All aspects of how the data were collected, accessed and used were explained to participants, in line with the University of Northampton's ethics guidelines.

3.5.1 Sampling Method

The purposive sampling method was adopted and canvased using the professional networking platform LinkedIn. The primary aim of this method was to produce a sample that could be logically assumed to represent the population, specifically by applying expert knowledge of the population to select, in a non-random manner, a sample of elements that represents a cross-section of the population. The selection criteria used was those respondents whose organisations adopted a centralised technology function. Only those respondents that selected 'Centralised IT' in the online survey as their current organisation design were included in the overall study. To maintain the integrity of the sample, three responses in which participants identified their existing organisational structure as decentralised were removed.These three responses represented only a small proportion of the overall response sample (1.4%).

The sample size in the quantitative study was estimated to be around 350–400 participants. The total size of the population who work in a centralised IT function was unknown, however an educated guess would be in the millions. Therefore, similar sampling methods were identified during the literature review; for example, Butt et al. (2016) conducted a survey of 340 students in Pakistan to examine the behavioural acceptance of consumers towards online shopping using the technology acceptance model (TAM) in a developing country, with wider implications for South Asia. Similar sample sizes could also be seen in other studies (Ramamurthy, 2011; Lowry & Wilson, 2016a).

3.6 Pilot Study

A pilot version of the survey was developed to assess the validity and reliability of the data collected. The key criteria for evaluation were as follows: time taken to complete the survey, clarity of survey instructions and layout, clarity of the questions, relevance of the questions and any missing topics or questions.

The pilot study was evaluated by the research supervisor of this study and then tested by ten employees within the researcher's current organisation. Upon feedback, changes were

incorporated into the final version. The survey platform used was https://www.onlinesurveys.ac.uk/, formerly known as Bristol Online (BOS). The survey link was communicated through two channels: LinkedIn for social media and email (where the researcher's official university email account was used to send the survey link). Before taking part in the research, each participant was provided with a full description of the research, explaining the purpose of the research, its aims and objectives, a description of the procedure, risks, confidentiality and the right to withdrawal.

3.7 Instrument Development

The research instrument was adapted from Ramamurthy's (2011) agility model (see Figure 17). This study incorporated a fourth dimension of *decentralised IT agility* to complement the existing dimensions of IT capabilities, market capitalisation agility and operational adjustment agility. We further adapt the first-order dimensions of the second-order construct of centralised IT capability.

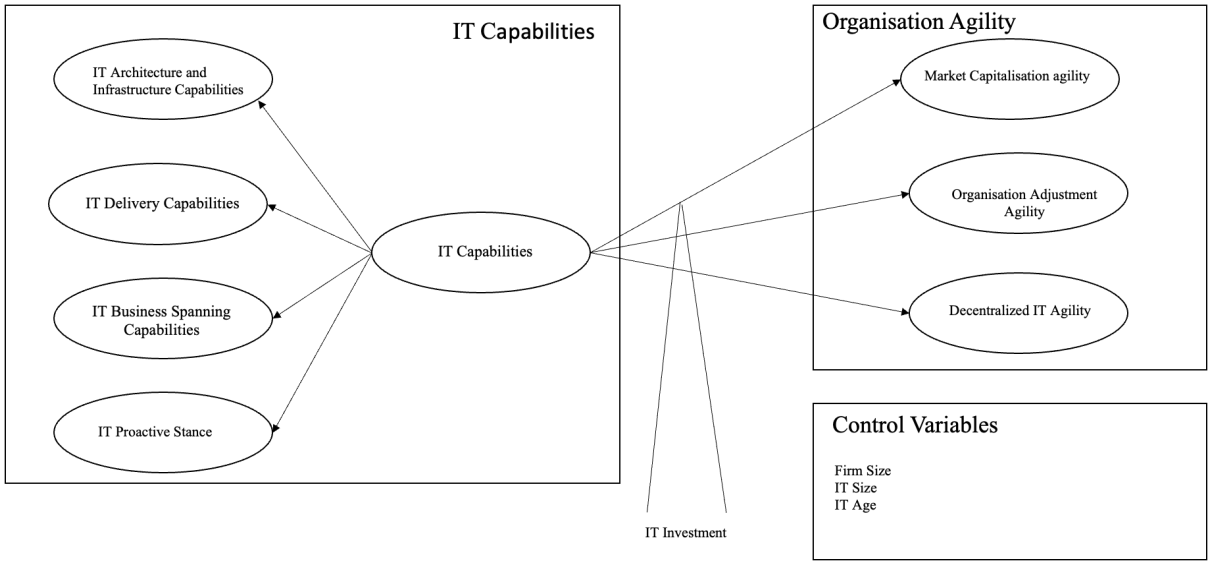

Figure 17. IT agility four-dimension model, adapted from Ramamurthy (2011)

The measurement scale in this study consisted of the following:

Organisational agility

- **Market capitalising agility** is measured to reflect an organisation's ability to respond rapidly to market changes to improve products or services for end consumers.

- **Operational adjustment agility** is measured to reflect the ability of an organisation's business processes to adapt rapidly to market changes.
- **Decentralised IT agility** is measured to reflect whether centralised IT capabilities lead to decentralisation.

Centralised IT capability – Ramamurthy's (2011) conceptualised model acts as a second-order construct to reflect four interrelated first-order dimensions. The measurements captured the covariances between the four dimensions. The four dimensions are as follows:

- **IT architecture and infrastructure capability** was used to reflect the extent to which an organisation is able to change rapidly and deploy an enterprise-level system.
- **IT delivery capability** was used to reflect the extent to which an organisation is able to rapidly deliver projects.
- **IT business spanning capability** was used to reflect the extent to which an organisation is able to envision and exploit its IT resources to support and enhance business objectives.
- **IT proactive stance** was used to reflect the extent to which an organisation is able to proactively search for ways to explore or exploit IT resources to address and create business opportunities.

IT contextual variables

- **IT spending** was measured as the ratio of IT budget to sales revenue.
- **Firm size** is the number of full-time employees (FTE) deployed within the organisation.
- **IT size** is the number of full-time employees (FTE) deployed within the IT department.
- **IT age** is the number of years the IT department has existed.

3.8 Hypotheses

The study aims to evaluate the following three hypotheses:

H1 Centralised IT capability is positively associated with market capitalising agility.

H2 Centralised IT capability is positively associated with operational adjustment agility.

H3 Centralised IT capability is negatively associated with decentralisation of IT.

3.9 Questionnaire Design & Format

The survey design comprised 31 questions. The average time taken to participate in the survey was estimated to be 10–20 minutes. The survey is provided in full in Appendix A. The survey covered the following areas:

- **IT capabilities** – with four dimensions:
    - **IT architecture and infrastructure capability** (four questions) – focusing on the agility and responsiveness of technology and architecture within the firm
    - **IT delivery capability** (three questions) – focusing on responsiveness, agility and business collaboration in the delivery of projects within the firm
    - **IT business spanning capability** (four questions) – focusing on IT and business alignment of strategic goals and scaling capabilities to meet business demand
    - **IT proactive stance** (two questions) – focusing on the proactivity of IT departments to aid business growth
- **Organisational agility**
    - Market capitalisation agility (five questions)
    - Operational adjustment agility (three questions)
    - Decentralised IT agility (three questions)
- **Contextual IT** (seven questions) – focusing on:
    - IT spending
    - Firm size
    - IT size
    - IT age.

The survey was made up of free text, dropdowns (single choice) and matrices of choice (single options).

3.10 Data Analysis Techniques

This study applied several data analysis techniques. Once collected through the online survey, the data were imported into a statistical software package (SPSS) for analysis. To analyse the Likert scale data, parametric tests of Pearson correlation and linear regression parametric tests were used to accept or reject the hypotheses.

While some researchers have argued against the use of a parametric test for Likert scale responses, others argue that although there is a logical reason to use tests other than Pearson's, often these arguments are based on theoretical assumptions. Some researchers (Sullivan & Artino, 2013; Wadgave & Khairnar, 2016) conclude that there is compelling evidence that objectively justifies the robustness of parametric statistics for the Likert data, even with small sample sizes and non-normal distributions.

Pearson correlation was used to test *H1*, which examined the correlation between centralised IT capability and a firm's market agility, and *H2*, which studied the correlation between centralised IT capability and a firm's operational adjustment agility. Pearson correlation was included in the study, as it was deemed suitable for the analysis, whereby the strength of association could be measured between two continuous variables. Other alternatives, such as Spearman's correlation, were considered. However, this technique determines the strength and direction of variables rather than the strength and direction of the linear relationship, as determined by Pearson correlation. A multiple linear regression was applied to *H3* to evaluate the relationship between three independent variables (IT capability, market capitalisation agility and operational adjustment agility) and one dependent variable (decentralisation).

3.11 Ethical Considerations

Given the importance of the research method in providing an accurate representation of the sample population for this study, it is equally important to consider the ethical aspects related to the research study. Quantitative analysis was conducted through an online survey.

The survey platform used was https://www.onlinesurveys.ac.uk/, formerly known as Bristol Online (BOS). The survey link was communicated over two mediums: LinkedIn for social media and email. Before taking part in the research, a full description of the research,

explaining the purpose of the research, aims and objectives, description of the procedure, risks, confidentiality and right to withdrawal was provided to each participant.

In the online data collection method, anonymity was made possible since identifying fields such as email, name and job role were optional data entry points. Moreover, it was essential that the participants were informed that the data were analysed at the group level to de-identify participants. Identifying numbers were not presented in the results of the analyses, and no reference to people or organisations was referenced in the research.

The data were collected confidentially and kept in a secure online university environment. The research was underpinned by the ethical guidelines provided by the University of Northampton (UoN). During the research process, UoN's ethics committee approved the ethics application to proceed with the research (**ETH1920-0195**).

In summary, the key ethical concerns were addressed with the relevant methods of data collection and privacy. Given the use of online survey tools, it was imperative that the data for each participant were stored securely. Throughout the online survey process, the study remained in strict adherence to the university's choice of tools and guidelines. All participants were made aware of the purpose of the research and how it would be used. All data collected were used solely for the study and destroyed upon completion of the study, facilitated by the university.

3.12 Chapter Summary

This chapter presented the research design and rationale and described the survey used in the study. It outlined key considerations when deciding between the positivist and interpretivist approaches. Quantitative methods were employed in this research through the deployment of the research instrument. An online questionnaire was used for data collection, which provided flexibility and facilitated the process of data collection. The data collection instrument was designed using the Bristol Online Survey platform and comprised 31 questions with various data input controls, most notably Likert scales. The SPSS statistical analysis tool was used to produce various statistical findings, frequency tables, descriptive analysis and Pearson and linear correlation tests.

Chapter 4 Analysis and Results

4.1.1 Chapter Introduction

This chapter describes some noteworthy findings on various data points from the data sample. The following sections consist mainly of descriptive statistics outlining the basic features of the data, initially incorporating distribution analysis as frequencies in the form of frequency distribution bar charts. The subsequent sections focus on inferential statistics, based on which the study aims to test the three research hypotheses. Various techniques were used to analyse the Likert scale data; Pearson correlation and linear regression parametric tests were used to accept or reject the hypotheses.

The online survey attracted 212 participant responses, resulting in a 60% overall response rate. This response rate is comparable to previous research (Lowry & Wilson, 2016b), which validated the sample size as reliable for the analysis. To maintain the integrity of the sample, three responses in which participants identified their existing organisational structure as decentralised were removed, as the aim of the study was focused on centralised IT capabilities. These three responses represented only a small proportion of the overall response sample (1.4%).

The participants in the survey primarily hailed from retail organisations (39%), with the remaining participants predominantly coming from other industries (44%). It is most likely that the skew towards respondents from retail was driven by the researchers' network predominately being in the retail industry (see Figure 18). A Cronbach Alpha test was conducted in SPSS to test internal reliability. The results showed the following results

- IT architecture and infrastructure capability - α .713
- IT delivery capability - α .826
- IT business spanning capability - α .721
- IT proactive stance - α .656

Content validity was tested in SPSS using Pearson correlation for variables for Market capitalising agility, Operational adjustment and Decentralised IT agility. The test showed that all variables had high validity

The chapter ends with a focus on evaluating the results of the three hypotheses set out in the objectives of the research.

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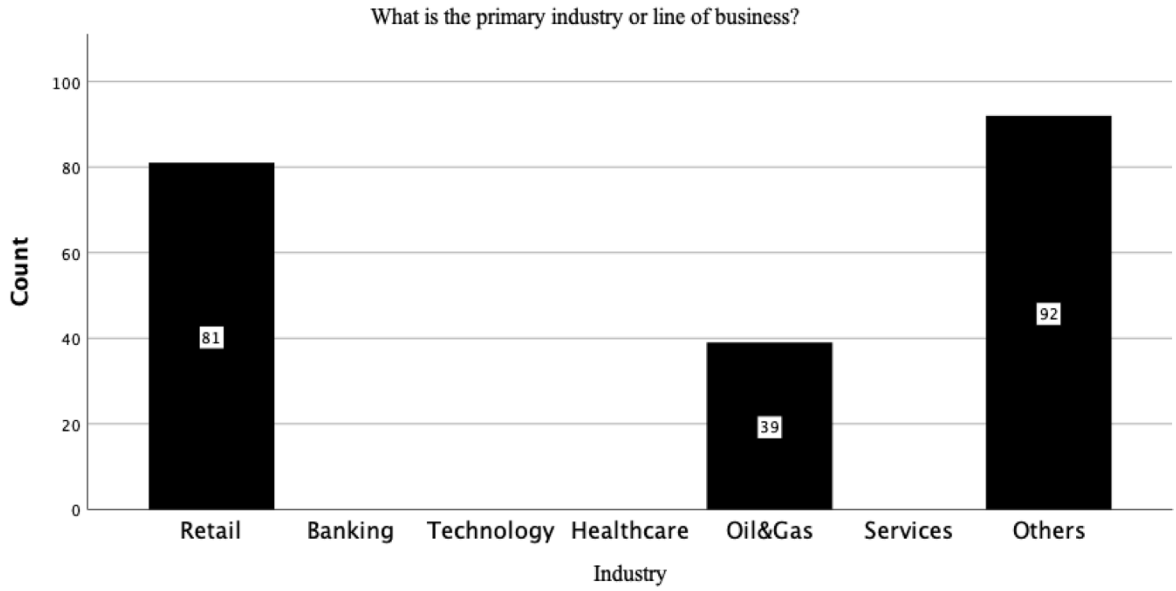

Figure 18. Primary industry of participants

The size of the IT organisations (see Figure 19) ranged between 20 and 499. An IT organisation size of 50–99 employees showed the highest frequency (44%), followed by IT organisations with 100–249 employees (24%).

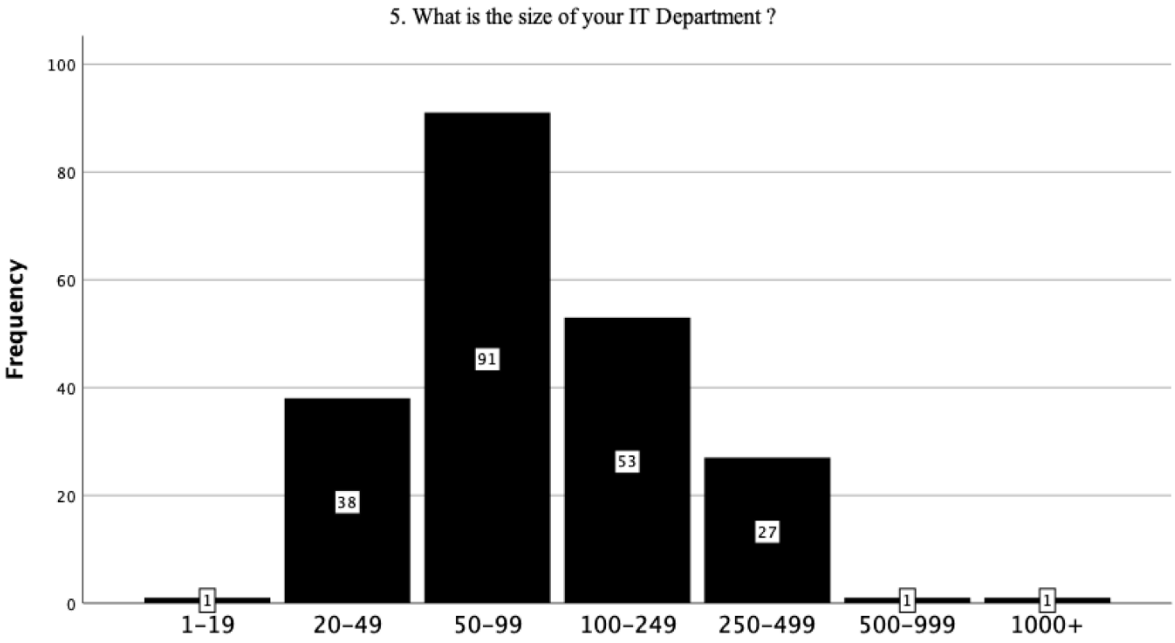

Figure 19. Employee size of IT organisations

The responses (see Figure 20) indicated that 51% of the participants' organisations invest between $500k and $1m USD annually in IT. This was followed by 30% of organisations investing between $1m and $5m USD and a further 14% of organisations investing between $5m and $20m USD.

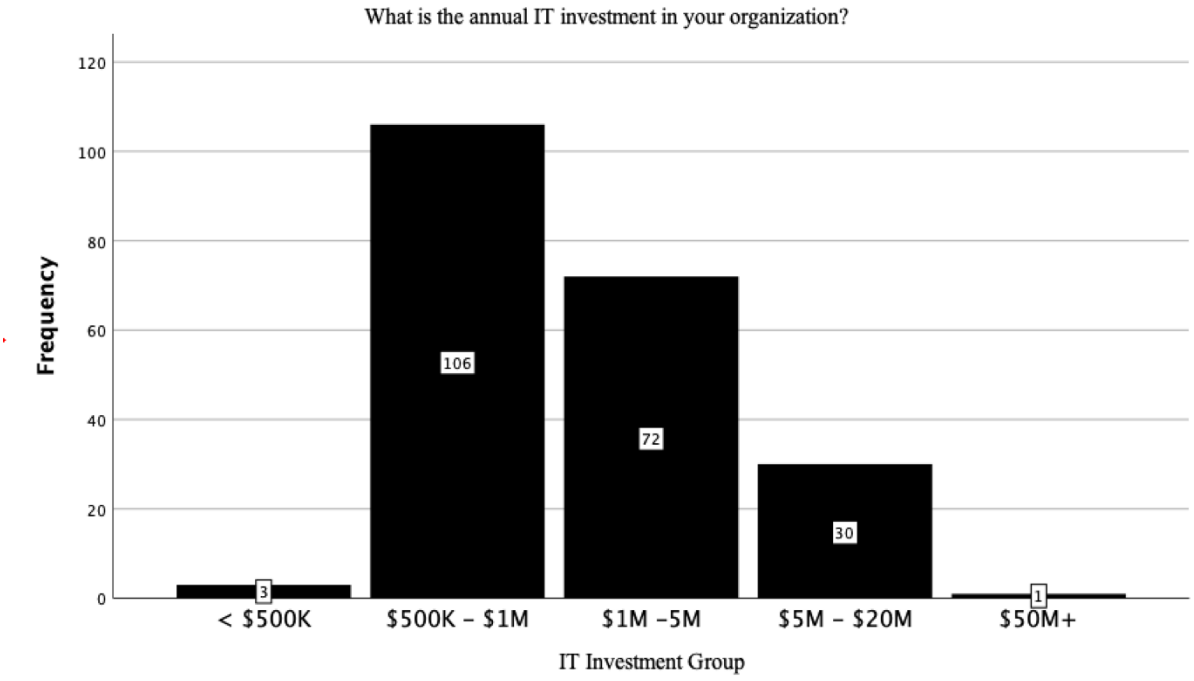

Figure 20. Annual business investments of IT organisations

4.2 Descriptive Statistics

4.2.1 IT Architecture and Systems

The analysis highlighted that 66% of participants felt that their IT systems and architectures were not responsive to change to meet their business needs. However, only 34% of participants felt that their IT systems were an actual inhibitor of business agility. This lack of technology responsiveness can be a common challenge for many IT organisations, primarily because of legacy information systems that have been developed with antiquated technologies and enterprise resource planning (ERP) systems that have been heavily customised and are often no longer supported by the ERP vendor. In an earlier study by Reddy and Reddy (2002), the authors argued that organisations suffer from competitive flexibility because of information technology, often due to the burden of legacy systems, highly complex interwoven processes and disparate technology systems of different levels of technology sophistication.

8. I feel the technology systems in IT have been built for responsive change to my business needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	29	13.9	13.9	13.9
	Agree	42	20.1	20.1	34.0
	Disagree	137	65.6	65.6	99.5
	Strongly Disagree	1	.5	.5	100.0
	Total	209	100.0	100.0	

Table 2. IT responsiveness to change

9. I feel the technology systems in IT are an inhibitor to Agility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	26	12.4	12.4	12.4
	Agree	109	52.2	52.2	64.6
	Undecided	1	.5	.5	65.1
	Disagree	44	21.1	21.1	86.1
	Strongly Disagree	29	13.9	13.9	100.0
	Total	209	100.0	100.0	

Table 3. IT inhibitor of a firm's agility

Over time, most firms become entangled in large, complex information systems with embedded business processes, which frequently limit their actions when innovative changes are necessary. As a result, IT systems are often found to be the largest barrier to rapid and radical changes in business process re-engineering initiatives (Van Oosterhout et al., 2006).

4.2.2 IT & Business Strategic Alignment

One of the major challenges for IT organisations has been the disconnect between the IT organisation and the business. This often manifests itself in two elements. First, IT organisations will deliver portfolios of work that are often not aligned to the overall business strategy and objectives; therefore, little value is recouped. Second, as a cause and effect of low IT value, businesses underinvest in their technology, creating legacy systems, poor talent pools and technical debt.

18. How would rate the alignment of the IT department to the overall business strategy, vision and goal?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fully aligned	35	16.7	16.7	16.7
	Partially aligned	32	15.3	15.3	32.1
	Partially misaligned	79	37.8	37.8	69.9
	Complete misalignment	63	30.1	30.1	100.0
	Total	209	100.0	100.0	

Table 4. Strategic business-IT alignment

Significantly, the analysis of IT alignment with business strategy and objectives highlighted that 68% of the respondents felt that their IT organisation was not aligned with the overall business strategy vision and goal. Glaser (2008) highlights the importance of aligning IT and business functions to meet the overall business objectives. This is further supported by Cao et al. (2016), who argue that IT creates business value when IT is aligned with or complementary to organisational strategy. Remenyi et al. (2005) also supports this view, attributing much of the misalignment of IT and business objectives to perceived mistrust in the capabilities of the IT organisation. The results support previous literature (Lorin, 2018), that alignment of IT and business is crucial in increase business agility and speed-to-market

4.2.3 IT Delivery

An analysis of IT delivery – largely made up of project management and the delivery of business needs on time – showed that 74% of participants felt that IT organisations were failing to meet their promises on delivery of business needs. The poor delivery of projects can be attributed to many factors, but it can often be due to flawed project management frameworks being used, including waterfall methodologies being applied in software development work or the lack of agile delivery frameworks being applied in IT organisations.

12. Are planned goals achieved in due time by the IT department?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fully aligned	1	.5	.5	.5
	Partially aligned	54	25.8	25.8	26.3
	Partially misaligned	92	44.0	44.0	70.3
	Complete misalignment	62	29.7	29.7	100.0
	Total	209	100.0	100.0	

Table 5. IT delivery performance

4.3 *H1* Market Capitalisation Agility

H1 examines the correlation between centralised IT capability and a firm's market agility. The dataset was analysed using a Pearson correlation by collating a group of 13 questions from the subsections of the online survey (IT architecture and infrastructure capability, delivery capability, IT business spanning capability and IT proactive stance) into a new variable called *IT capability* to produce an overall average. The same exercise was conducted for market capitalisation. The mean from the responses for the IT capability variable was 2.17, with a standard deviation of .975. The mean from the responses for the market capitalisation variable was 1.79, with a standard deviation of .715.

	N	Minimum	Maximum	Mean	Std. Deviation
Tv_ITCAP	212	.38	3.54	2.1727	.97559
Tv_Market Cap	212	.80	3.20	1.7943	.71541
Valid N (listwise)	212				

Table 6. Descriptive statistics of market capitalisation

Examining *H1* ("Centralised IT capability is positively associated with market capitalising agility"), a Pearson correlation was conducted on the two variables. Preliminary analyses showed the relationship to be non-linear, with both variables not normally distributed (p = .000; skewness = .080), as assessed by Shapiro-Wilk test ($p < .05$). The results showed a statistically significant (r = .074, p = .283) correlation between the two variables. The R-

value of .074 highlights a positive relationship between IT capabilities and market capitalisation agility.

		Tv_ITCAP	Tv_Market Cap
Tv_ITCAP	Pearson Correlation	1	.074
	Sig. (2-tailed)		.283
	N	212	212
Tv_Market Cap	Pearson Correlation	.074	1
	Sig. (2-tailed)	.283	
	N	212	212

Table 7. Market capitalisation correlation with IT capabilities

Therefore, the study can accept for *H1* that a positive relationship exists between centralised IT capabilities and a firm's ability to capitalise on market opportunities. This helps us understand that there is a relationship between IT capabilities and businesses capitalising on market opportunities and change through agility. In a broader sense, such knowledge is fundamental to better understanding IT capabilities as a set of key components in IT-based value creation and their contribution to organisational agility. For example, if firms apply modern-day IT architecture capabilities, this creates a foundation for reacting rapidly to market changes. At the same time, the establishment of IT and business strategic goal setting and alignment can enable firms to direct scarce IT resources to the right business initiatives, thus enhancing agility and realising value. In summary, the analysis highlights that increased centralised IT performance boosts a firm's ability to capitalise on market opportunities.

4.4 *H2* Operational Adjustment Agility

H2 considers the correlation between centralised IT capability and a firm's operational adjustment agility. Again, the dataset was analysed using a Pearson correlation. This was conducted by grouping several questions into a new variable called "Tv_ITCAP" to produce an overall average. The same exercise was conducted for operational adjustment agility (TV_ITOPSNEW). The mean from the responses for the IT capability variable was 2.17, with a standard deviation of .97. The mean from the responses for the operational adjustment

agility variable was 1.79, with a standard deviation of .68.

Examining *H2* ("Centralised IT capability is positively associated with operational adjustment agility"), preliminary analyses showed the relationship to be non-linear, with both variables not normally distributed (p = .000; skewness = .881), as assessed by Shapiro-Wilk test (p < .05). A Pearson correlation was then conducted on the two variables. The results showed a statistically significant (r = .137, p =.046) positive correlation between the two variables. The R-squared was .137, which highlights a strong positive relationship between the two variables. Therefore, the study can accept for *H2* that there is a relationship between centralised IT capabilities and a firm's ability to adjust its operational capabilities.

		Tv_ITCAP	TV_ITOPSNEW
Tv_ITCAP	Pearson Correlation	1	.137*
	Sig. (2-tailed)		.046
	N	212	212
TV_ITOPSNEW	Pearson Correlation	.137*	1
	Sig. (2-tailed)	.046	
	N	212	212

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

Table 8 - Correlation of operational agility

This result helps us understand that there is a relationship between IT capabilities and businesses' operational agility. In summary, it can be assumed that IT capabilities improve a firm's ability to adjust its operations, such that its people, processes and operational responses also improve. The operational responsiveness is key for firms who are entering new growth markets, opening and closing lines of businesses and applying government compliance and legal legislations such as Tax.

4.5 *H3* Decentralised IT

H3 ("Centralised IT capability IT is positively associated with an organisation's desire to

decentralise IT') investigates the impact of a firm's IT capability on a firm's desire to decentralise their IT organisations. For this analysis, a multiple linear regression was conducted. Market capitalisation, IT capability and operational change agility were used as independent variables, while decentralised IT was used as a dependent variable.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.560	.259		17.597	.000
	Tv_Market Cap	-.548	.186	-.303	-2.942	.004
	TV_ITOPSNEW	.458	.195	.244	2.353	.020
	Tv_ITCAP	-.709	.078	-.534	-9.108	.000

a. Dependent Variable: TV_DEC_NEW

Table 9. Decentralisation coefficients

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	107.112	3	35.704	30.056	.000[b]
	Residual	247.087	208	1.188		
	Total	354.199	211			

a. Dependent Variable: TV_DEC_NEW

b. Predictors: (Constant), Tv_ITCAP, Tv_Market Cap, TV_ITOPSNEW

Table 10. Decentralisation ANOVA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.550[a]	.302	.292	1.08992	.302	30.056	3	208	.000

a. Predictors: (Constant), Tv_ITCAP, Tv_Market Cap, TV_ITOPSNEW

Table 11. Decentralisation model summary

The analysis highlighted that the independent variables had a statistically significant (p = .000, skewness = -.704) impact on a firm's direction to decentralise its IT organisational structure. The analysis also highlights the R-squared of .302, which shows that 30% of variance in the dependent variable could be attributed to the independent variables, thus

denoting a positive relationship. The analysis further highlighted that two of the three independent variables had a negative unstandardised beta coefficient (IT capabilities: - .709; market capitalisation: -.548), while operational agility had a positive unstandardised beta coefficient.

For IT capabilities and market capitalisation, therefore, it can be assumed that as these two independent variables increase, the dependent variable decentralisation decreases. In turn, as the performance of IT capabilities increases, it becomes less likely that an organisation will decentralise its IT organisation. The study can therefore accept for *H3* that there is a relationship between IT capability and a firm's decision to decentralise its IT organisation. Ultimately, this means that the higher the increase in IT value generated by centralised IT organisations, be it agility or other forms of value, the less likely a firm will be to decentralise the IT function.

4.6 Other Findings: IT Investment & IT Capability

Further analysis was conducted to assess the impact on IT capabilities in relation to organisational spend on IT. For this analysis, a linear regression was conducted. IT investment was used as an independent variable, and IT capability was used as a dependent variable.

The analysis highlighted that the independent variable had a statistically significant (p = .000) impact on a firm's IT capability. The analysis also results in an R-squared of .166, which shows that 16% of variance in the dependent variable (IT capability) could be attributed to the independent variable (IT investment), denoting a small positive relationship. The analysis further identified that the independent variable had a negative unstandardised beta coefficient of -.518. Therefore, it can be assumed that a decrease in IT spending can negatively affect a firm's IT capabilities.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.015	.142		21.207	.000
	6. What is the annual IT investment in your organization?	-.518	.079	-.413	-6.565	.000

a. Dependent Variable: Tv_ITCAP

Table 12. Correlation of operational agility

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.198	1	34.198	43.100	.000[b]
	Residual	166.626	210	.793		
	Total	200.824	211			

a. Dependent Variable: Tv_ITCAP

b. Predictors: (Constant), 6. What is the annual IT investment in your organization?

Table 13. IT investment ANOVA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.413[a]	.170	.166	.89076	.170	43.100	1	210	.000

a. Predictors: (Constant), 6. What is the annual IT investment in your organization?

Table 14. IT investment model summary

Therefore, it can assumed that higher IT investment increases a firm's IT capabilities, which may in turn enhance a firm's agility. Ramamurthy (2011) suggests that a lack of IT investment may show that IT organisations are not aligned with the objectives and goals of the overall organisation; as highlighted above, 68% of participants in this study felt that the IT organisation was misaligned with the overall goals and aims of the wider organisation. Ramamurthy (2011) further suggests that, as a result of the lack of IT-business alignment, centralised IT organisations are likely to mismanage their IT investments and direct their spending to activities that neither produce IT value nor result in any increased agility for the overall organisation.

4.7 Chapter Summary

The analysis in this chapter supported the three key hypotheses set out in this study, which focused on centralised IT capabilities having a positive association with market and operational agility, and centralised IT capabilities being negatively associated with decentralisation. The analysis identified positive relationships with both market and operational agility, meaning that IT capabilities improve in line with the market and operational agility of firms. The study also discovered a negative relationship between IT capabilities and decentralised IT organisations; thus, as IT capabilities improve, it is less likely that firms will decentralise their IT organisations. On a final note, the analysis also highlighted that low IT spending or investment could cause the generation of low IT capabilities, thus creating a cyclical effect by which firms encounter low market and operational agility and so miss out on new marketing and growth opportunities.

Chapter 5 Critical Discussion

5.1 Chapter Introduction

In today's competitive business environment, an organisation's enterprise would be unthinkable without the use of IT. Increasing cost pressures and growing customer requirements and expectations drive organisations to continuously enhance their IT organisations and capabilities. However, the question remains: What value does IT bring to an organisation's market and operational abilities, and is this influenced by centralised IT capabilities?

The findings in this chapter build on the existing evidence from Chapter 2, the study identified significant correlations between centralised IT capabilities and impact on firms' marketing capitalisation and operational adjustment capabilities. The findings highlighted that centralised IT capabilities positively impacted a firm's ability to capitalise on market opportunities and the ability of a firm to adjust its operational processes. The study also highlighted that low centralised IT value had a correlated relationship with a firm's decision to decentralise its IT organisation and capabilities. The remainder of this chapter will explore the key IT capabilities that impact the overall performance of IT value generated through centralised IT organisations, while highlighting the business implications and postulating the next steps for organisations to generate an increase in IT value through a centralised IT organisational structure.

The study aimed to answer the question "Do centralised IT capabilities affect an organisation's ability to adjust and capitalise on market opportunities and does centralised IT capabilities drive organisations to decentralise their IT organisation and capabilities?". The question formed three hypotheses that observed an independent variable of IT capability, derived though a second-order construct to reflect four interrelated first-order dimensions. The independent variable (IT capability) captured the covariances between the four dimensions (IT architecture and infrastructure, IT delivery capability, IT business partnership and IT proactivity).

The findings showed that the independent variable (IT capability) had a positive correlation with market capitalisation, operational adjustment and decentralisation of IT, meaning

centralised IT capabilities impact a firm's market and operational posture and sway a firm's decision to decentralise its IT organisation and capabilities. The following sections explore each of the four dimensions that formed the IT capability construct and provide suggestions for alternative thinking for centralised technology organisations to generate an increase in IT value.

5.2 Findings

This study identified that 66% of participants felt that their IT systems and architectures were not responsive to change to meet their business needs; however, only 34% of participants felt that their respective IT systems were an actual inhibitor of business agility. This is a common challenge for many IT organisations, primarily because of legacy information systems that have been developed using antiquated technologies and ERP systems that have been heavily customised and are often no longer supported by the ERP vendor. Leslie (2021) suggests that, during COVID-19, many US states discovered that a large proportion of their systems and infrastructure was old, clunky and inefficient in applying changes at pace in response to the pandemic. Old hardware is slow and lacks modern capabilities: for example, dinosaur machines like the IBM Series/1 at the US Department of Defense have far less computing power than a single modern smartphone (Leslie, 2021). Often, when organisations are required to make rapid changes due to market needs, they realise that modernising their out-of-date systems is a necessity; however, this is more complex than just a simple upgrade, one reason being that legacy systems are built over years with high investment, millions of lines of code and tightly coupled architectures that are difficult to unpick. Moreover, a mentality of 'if it ain't broke, don't fix it' often deters organisations from making the investments in technology, people and process in order needed to disruptively transform their businesses. Leslie (2021) gives further examples of US politicians who are reluctant to push for overhauls of government systems. Given that many upgrades take more than a decade, these stakeholders know that they will probably not receive any future credit or benefit while facing criticism for delays or failure in the present.

While every organisation will have some degree of legacy technology, it has become apparent that for organisations to gain operational and market effectiveness though enhanced productivity within their technology systems, the need to modernise is a must. Enabling

technology to change rapidly, acting as a partner and enabler to capture market opportunities, not only benefits the organisation through the top and bottom line but also increases the perception of IT value. Ibrahim and Leong (2012) suggest that the advancement of IT architecture is a fundamental change that revolutionises the transformation of an organisation's IT system. This viewpoint highlights that inefficient technology can be a major inhibitor in an era where customer demand and expectations are high, remote working has become the norm and many organisations have expanded their sales channels into online and mobile to complement physical stores. Likewise, the unification of video, voice and data technologies to enhance collaboration can create a sense of anxiety among employees over the use and adoption of technology systems, ultimately resulting in low perceived value of IT.

5.2.1 Cloud Computing Adoption

IT organisations can adapt their technology architecture to leverage the concept of cloud computing. However, during our analysis, the study found that 66% of participants felt that their IT architecture was not responsive enough to support business change. The concept of cloud computing allows the IT organisation to provide computing infrastructure to the business on demand and in a faster and more responsive manner than that of traditional data centres. The IT organisation should treat the IT infrastructure like a utility, both in terms of processor capacity and storage capacity, which can be instantly changed through virtualisation based on business demand. An example of this would be during peak sales periods: e-commerce sites can be scaled up and down to ensure that the sites can cope with the demand of user traffic; any downtime or slowness on the sites can lead to loss of revenue or poor customer experience. In addition, as Bhardwaj et al. (2020) highlight, during the pandemic, the need to adopt cloud computing services by education institutions has increased considerably to support the high volume of students using an online and remote mode of working.

Given the above, the IT organisation should initially adopt two different cloud offerings:

1. Software-as-a-Service (SaaS): Rather than procuring and installing software applications on user's machines and having to manage the updates and maintenance of applications such as Microsoft Office (e.g., Outlook, Excel, Word, PowerPoint), ERPs and HR tools, these should instead be made available by the software vendor,

who would then be responsible for version upgrades, maintenance and end-user consumption needs.

2. Infrastructure-as-a-Service (IaaS): As discussed earlier, IT infrastructure (physical devices), network storage devices and computing power can be hosted by a cloud vendor. The IT organisation should leverage this technology to host its critical applications, such as e-commerce sites, ERP systems and other critical architectures. This model will enable the business to scale up and down at will based on the consumption required without the need to buy new expensive hardware with long lead times, often resulting in business frustration.

The advantages of the above two recommendations are targeted towards opportunity cost and time-to-market (Lynn et al., 2020). Human capital can be released from high overheads of IT administrative activities, which can instead be focused on the strategic and growth aspects of the core business. Garrison et al. (2015) support this view by suggesting that IT capabilities should be organised to deliver technical solutions effectively, enabling the firm to efficiently integrate new IT into an existing infrastructure. The more capable the firm is in integrating cloud services across its business units, the quicker it will reduce IT expenses, increase IT capacity and free resources in pursuit of strategic outcomes. Often, it is the unique characteristics of a firm's technical capability that enable it to implement new technology differently and to exploit opportunities synergistically across business units (Garrison et al., 2015). In turn, smaller business units can be provided with entry-level low-cost infrastructure and services in a start-up model. Finally, the cost reduction from cloud technologies can free up greater investment in IT innovation. As Gupta et al. (2013) highlight, the subscription model results in a considerable cost saving for small firms. For example, the entry cost for small firms utilising business analytics, which requires considerable computing power, has been lowered, while a 70% cost reduction has been observed since adopting AWS as the cloud vendor (Gupta et al., 2013).

Lynn et al. (2020) highlight four specific IT business value measures that can be derived from the utilisation of cloud computing:

- Resilience – a risk-based measure that speaks to system reliability and availability.
- Speed of deployment – since deployment lags any decision to deploy IT resources, this measure assesses the ability of IT to respond to changes in the demand for IT.

- Scalability – this describes how easily and quickly incremental IT resources can be added to (or removed from) the portfolio of IT resources available to distributed users.
- Organisational agility – this describes how easily and quickly organisations can respond to changes in their business environment and at what cost.

5.2.2 Service-Orientated Architectures

For many years, IT organisations have been shifting from one system integration to another. However, enterprise systems have moved on considerably from monolithic siloed systems to a set of distributed applications, connected through flexible integration patterns. This change in technology strategy is a necessity for IT organisations to meet changing business challenges at speed and to adapt their underlying systems and business processes. Serrano et al. (2014) support this argument, highlighting that organisations are required to be flexible to adapt to market conditions and harness competitive advantage.

Monolithic architectures often involve sizeable rebuilds in multiple systems (even for minor changes), resulting in tremendous effort in the system integration and regression testing phases, while also introducing the risk of over-customisation and tight coupling (Serrano et al., 2014; Chen et al., 2021). Conversely, the service-orientated architecture (SOA) approach facilitates loose coupling of systems, abstraction of underlying business logic, flexibility and reusability. The core concept of SOA and microservices is the development of self-encompassing units of code that provide specific functionality that is used in multiple applications (Gold et al., 2004; Thönes, 2015). According to Chen et al. (2021), microservices are growing in popularity within the IT industry. Many companies, such as Netflix, Twitter and Amazon, have developed from a centralised monolithic architecture into a decentralised cloud-native set of small services, enabling higher resilience and agility.

To illustrate this point, online retailers often provide the same capabilities and customer experience for both their e-commerce sites and mobile applications. In an SOA and microservice approach, these shared components, such as loyalty engines, customer details and product recommendations, are consumed by any consumer channel that requires this functionality. This approach helps provide abstractions between the underlying systems, such that changing the underlying systems minimises the impact on the consumers. For

organisations, this enables greater flexibility and increases speed-to-market in providing customer capabilities through agility.

In summary, centralised IT organisations can benefit from adopting an SOA approach in several ways (Larrucea et al., 2021):

- Provides modularisation of complex legacy systems by integrating services from a plethora of independent systems, vendors and platforms.
- Promotes efficiencies by enabling applications and systems to be reused, thus reducing cost and engineering time, enabling faster response to change and time-to-market for businesses.
- Introduces a concept of loose coupling, especially for those with legacy systems, and thus limits the underlying work and impact required to change complex legacy systems such as ERP and payroll applications.
- Promotes a standard architecture method and practices within the IT organisation, thus reducing the cost of maintenance, resource skills and complexity within the technology landscape.

5.2.3 IT Delivery Capability

An analysis of IT delivery, which largely spans project management and the delivery of business needs on time, showed that 74% of participants felt that IT organisations failed to meet their promise on delivery of business needs. The perceived poor delivery of projects can be attributed to many factors but often to a lack of project management frameworks and methods being applied in IT organisations.

The findings in this research also showed that approximately 71% of participants felt that the collaboration between business and IT was below average. As a result, centralised IT organisations should not only focus on perfecting project management methodologies but also on the vital importance of soft skills management mechanisms, as well as the recognition of the impact of the users' and stakeholders' involvement, responsibility and accountability.

A further aspect that was highlighted in the research was the ability of centralised IT departments to scale their teams to meet business demand. The study showed that 66% of participants felt that the IT organisation's ability to scale on demand was between below average and poor. Clearly, there is a natural limit to how much supply an IT organisation can

generate to meet demand. However, the challenge that IT organisations face is that most business users are fickle in their understanding of what it takes to quickly onboard 10 new engineers or other resources at leisure. This lack of understanding often results in IT organisations being labelled as slow or inhibiting business agility.

Quaadgras et al. (2014) highlight that as digitisation becomes more pervasive, many organisations are struggling to derive value from the growing number of IT-related opportunities. As organisations are competing for new business opportunities and customer expectations of services and products know no bounds, IT organisations are expected to meet the demands of their businesses and customers at a rapid pace. Lowry and Wilson (2016c) support this argument, arguing that IT resources should support organisational flexibility.

In response, this study identifies a set of specific recommendations that IT organisations can follow to use IT delivery to successfully enhance impact. These are grouped into a framework of five commitments, as outlined below.

5.2.3.1 Commitment 1 – PMO Governance

1. Implement a structured project management framework with a clearly defined set of consistent activities and tools aimed at the delivery of projects.
2. PMO governance should support project managers in achieving more predictable rates of success, which include project delivery time, project budgeting targets and the required functions and quality required by the business.
3. Projects with large time-horizons often take time to produce business value (increased revenue, cost reduction efficiencies, customer satisfaction, etc.); therefore, PMO offices should adopt minimal viable product (MVP) mindsets by breaking down large project deliveries into small release phases to unlock and produce business impact sooner.
4. Interaction and stakeholder management with the project sponsor is a significant contributor to the success of a project; therefore, early and continuous involvement of the project sponsor can be a major factor in the evaluation of a project's success. Greater attention should thus be paid to the project sponsor's role in project deliveries. Project managers should be developed and skilled in the ability to converse with business stakeholders and users in a business-centric manner, rather than being solely

focused on technological jargon and narrative.

5. Implementation of quarterly portfolio alignment meetings between business executives and technology management to plan the technology project roadmaps (1–3 years) and to ensure alignment between the business and technology strategies.

5.2.3.2 Commitment 2 – Agile Practices

Many studies have highlighted that transforming market conditions, new technologies, short time-to-market cycles and many other factors of the social and business worlds influence how projects are managed. Different projects require different procedural models for successful execution (Alexander, 2020; Thesing et al., 2021). Therefore, IT organisations should not only continue with traditional classical waterfall processes but also adopt agile methods that follow an iterative model of delivery. Agile methods such as Kanban or Scrum are both iterative methods of delivery, which do not focus on a detailed level of advanced planning or a linear method of planning the execution (Radhakrishnan et al., 2021). Agile teams instead plan the delivery in small steps; in Scrum, these are referred to as sprints. These small cycles deliver small subsets of customer user stories, continuously taking on feedback from the business owner to refine the end outcome.

One reason for IT organisations to adopt agile methodologies is that, in traditional projects, the upfront detailed requirements are expected before the project delivery can start; in reality, these are often unclear for business users, resulting in many change requests at later stages of the project, or (worse still) a delivered project that is no longer fit for purpose. Conversely, in agile methods, detailed requirements are not essential from the start; rather, the product details are fleshed out during the short sprint cycles, and multiple iterations may approach the desired result. As a result, agile methods enable small MVP products to be released, allowing businesses to test customer adoption, feedback and market penetration prior to any large IT investments.

In summary, agile project management methods provide flexibility in project management, enabling companies to react quickly to changing customer requirements and allowing businesses to capitalise rapidly on market opportunities. IT organisations can leverage this model of delivery to generate high degrees of IT value through agility, flexibility and speed-to-market.

5.2.3.3 Commitment 3 – Strategic Roadmap Planning

Strategic roadmap planning should be used to increase the alignment between IT and the wider business. A key element of such planning is for IT organisations to plan their human resource capabilities accordingly. More specifically, the process of roadmap planning comprises two elements: strategic corporate planning and IT strategy planning. On the one hand, strategic corporate planning is the overall organisation's strategy. It is often a 1–3-year cyclical view that denotes threats, market opportunities and new business lines. On the other hand, IT strategy planning aligns with the overall business strategy by outlining the human resources, processes, technology requirements (hardware and software) and financial investments required to deliver the technological business objectives of the overall organisation.

5.2.3.4 Commitment 4 – Forming Strategic Partnerships

In most organisations, internal IT resource capabilities are finite. By forming partnerships with offshore IT firms, internal IT organisations can leverage these relationships by using the offshore partner to help scale. Often, many of these offshore IT firms, specifically in offshoring hubs such as India, have a plethora of resources and can scale up and down faster than internal IT organisations (Pereira et al., 2018, 2021). A further benefit of this approach is that of fixed IT costs. Buchta et al. (2010) highlight that organisations are seeking IT cost reduction targets of 20–30% year-on-year. The flexible offshoring model not only reduces the organisation's fixed cost but also creates a powerful outsourcing partnership with increased competences, capabilities and the ability to gain IT resources quickly at moderate cost. This model proves beneficial to organisations for whom implementing IT products at speed is critical to their market competitiveness (Cepeda & Arias-Pérez, 2019).

5.2.3.5 Commitment 5 – Benefits Realisation

As discussed in the literature review, certain models can help IT organisations determine their contribution to the overall value of the group. One such model is the benefits realisation model. To help answer the reoccurring question from firm executives regarding the value of

IT, IT organisations can use as a foundation the four-stage competence framework devised by Ashurst et al. (2008). The details of the framework can be reviewed in the literature review chapter (Chapter 2).

As stated in Section 2.3.9, the benefits realisation model provides solid grounds for organisations to establish a framework for recognising the benefits of IT investments. The framework also highlights three key factors:

a) The planning and setting of perceived benefits in the initial stages of the programme are essential metrics in the post-implementation phase.
b) Benefits are realised over a long period, and therefore firms are required to establish competencies that continue to measure the benefits post-programme completion.
c) Finally, IT should not be solely responsible for the benefits realisation but seen as an integral part of the organisational establishment.

An enterprise-wide benefits realisation capability has an important role in firms wanting to generate value from their IT investments. Love (2019) argues that incorporating benefits management strategies into an organisation ensures that the value and strategic relevance of digital technologies are made explicit. In turn, the need for strategic governance is essential so that organisations can ensure that perceived benefits are measurable and obtained (Prat et al., 2015; Love & Matthews, 2019).

5.2.4 IT Business Partnership

This section of the discussion focuses on IT and business partnerships. The analysis of IT alignment with business strategy and objectives highlighted that 68% of the responses felt that their IT organisation was not aligned with the overall business strategy vision and goal. The analysis further highlighted that nearly half of the participants (43%) felt that the collaboration between the business and IT was below average. These findings emphasise the disconnect in synergies between business and IT.

This study defines business and IT partnerships as the ability for strategic IT planning to align with an organisation's strategic goal to enable the overarching organisation to respond to constant change in a competitive market. In prior sections, the study discussed the technology elements that enhance IT organisations' agility; however, technical competencies are just one piece of the overall puzzle. IT alignment requires more than just technical competencies; it requires organisations to utilise the knowledge of human capital from both

IT and business teams to manage competitive environments. Fink and Neumann (2007) reinforce this view by suggesting that IT professionals require technical, behavioural and business knowledge and skills to serve their organisations effectively. The authors also suggest that IT organisational resources must encompass not only technical competencies but also cross-functional interpersonal and management knowledge and skills to collaborate and build effective relationships with their business counterparts.

In line with previous research, the results of our analysis show that IT capabilities affect a firm's market and operational agility, with business and IT partnerships a contributing factor. Therefore, it is imperative for IT organisations to build partnerships with businesses to gain a competitive edge. This study recommends four enablers that can help reinforce this partnership:

1. **Strategic business & IT alignment** – creating a strategic forum that enables joint strategic planning sessions that align IT objectives with the firm's overall goals and strategy. The strategic alignment should be reviewed quarterly to ensure consistent alignment and to measure progress and results.
2. **Shared KPIs** between IT and the business on key strategic initiatives – this mechanism incentivises all parties to ensure the success of organisational objectives. Often, IT organisations take the role of service providers, with no accountability to ensure the success of the business aim; instead, this enabler creates joint accountability through penalisation and reward methods.
3. **Technology business partner** – introducing the role of technology business partner (Tech BP). This role is becoming prevalent in many organisations. The purpose of the Tech BP role is to act as a conduit between IT and the business, while proactively anticipating business needs and assessing the holistic capabilities required to unlock measurable benefits for the business.
4. **Upskilling IT resources** – as discussed previously in this section, IT resource competencies need not only to be technically focused but also to encompass business knowledge and understanding. The upskilling of IT resources should be focused on developing the IT organisation into a more customer- and business-centric culture. The key elements of this upskilling should include:
    - **Agility & flexibility** – the ability of IT resources to incorporate speed and dynamism of decision-making and to adapt to changing business demands.

- **Business knowledge** – the understanding of key business operations, processes, objectives and pain points required for the business to operate effectively.
- **Customer-centricity** – the implementation of IT solutions that transform the customer experience and put customers at the heart of IT services and capabilities.
- **Value mindset –** creating a value-driven mindset that focuses on providing IT services that generate overall value for the business. Initiatives that have zero value should be stopped or re-prioritised.
- **Innovation** – The prevalence of behaviours that support risk-taking, disruptive thinking and the exploration of new ideas.
- **Collaboration** – The creation of cross-functional, inter-departmental teams to optimise the enterprise's skills.

5.2.5 IT Investment

As previously highlighted in this study, organisations are transforming. The threat of increasing competition, expanding markets and rising customer expectations has increased the pressure on organisations not only to lower their IT costs but also to generate more value from their existing IT investments. However, here lies a paradoxical problem in which the rapid change of markets, consumer behaviour and the increasing reliance on IT systems to gain a competitive edge ultimately translate into an increased investment allocation in IT. As Marshall et al. (2005) highlight, IT is critically important in today's business world in terms of organisational efficiency, effectiveness and business competitiveness. Today's businesses could not survive, let alone compete, without appropriately well-designed and well-implemented IT systems (Marshall et al., 2005).

The study by Marshall et al. (2005) echoes the findings of this study, which notes that higher IT investment increases a firm's IT capabilities, potentially enhancing a firm's agility. To recap, the analysis highlighted that the independent variable had a statistically significant (p = .000) impact on a firm's IT capability; with an R-squared of .116, 12% of the variance in the dependent variable (IT capability) could be attributed to the independent variable (IT investment), signalling a small positive relationship. The analysis further highlighted that the independent variable had a negative unstandardised beta coefficient of -.405. Therefore, it can be assumed that a decrease in IT spend can negatively influence a firm's IT capabilities.

Ramamurthy (2011) suggests that a lack of IT investment may indicate that IT organisations are not aligned with the objectives and goals of the overall organisation. As highlighted earlier, 68% of participants in this study felt that the IT organisation was misaligned with the overall goals and aim of the wider organisation. Ramamurthy (2011) goes on to further suggest that, because of the lack of IT-business alignment, centralised IT organisations are likely to mismanage their IT investments and direct their spending to activities that neither produce IT value nor result in any increased agility for the overall organisation.

Marshall et al. (2005) further suggest that good strategy processes and project processes are needed, together with appropriately skilled and knowledgeable human resources for IT investments to be successful in creating business value in terms of improved organisational effectiveness and business competitiveness. This study expands on this view by arguing that processes and skilled resources are not enough; the choice of technology architectures, the CIO, executive support and alignment of business and technology objectives also have a contributing factor in successfully creating business value. Ultimately, IT organisations face the challenge of finding the right balance required to contain rising IT costs while still providing high-quality service and support for business growth. Maintaining this balance is a challenge for both CIOs and IT organisations (Jafari, 2014).

Jafari (2014) highlights that most boards of directors remain unclear about IT spending and strategy. Few understand the full degree of their operational dependence on computer systems or the extent to which IT plays a role in shaping their firms' strategies. This view is supported by Bailey et al. (2016), who illustrates the importance of the CIO role as a major strategist who develops the organisations' objectives and goals by planning and utilising IT resources to transform business process and activities in support of the company's objectives. In turn, IT organisations could use models to evaluate the importance of a strategic investment in line with the direction of the firm, such as the strategic grid developed by McFarlan et al. (1983). The strategic grid comprises four organisational quadrants within a firm: strategic, turnaround, factory and support (McFarlan et al., 1983).

Strategic organisations are those where investment in IT applications and activities is critical for future success and maximising existing operations – an example of strategic organisation could be the marketing, retail or e-commerce functions. **Turnaround organisations** are not totally dependent on current IT to function, but new IT methods are essential for reaching organisational objectives. **Factory organisations** that depend on IT for their day-to-day operations will not gain significant competitive advantage from further

development. **Support organisations** are neither highly dependent on IT nor will they be improved by them in the future (McFarlan et al., 1983).

In relation to IT investment, the four quadrants represent different organisational needs and the associated IT investment, thereby enabling organisations to focus their IT investment in key areas. For example, strategic organisations running e-commerce growth and marketing customer acquisition initiatives may require a high level of IT investment, while turnaround organisations may require small, stepped increases in funding and management support to invest strategically if the desired results of the turnaround materialise. Factory organisations, such as warehouse and accounting functions, are likelier to require consistent and stable management attention, with careful budgeting and emphasis on reliability and efficiency.

In summary, the concept of IT investment is a broad subject that is influenced by many factors, such as economic downturns, pandemics and corporate strategy. However, the study highlights from the findings and review of the literature that declining IT investments create significant challenges for firms aiming to improve the quality of their products and services in competing markets (Demirhan et al., 2005). Conversely, the global pandemic and previous economic recessions have reinforced the need for cost-cutting in IT capabilities (Buchta et al., 2010).

This study argues that given the appropriate strategic alignment between the IT organisation and the wider business, strategical investments can be made where future opportunities are identified. For example, IT costs are often demand-driven; therefore, IT organisations should align with the business to prioritise which initiatives should start, continue or be stopped; the latter often makes for difficult discussions. In turn, cost-cutting can assist organisations to maximise their business value from their IT capabilities in less strategic initiatives and to revise complex IT operating models and processes, which can reduce costs and improve service levels.

5.2.6 To Centralise or Decentralise?

The findings of this study show a negative relationship between IT capability and a firm's decision to decentralise its IT organisation. This can mean that while IT capabilities continue to generate business value, firms are less likely to decentralise their IT organisations. Conversely, the opposite would also be plausible; the study discussed the concepts of centralised and decentralisation in Section 2.6. This section aims to conclude the topic by

highlighting a few key points of consideration for a centralised IT organisation. In competitive markets, organisations often restructure to give themselves the best possibility of attaining success. The theory of decentralisation in relation to IT often comes about when centralised IT capabilities are perceived to lack the agility to support the business to capitalise on opportunities in times of market uncertainty. This poses a genuine threat to centralised IT organisations and should be taken seriously by executives in their assessment of the business value generated. In response, this study adapts the research by Remenyi et al. (2005), in which the authors compare the characteristics of a CIO to those of a chameleon. Here, the study maps these features onto a centralised IT organisation, the four characteristics of which are as follows:

1. **The ability to change –** change is inevitable in modern-day organisations. Indeed, it may be the only constant. IT organisations are required to quickly adapt to and manage change within the organisation and markets through agile structure, processes and technology. They are also expected to act as key change agents, ensuring that the value of technology is realised within the overall organisation.
2. **The ability to see in multiple directions** – IT organisations should not be siloed in their activities and thinking. IT organisations are expected to proactively keep abreast of both internal and external organisational opportunities and threats. Some of the multiple directions that IT organisations should focus on include: IT-business strategy alignment, technology strategy (existing and future), ensuring business continuity and generating business value though IT while reducing the cost of doing business.
3. **The ability to strike fast when required –** one of the key IT capabilities that organisations require is agility, but this is an inherent problem for centralised IT organisations, as discussed throughout this study. It is therefore essential for IT organisations, as discussed in Sections 5.2.1 and 5.2.2, to create agile capabilities in their technology architectures and delivery processes and to foster a business-centric culture and mindset among IT employees. When organisations need to act fast, IT organisations need to respond rapidly to meet organisational needs.
4. **The ability to hang on when the going gets tough –** relationships are often ambivalent, as are market conditions. IT organisations should hence be adapted to adjust their operations seamlessly when the organisation's direction changes, or it faces adversities such as global pandemics or economic downturns. IT organisations should build and leverage business and executive relationships, especially when perception of IT is low.

In summary, there are arguments for both the centralisation and decentralisation of the IT function. However, this study highlights that with the correct level of centralised agile practises in an organisation's technology architecture, its people and processes, a firm's ability to react to market changes can be achieved without the need to decentralise. Whilst the effectiveness of centralised IT often comes into question, the need to change the IT organisation model needs to be driven from the strategic objectives of the organisation's strategic goals, as high decentralisation is beneficial in organisations with strong global brand identity; if the business context is not highly competitive, then the effort to achieve decentralisation may outweigh the gains. In specific context, firms who look for globalisation of their online platforms may decentralise these functions in the countries that they operate due to tax, culture and legal aspects.

Chapter 6 Conclusion

6.1 Chapter Introduction

Prior to this study, the research into the impact of centralised IT functions on an organisation's overall market performance, together with the influencing factors of decentralised IT, required further investigation. This study was conducted to address this gap in the currently available research literature. The main outcome of this study has highlighted that centralised IT capabilities have a relationship with a firm's ability to react to market needs and can prove to be an influencing factor in decentralising IT capabilities. This chapter revisits the key aims and objectives of the study, highlights its main contributions and suggests future research avenues that could be investigated.

6.1.1 Research Questions

The aim of this study was to investigate performance factors of centralised IT capabilities that impact a firm's market and operational agility and to study whether there was a relationship between centralised IT capabilities and a firm's decision to decentralise by devolving IT capabilities to individual business units. The study therefore attempted to answer the following two questions:

Do IT capabilities through a centralised IT structure impact a firm's market and operational agility? The study identified an association between IT capabilities and firms' market and operational agility. This study found a positive association between the independent (IT capabilities) and dependent variables (market capitalisation, operational agility). The study provided several recommendations that could aid centralised organisations in improving their IT capabilities from a technology, people and process perspective. The study accepted both initial hypotheses: *H1* (high centralised IT capability is positively associated with market capitalising agility) and *H2* (high centralised IT capability is positively associated with operational adjustment agility).

Do IT capabilities drive a firm's decision to decentralise its IT organisation? Through the analysis, the study identified a negative linear association between IT capabilities and a

firm's decision to decentralise. Through regression analysis, it was highlighted that as the mean IT capabilities increased, the decentralised mean decreased, thus highlighting that as IT capabilities increased, it was less likely that a firm would decentralise its IT organisation. The study therefore accepted the initial hypothesis *H3* (high centralised IT capability is negatively associated with an organisation's desire for the decentralisation of IT).

6.1.2 Research Objectives

The four research objectives of this study were as follows:

1. **To extend and apply an existing IT capabilities model to understand the perception of a firm's employees regarding the value generated by their centralised IT structure towards a firm's strategic market capitalising and operational adjustment agility –** in this study, the study adapted a capability instrument from Ramamurthy (2011), incorporating a fourth dimension of decentralised IT agility to complement the existing dimensions of IT capabilities, market capitalisation agility and operational adjustment agility. The model was applied in the study through data collection and data analysis techniques, as described in the research method (Chapter 3).
2. **To assess whether centralised IT capabilities impact a firm's level of agility** – the study identified an association between IT capabilities and firms' market and operational agility. This study found a positive association between the independent (IT capabilities) and dependent variables (market capitalisation, operational agility). The study also provides several recommendations that could aid centralised organisations in improving their IT capabilities from a technology, people and process perspective. The study accepted both of the initial hypotheses *H1* (high centralised IT capability is positively associated with market capitalising agility) and *H2* (high centralised IT capability is positively associated with operational adjustment agility). The aim of the study was achieved through a rigorous method and approach comprising survey data collection, quantitative analysis and statistical analysis, while ensuring that all ethics guidelines were adhered to.

3. **To analyse whether IT capabilities in centralised IT structures have an influencing factor in organisational decision-making to adopt a decentralised IT organisational structure** – through the analysis, the study identified a negative linear association between IT capabilities and a firm's decision to decentralise its IT function. Through regression analysis, we highlighted that as the mean IT capabilities increased, the decentralised mean decreased, thus highlighting that as IT capabilities increased, it was less likely that a firm would decentralise its IT organisation. As a result, the study accepts the initial hypothesis *H3* (high centralised IT capability is negatively associated with an organisation's desire for the decentralisation of IT). As with objective two, objective three was achieved through a rigorous method and approach comprising survey data collection, quantitative analysis and statistical analysis, while ensuring that all ethics guidelines were followed.
4. **To make considerations to improve the agility of centralised IT capabilities to improve a firm's market and operational agility** – this study provides several key recommendations for centralised IT organisations to consider. The recommendations were based on prior academic literature and industry knowledge from professional practices. The recommendations cover several detailed areas in IT architecture, IT delivery and IT-business partnership.

6.1.3 Contributions of the Study

By addressing the importance of centralised IT capabilities in providing higher levels of agility to their organisations, this study has made several major contributions to the understanding of centralised IT performance and its subsequent impact on a firm's market and operational agility. In this section, the contributions are represented as twofold: (a) contributions to professional practice and (b) contributions to academic knowledge.

6.1.3.1 Contributions to Professional Practice

This study provides centralised IT organisations with greater insight into the impact of their performance on the overall organisation. The study highlighted four key dimensions (*IT architecture, IT delivery, IT business spanning* and *IT proactivity*) that contribute to overall

IT capability performance. The outcome of the study highlights that IT capabilities have a relationship with a firm's market opportunities, operational agility and desire to decentralise its IT capabilities. With this insight, IT organisations can evaluate and transform their operating models to align with the overall organisation's goals and strategy, thereby enhancing its competitive advantages while increasing the perception of IT value throughout their organisations.

The contributions that this study provides to centralised IT organisations and wider firms are as follows:

1. Awareness and recognition that organisations require rapid agility from their IT organisations to capitalise on market opportunities. Organisations are more inclined to make strategic organisational change to achieve this through the decentralisation of IT capabilities.
2. The four IT capability dimensions provide IT organisations with a set of key focus areas to address to increase overall IT performance.
3. The study provides IT organisations with a set of key recommendations:
    a. Leverage greater use of API, microservice and cloud technologies to achieve higher degrees of agility and time-to-market.
    b. Promote a standard architecture method and practice within the IT organisation, thus reducing maintenance costs, resource skills and complexity within the technology landscape.
    c. Implement a structured project management framework with a clearly defined set of consistent activities and tools aimed at the delivery of projects.
    d. Adopt a higher use of Agile and MVP methods when delivering projects.
    e. Implement strategic roadmap planning**,** increasing the alignment between IT and the business.
    f. Form partnerships with offshore IT firms, so that internal IT organisations can leverage these relationships to help achieve scale.
    g. Implement a framework of benefits realisation, which aids the ability of firms to measure the value of IT investments.
    h. Create a strategic forum that enables joint strategic planning sessions to align IT objectives with the firm's overall goals and strategy.

i. Share KPIs between IT and the business on key strategic initiatives, thus incentivising all parties to ensure the success of organisational objectives.
j. Introduce the role of technology business partner (Tech BP) to act as a conduit between IT and the business while proactively anticipating business needs and assessing the holistic capabilities required to unlock measurable business benefits.
k. Upskill IT resources to be not only technically focused but also to encompass business knowledge and understanding. The upskilling of IT resources should be focused on developing the IT organisation into a more customer- and business-centric culture.

The study also highlights to organisations that IT investment has a relationship with IT capabilities. Thus, the lower the IT investment, the lower the IT value generated.

6.1.3.2 Contributions to Academic Knowledge

Prior research has debated the impact of IT capabilities on a firm's performance (Hitt & Brynjolfsson, 1996). This study reinforces the view that a direct relationship exists between the two (Abdurrahman, 2020; Khalil & Belitski, 2020; Tsilionis & Wautelet, 2022). The study also revealed other areas that could support future academic studies. First, the strategic alignment of IT and business is a key area for consideration. Mekawy et al. (2014) argue that poor organisational performance can partially be attributed to a lack of business-IT alignment; thus, in an increasingly competitive, IT-driven and diverse global business environment, companies can only gain strategic advantages and derive values from IT investments when efforts are made by management to ensure that business objectives are continuously shaped and supported by IT (El Mekawy & AlSabbagh, 2014). Qualitative studies could be considered to understand the reasoning for a lack of IT-business alignment, and proposals for recommended frameworks could be derived for enhanced collaboration between the various business functions and IT. Second, the subject of executive perception on IT performance remains a common theme in industry. Further research is needed not only to understand the reasoning behind this perception and bias, but also to devise value-based scoring and linking frameworks to measure and attribute the value generated from IT, both tangibly and intangibly.

6.1.4 Summary of Key Points

This study has identified that centralised IT organisations can no longer act as a silo function within the overall organisation, with the threat of centralising IT functions being decentralised a stark reality. Firms intrinsically depend on technology and the expectations and needs that technology plays in a firm's growth are continuously increasing. Market competitiveness and an increase in customer demand and expectations have only fuelled the increase in expectations. As a result, executive and business leaders expect IT organisations to adapt to the agility of markets and to provide measurable value generated through IT. This study has highlighted that IT capabilities have a relationship with a firm's ability to react to market needs and can prove to be an influencing factor in decentralising IT capabilities.
The need to address low IT capabilities does not sit solely with IT organisations; it spans both IT and the overall organisation, who must work collectively to form an operating model that generates greater value from IT investments. This, however, does not abdicate IT organisations from making changes within their own organisations to improve the level of service they provide while integrating the function within the rest of the organisation.
The challenges that IT functions face are the constant changes in technology innovations, skills and ways of working depending on market needs and the business environment. For success, it is essential to create the ability to rapidly change and to accept contradictions and paradoxes while reacting quickly. The capabilities of the IT organisation are central to the overall organisation's success; IT used effectively can substantially transform the business. Ultimately, the value of IT cannot escape subjective measurements, as the value generated from IT can be both tangible and intangible, which can often blur the true output of IT and business performance. Recognising this, further research could be devised to build value-based scoring and linking frameworks to measure and attribute the value generated from IT performance, both tangibly and intangibly.

6.1.5 Limitations of the Study

The study has highlighted the relationship between IT capabilities, organisational performance and design, while providing a set of recommendations to improve centralised IT performance. As with most research studies, however, it faces certain limitations due to the time and complexities of the study. This study focused on the quantitative aspects of IT

performance. The challenge with quantitative methods is that they often represent the complexities of social realities. To enhance the study, a mixed-method approach could be adopted. This could involve a more detailed exploration of several responses in which a poor performance of IT value is identified. A qualitative method would use a structured interview technique aimed at establishing the rationale and views of the participants on organisational design where IT value was deemed to be low. Both methods could then be triangulated to seek convergence and to determine a theoretical position.

6.1.6 Areas for Future Research

Several areas of future research emerge from this study. The importance of measuring and comparing centralised and decentralised IT capabilities to a firm's performance could be beneficial. This could inform which model provides firms with a greater ability to generate the maximum value from IT. A longitudinal study that baselines the performance of both models over a period and then assesses their overall impact – or a set of case studies and lessons learned from organisations that have implemented both models – could provide a valuable set of comparisons. These case studies would provide a more informed view of organisations' experiences, particularly regarding the governance of decentralisation, the risk of security threats, scaling on demand, collaboration between various functional teams and the growth and development of technical employees. The study could also prompt further avenues of research by, for example, exploring the effectiveness of offshore IT and engineering capabilities in terms of a firm's productivity and by evaluating the impact of IT capabilities from a human perspective, using dimensions such as cultural mindset, nationality, gender diversity, age and exploring how these dimensions may impact the value generated from IT capabilities. Further study could be conducted by evaluating the effectiveness of start-up agility and evaluating the impact of these practises when implemented in corporate technology functions. Finally, latest technologies such as the blockchain, Web3.0, metaverse, NFTs and the role of corporate innovation in organisations should be considered on how they will impact organisational IT capabilities in the future.

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Appendix A – Survey Questionnaire

1	*Participant's Name*	*N/A*	*Free Text*	*Optional*
2	*Participant's email*	*N/A*	*Free Text*	*Optional*
3	*What is the primary industry or line of your business?*	*Retail* *Banking* *Technology* *Healthcare* *Oil & Gas* *Services* *Other*	*Dropdown*	
4	*What is your organisation size?*	*1–49* *50–999* *1,000–4,999* *5,000 or more*	*Dropdown*	
5	*What is the size of your IT department?*	*1–19* *20–49* *50–99* *100–249* *250–499* *500–999* *1,000 or more*	*Dropdown*	

6	*What is the annual IT investment in your organisation?*	*< $500k* *$500k–$1m* *$1m–$5m* *$5m–$20m* *$20m–$50m* *$50m or more*	*Dropdown*
7	*What structure is your current IT department within your organisation?*	*Centralised* *Decentralised*	*Dropdown*
8	*I feel the technology systems in IT have been built for responsive change to my business needs.*	*Strongly Agree* *Agree* *Undecided* *Disagree* *Strongly Disagree*	*Matrix of Choice*
9	*I feel the technology systems in IT are an inhibitor to agility.*	*Strongly Agree* *Agree* *Undecided* *Disagree* *Strongly Disagree*	*Matrix of Choice*
10	*I feel the IT department resolved my technology issue quickly.*	*Strongly Agree* *Agree* *Undecided* *Disagree* *Strongly Disagree*	*Matrix of Choice*
11	*Technical teams are detached from the business needs of technology requirements.*	*Strongly Agree* *Agree* *Undecided* *Disagree* *Strongly Disagree*	*Matrix of Choice*

12	*Are planned goals achieved in due time by the IT department?*	*Never* *Rarely* *Occasionally* *Always*	*Matrix of Choice*
13	*How would you rate the delivery pace of the IT department?*	*Excellent* *Above Average* *Average* *Below Average* *Very Poor*	*Matrix of Choice*
14	*How would you rate the understanding of your business requirements in the IT department?*	*Excellent* *Above Average* *Average* *Below Average* *Very Poor*	*Matrix of Choice*
15	*How would rate the alignment of the IT department to the overall business strategy, vision and goal?*	*Fully Aligned* *Partially Aligned* *Partially Misaligned* *Complete Misalignment*	*Matrix of Choice*
16	*How would you rate the IT department's ability to shift people on demand?*	*Excellent* *Above Average* *Average* *Below Average* *Poor* *Very Poor*	*Matrix of Choice*
17	*How would you rate the IT department's ability to scale on demand to meet business needs?*	*Excellent* *Above Average* *Average* *Below Average* *Poor*	*Matrix of Choice*

		Very Poor	
18	*How would you rate the collaboration between the business and the IT department?*	*Excellent* *Above Average* *Average* *Below Average* *Poor* *Very Poor*	*Matrix of Choice*
19	*How would you rate the IT department's effectiveness in proactively searching for ways to explore or exploit IT resources to address and create business opportunities?*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective* *Not at all Effective*	*Matrix of Choice*
20	*How would you rate the IT department's effectiveness in proactively solving business pain-points caused by technology/processes/people?*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective* *Not at all Effective*	*Matrix of Choice*
21	*How would you rate the IT department's ability to rapidly respond to market changes to improve products or services for the end consumer?*	*Very Slow* *Slow* *Moderate* *Fast* *Very Fast*	*Matrix of Choice*
22	*How would you rate the IT delivery to rapidly respond to market changes?*	*Very Slow* *Slow* *Moderate* *Fast* *Very Fast*	*Matrix of Choice*

23	*How would you rate the IT architecture to rapidly respond to market changes?*	*Very Slow* *Slow* *Moderate* *Fast* *Very Fast*	*Matrix of Choice*
24	*How would you rate the IT processes to rapidly respond to market changes?*	*Very Slow* *Slow* *Moderate* *Fast* *Very Fast*	*Matrix of Choice*
25	*How would you rate the IT organisational structure to rapidly respond to market changes?*	*Very Rigid* *Rigid* *Flexible* *Very Flexible*	*Matrix of Choice*
26	*How would you rate the IT processes to rapidly respond to operational adjustment changes?*	*Very Slow* *Slow* *Moderate* *Fast* *Very Fast*	*Matrix of Choice*
27	*How would you rate the IT department's effectiveness in their ability to rapidly respond to operational adjustment changes?*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective* *Not at all Effective*	*Matrix of Choice*
28	*How would you rate the IT organisational structure to rapidly respond operational adjustment changes?*	*Very Rigid* *Rigid* *Flexible* *Very Flexible*	*Matrix of Choice*
29	*How would you feel a decentralised IT department would meet your business*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective*	*Matrix of Choice*

	needs versus a centralised department?	*Not at all Effective*	
30	*How would you feel a decentralised IT department would attain market capitalisation agility versus a centralised department?*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective* *Not at all Effective*	*Matrix of Choice*
31	*How would you feel a decentralised IT department would attain operational adjustment agility versus a centralised department?*	*Extremely Effective* *Very Effective* *Moderately Effective* *Slightly Effective* *Not at all Effective*	*Matrix of Choice*

Appendix B – Published Research

Centralised IT Structure and Cyber Risk Management

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Abstract. Against the backdrop of organisational needs to derive value from IT organisations through agility, efficiencies and cost effectiveness, many organisations have adopted a decentralised IT organisational structure, granting individual business units the autonomy to implement, operate and govern technology. The increased risk posed to organisations through cyber-attacks raises the question of how IT security could effectively provide the level of organisational governance to counter cyber threats in a decentralised organisational model. In exploring the challenges in the decentralisation of IT security, we highlight that the accountability of such activities would become diluted, with each business unit managing security using their own methods and practices (or lack thereof), while being unable to take full accountability due to the complex independencies of modern system architectures, often resulting in a lack of ownership, accountability and reporting around security at an organisational group level. This ultimately increases the overall security risk to the organisation. We further highlight that while centralisation of IT security at a group level would be more effective, a hybrid model of IT security at two levels, with strategy and policy at the central governance level and a degree of autonomy and decision at the IT operational level, could also be considered.

Keywords: IT, Information Security, Cybersecurity, Centralisation, Decentralisation, IT Organisation, IT Value

Appendix C – Ethics Participant Information

Study title: An exploratory research study into the link between centralised IT performance and organisational structure

Why have I been invited?

You are being invited to take part in this research study to explore whether a lack of agility in centralised IT organisations is a deciding factor in executive management decisions to decentralise their IT in order to meet their business needs in today's competitive markets.

Before you decide whether you wish to participate, it is important for you to understand why the study is being conducted and what it will involve. Please take some time to read the information provided and discuss it with others if you wish. Please ask if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

The study will specifically attempt to answer the following questions:

1. *Does low IT agility performance through a centralised IT structure impact a firm's market and operational agility?*
2. *Does low IT agility performance drive a firm to decentralise its IT organisation?*

In this study, ***agility*** *is defined as an organisation's ability to react to market changes by enhancing its IT capabilities to support its strategic goals so that business value can be realised and competitive advantages can be sustained.*

Market capitalising agility *is defined as processing an extensive and variable amount of information to identify and anticipate external changes while also continuously monitoring and quickly improving product/service offerings to address customer needs.*

Operational adjustment agility *is a firm's ability through its internal business processes to physically cope with and rapidly respond to market or demand changes.*

Why have I been chosen?

You have been asked to take part in the study because you work in an organisation where you either interact with or work in an IT department and where IT impacts (positively or negatively) your day-to-day working activities.

Do I have to take part?

Taking part is entirely voluntary. If you decide to take part and then change your mind, you are free to withdraw from the study or withdraw any data you have given within 30 days of participating.

What will my participation involve?

Once you have agreed to take part in the study, you will be sent an online survey that you will be expected to complete. The survey will take no longer than 10–15 mins to complete. The survey consists of 31 questions, with a mix of optional and required inputs.

What are the possible benefits of taking part?

The primary information obtained from this study will help organisations and IT departments understand whether low centralised IT agility influences businesses to decentralise their IT. Based on the results, a key set of recommendations will benefit IT organisations seeking to adapt and improve their agility to drive business value. Some of the areas of recommendation may be focused around, but not limited to:

- *Agility in IT delivery*
- *Agility in IT architecture*

- *Agility in IT infrastructure*
- *The embracing of startup ecosystems and innovation*
- *Business partnership*
- *Culture and mindset*
- *Measuring IT value through market growth and operational adaptability.*

What if something goes wrong?

If you have any concerns about any aspect of the way you have been approached or treated during this study, then please contact Amin.Hosseinian-Far@northampton.ac.uk

Will my information be kept confidential?

All the information collected will be stored securely on a password-protected computer. The data will be routinely backed up to prevent any data loss, and all data files will be password-protected. The data will not be shared with anyone outside of the university. Once the research is completed, all data will be archived according to the University of Northampton's Data Management policies.

What will happen to the results of the study?

The results will be used to answer the research questions of this study as highlighted above. If you would like to receive a summary of the findings, then please contact the lead researcher.

Who has reviewed the study?

This study has been reviewed and approved by the Northampton University Research Committee.

Contact for further information

If you have any questions about this study or your possible involvement, then please contact me using the contact details below.

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