IMPROVING ACCOUNTING INFORMATION SYSTEM PERFORMANCE AND ACHIEVING COMPETITIVE ADVANTAGE THROUGH EFFECTIVE IT GOVERNANCE

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Certificate of Original Authorship

This thesis is the result of a research candidature conducted at the University of Technology Sydney as part of a Doctoral degree. I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Peter Chapman

4 October 2016

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Preface

This thesis is the culmination of a journey longer than my enrolment in the PhD program at UTS. IT governance and organisational IT have been a longstanding focus of my professional life as a forensic IT consultant and analyst. Over a period of 15 years I have observed and investigated hundreds of situations where organisations have suffered severe consequences from poor IT decision making. From organisations that have gone insolvent partly due to a lack of accurate and valid accounting information, to organisations that suffer substantial damage due to poor system implementations, security failures or other IT issues, often the underlying cause of the problem could be traced back to a lack of effective IT governance.

When offered the opportunity to study a PhD at UTS, I immediately knew that my topic would have to involve the role of IT governance and the impact that it can have on organisational performance. While my practical experience had given me substantial insight into what could occur in the absence of effective IT governance, I was curious as to whether organisations with effective IT governance were able to not only avoid the disasters I had witnessed, but also obtain significant benefits from this capability. This curiosity was the initial and ongoing driver for the research presented in this thesis.

Table of Contents

List of Tables

List of Figures

Abstract

Accounting information systems (AIS) are a vital technology-based asset for all organisations. The accounting information that is generated and distributed by these systems is essential for effective strategic decision making and achieving ongoing organisational benefits. The quality of the accounting information used for these decisions is reliant on the performance capabilities of the AIS. Prior research has identified a number of direct organisational benefits that can be obtained through effective IT governance, including improvements in the performance of organisational information systems such as AIS. This thesis expands upon prior literature by utilising the resource based view of the firm (RBV) to examine how competitive advantage is achieved via complex interactions between IT governance, AIS and other technology related capabilities and resources.

The three types of IT governance mechanism - structural, procedural and relational - are assessed from a theoretical perspective in regards to their suitability to act as RBV resources or capabilities. While only relational mechanisms are found to possess the characteristics required of an RBV resource or capability, a review of recent RBV-framed IT governance research finds that many studies give little consideration to relational mechanisms and rely predominately upon the presence of structural and procedural mechanisms to assess IT governance performance.

To confirm the significance of relational mechanisms of IT governance, this thesis tests the capacity for relational mechanisms of IT governance to contribute to competitive advantage through improving the performance of IT management capabilities and organisational AIS. Observations were collected via a survey of senior finance executives in Australian organisations and analysed using partial least squares structural equation modelling (PLS SEM). The results indicate that, under the direction and control of effective

IT governance, IT management capabilities are able to improve accounting information system (AIS) performance and thereby achieve competitive advantage.

Moderation analysis reveals that the level of competitive and technological pressure (environmental dynamism) alters the relationship between IT governance and competitive advantage. This finding suggests that IT governance not only acts as a higher order capability by directing and controlling the use of other organisational resources and capabilities, but may also be capable of acting dynamically to achieve competitive advantage through exploiting opportunities created by competitive and environmental pressures.

Chapter 1 Introduction

1.1 Research Background

The integration of information technology (IT) and business processes has irrevocably changed the way in which modern organisations operate. The majority of medium-to-large organisations invest significant amounts of time, money and effort on information systems (IS); which combine hardware, software and networking capacity to enhance the efficiency and effectiveness of their business processes (Dehning et al. 2005). In some circumstances the IS/IT that supports a business process becomes so integral that it can be very difficult to differentiate between them. The way in which organisational accounting processes have become embedded and reliant upon accounting information systems (AIS) is an apt example of this phenomenon. Only a technology enabled system is capable of managing the vast flows of transactional data, complex analytical processing and distribution of accounting information with the accuracy, reliability and speed that modern organisations require (Granlund 2011), and as a result essentially all organisations invest in this form of IS/IT.

Accounting information reports generated by an organisation's AIS are vital for effective strategic decision making (Prasad and Green 2015). The performance characteristics of the AIS will influence the quality of these accounting information reports, and therefore the performance of the AIS is of significant importance to the organisation. Should an organisation be able to continuously leverage high quality accounting information reports to make strategically optimal decisions they could potentially be able to establish and maintain an advantage over their competitors (Porter and Millar 1985).

Accurately and reliably improving the performance of organisational information systems, such as AIS, is a complex task. Establishing, maintaining and enhancing AIS performance

requires substantial investment into IS/IT assets and capabilities. The organisational benefits provided by IS/IT investments is often obfuscated, and generating clear value from IS/IT investments in general has become increasingly difficult for organisations to consistently achieve due to the increasing technical, environmental and organisational complexity present in the modern business environment. This increased complexity also brings new opportunities alongside these challenges (Pavlou and El Sawy 2011).

Given the high cost and potential organisational impact of IS/IT investments, they should not be considered from a purely technical viewpoint. To ensure that IS/IT efforts are aligned with the needs of the organisation, senior management and executive level involvement is required (Ross and Weill 2002). This involvement cannot simply be a perfunctory "arms-length" one, senior management must set the direction for organisational IS/IT strategy, monitor critical IS/IT management performance and ensure appropriate controls are in place to prevent loss. To this end, organisations are generally encouraged to implement effective governance over IS/IT investments and operations through the direct involvement of executives and senior managers.

A key objective of both IT governance and IT management is to obtain value from IT investments; however it is important to note that the role and responsibilities of these two functions are quite distinct from each other (Sohal and Fitzpatrick 2002). The international standard, ISO/IEC: 38500, clarifies this distinction identifying that IT governance is the system by which the current and future use of IT within the organisation is directed and controlled. IT governance evaluates and guides the actions of the IT management function, setting objectives to ensure that IT investments and activities are in alignment with the strategic goals of the organisation. Conversely, the management of IT relates to the operational deployment of technical specialists and IT related resources to achieve the objectives set by the governance process (Australia 2010). The COBIT framework (ISACA

2012) provides a similar distinction identifying that the IT governance function of an organisation should be committed to guiding the use of IS/IT with the overall goal of creating value; whereas the IT management function actually undertakes IS/IT activities, and is responsible for the execution of actions in accordance with the direction provided by the IT governance function. Accordingly this research views IT governance as an organisational capability distinct from other IT management capabilities.

Academic investigation into the concept of IT governance has increased over the last ten to fifteen years. There has been increased attention on corporate governance issues following the implementation of the Sarbanes Oxley in the United States alongside similar international legislation, as well as the introduction of various standards, guidance and formal recommendations regarding corporate governance world-wide (ASX Corporate Governance ASX 2014). Researchers have also developed IT governance concepts when examining the value of organisational IT investments (Dehning and Richardson 2002).

Early IT governance research focused on decision authority and organisational structure (Sambamurthy and Zmud 1999, Weill and Ross 2005a), while more recent IT governance research has focused on the nature and performance of specific structural, procedural and relational IT governance mechanisms (De Haes and Van Grembergen 2009, Ping-Ju Wu et al. 2015). Despite the change in the way IT governance is conceptualised, a primary goal of IT governance research has been answering questions relating to how IT governance may improve organisational performance. For-profit organisations will seek to outperform their competitors in order to maximise profits and consistently generate stakeholder value, so it is important to understand whether effective IT governance capabilities can assist organisations to achieve competitive advantages.

Academic views on whether IS/IT investments are capable of providing competitive advantage are divided. Some observers insist that technology is too easily copied and

quickly surpassed to provide significant advantage (Carr 2003). Others believe that even if such advantage could be obtained it would be difficult to observe due to other organisational factors (Santhanam and Hartono 2003). The majority view appears to be that IT capabilities can contribute to competitive advantage, although the root cause of this advantage is believed to reside in the management and specific use of the technology rather than the technology itself (Bharadwaj 2000, Mata et al. 1995). It is important to note that IT governance, while a separate concept to IT management, possesses the same theoretical aspects that drive the potential for competitive advantage potential as IT management capabilities (Ping-Ju Wu et al. 2015).

Because IT governance provides direction to and control over IS/IT resources, the competitive advantage that may be received through effective IT governance will need to manifest through the performance of these other organisational resources. This research will focus on the performance of organisational accounting information systems (AIS) and whether this type of information system is capable of providing a competitive advantage. Essentially all organisations operate an AIS and will rely upon the accounting information generated from this system for a variety of purposes, including strategic decision making. Despite the ubiquitous nature of AIS, the technology components and elements that are used in each organisation are likely to vary due to different choices in hardware and applications as well as customisations to those elements. It may be the case that organisational AIS is simply too common a resource to providing potential competitive advantage; however if this information system is capable of provide such an advantage, the direction and control provided by IT governance may be a determining factor.

The above observations outline the broad context of this thesis, which will explore how IT governance interacts with IT management and AIS, and whether these interactions provide an opportunity for achieving competitive advantage in the Australian business

environment. Additionally, the influence of external competitive and technological pressures on these interactions will be explored to determine if various combinations of IT governance and IT management capabilities are more effective in differing environmental conditions. Figure 1 provides a high level research model of these issues.

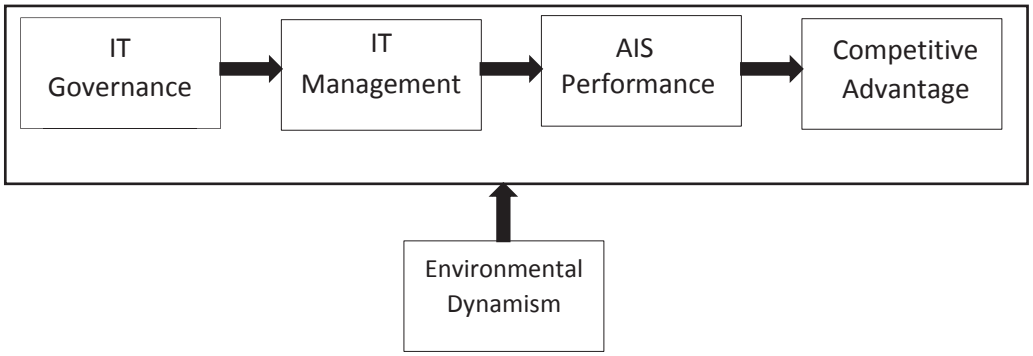


Figure 1: Conceptual Research Model

This thesis will utilise the resource-based view of the firm (RBV) as a framework in which to explore the interactions between IT governance, IT management, AIS and competitive advantage. RBV theory is widely used to frame research in which the relationships between organisational capabilities and resources can be examined in the context of how they provide potential for competitive advantage (Barney 1991) and is generally considered an appropriate and useful theoretical viewpoint to consider issues regarding information systems and organisational performance (Melville et al. 2004, Wade and Hulland 2004). This thesis will also consider prior theory developed specifically relating to IT governance. IT governance theory development is in a more nascent state compared with theory relating to RBV. Potentially due to the relative immaturity of IT governance research, it would appear that there may be theoretical disparities in regards to how previous researchers have incorporated IT governance mechanisms within an RBV research framework, and an analysis of these disparities is provided in Chapter 2.

1.2 Research Questions

Prior research has consistently found that effective IT governance is associated with improved organisational performance. This has been confirmed through broad survey research (Weill and Ross 2005a), practitioner expert panels (De Haes and Van Grembergen 2009), and individual case study analysis (Bowen et al. 2007). Much of the existing empirical IT governance research considers the direct relationship between IT governance and organisational performance, providing observation and theories as to how IT governance interacts with other organisational capabilities and resources in order to drive these benefits (Prasad et al. 2010). Accordingly there is an opportunity to explore the connections between IT governance and other organisational capabilities to provide a more complete understanding of the direct effects of IT governance and how these effects flow on to improve organisational performance and potentially achieve competitive advantage. In particular, this research is focused on the connection between effective IT governance and AIS performance as a potential source of competitive advantage. This opportunity to expand the existing body of IT governance knowledge provides the context for the first research question:

RQ 1: Can effective IT governance provide organisations with competitive advantage by improving AIS performance?

While organisations achieve competitive advantage through the use of their internal resources and capabilities (Barney 2001), they still need to contend with external competitive and technological pressures (Grant 1996). The extent of these external pressures, referred to as environmental dynamism, has been found to impact the use and effects of organisational resources and capabilities (Eisenhardt and Martin 2000, Grant 1996, Teece et al. 1997). Prior research has found that the optimal mechanisms and designs for IT governance are contingent upon industry (Porter 1985, Porter and Millar

1985) and organisational factors (Ali and Green 2007, Sambamurthy and Zmud 1999). It may also be the case that the interaction between IT governance mechanisms and other IS/IT resources, and the ability for IT governance to contribute to competitive advantage, is affected by environmental dynamism. This observation provides the context for the second research question addressed in this thesis:

RQ2: How does environmental dynamism change the relationship between IT governance, AIS performance and competitive advantage?

1.3 Motivation and Contribution

This thesis is primarily motivated by the desire to expand existing academic knowledge and findings regarding the role and contribution of IT governance to organisational performance. A substantial amount of prior IT governance research focuses predominately on either identifying methods to improve IT governance effectiveness (Bowen et al. 2007, De Haes and Van Grembergen 2009), or identifying the direct impact of IT governance on "end-point" organisational performance measures such as share price and profit (Banker et al. 2011, Khallaf and Skantz 2011, Preston et al. 2008, Sobol and Klein 2009). The latter of these styles of IT governance research tends to treat the management and resources that are directed and controlled by the IT governance function as a "black box", simply assuming that good IT governance will lead to good internal organisational performance in all circumstances. This research seeks to examine the inner workings of this black box by exploring the interactions between IT governance and other organisational capabilities and resources, and linking this to organisational performance.

This particular problem was identified in Wilkin and Chenhall's (2010) review of existing IT governance research with reference to AIS. These authors found that there was a lack of

holistic IT governance research, and specifically that much of the existing research in this field fails to consider the potential linkages between the Control Objectives for Information Technology (COBIT) 4.1 framework focus areas. While the COBIT model has since changed, the same IT governance and management focus areas of strategic alignment, risk management, resource management, value delivery and performance measurement are embedded in COBIT version 5 (ISACA 2012). While it would be ideal to structure a research project which addressed all five COBIT focus areas, the scale of such a project would be difficult to encompass in a single research thesis. Therefore the present research will seek to examine the linkages between strategic alignment, resource management and value delivery, addressing a number of the linkages identified by Wilkin and Chenhall (2010).

The second motivating aspect of this research is the high level of practitioner interest in the area of IT governance. This is demonstrated by the recent publications of the COBIT 5 framework (ISACA 2012) and the International Standard for Corporate Governance of IT – ISO/IEC 38500 (Standards Australia 2010) and the growing level of practitioner debate around the requirements of effective IT governance. Such interest is further demonstrated by the results of a survey conducted by the Information Technology Governance Institute (ITGI) which found that ninety-five percent of practitioner respondents considered IT governance to be an important focus for their enterprise (ITGI 2011).

There has been substantial prior consideration of the role of IT management, and technology in general, by RBV researchers and theorists (Bharadwaj 2000, Kearns and Lederer 2000, Mata et al. 1995, Wade and Hulland 2004). However there has been less consideration of the concept of IT governance utilising RBV theory. The concepts of IT management and IT governance are related in many ways, however by definition they are distinct concepts. Accordingly the capacity for an organisation to hold IT governance and IT management capabilities should be considered separately under RBV theory. This thesis

proposes to contribute to existing IT governance theory and RBV theory by clarifying and expanding upon how IT governance can be examined under an RBV framework.

A key finding of the literature review presented in Chapter 2 is that a significant proportion of the existing IT governance literature utilising RBV as a theoretical framework provides limited consideration of the core precepts of RBV theory when framing the concept of IT governance. By clarifying how these core RBV concepts relate to IT governance mechanism, this research seeks to contribute to future IT governance research seeking to apply an RBV framework. These future research efforts will hopefully benefit from ensuring that the mechanisms and measurements used to assess IT governance sufficiently meet RBV resource criteria (Barney 1991, Barney 2001, Wernerfelt 1984).

A further area of contribution relates to substantiating and testing the relationships between specific IT governance mechanisms, IT management capabilities and IS/IT resources. Despite the close practical association of these concepts, there has been very little research done into the direct relationship between IT governance activities and IT management activities, possibly because researchers fail to differentiate the two concepts.

Competitive and technological pressures, also referred to as environmental dynamism, affect the strategic opportunities and threats facing the organisation. Likewise, differing external conditions may also influence which types of IS hold the potential for competitive advantage as well the level of advantage that can be achieved. RBV researchers have theorised that organisations can possess specific higher order capabilities, termed dynamic capabilities, that adapt and extend their other resources and capabilities in the presence of changeable external pressures (Eisenhardt and Martin 2000, Grant 1996, Teece et al. 1997). This thesis will also seek to contribute to the RBV literature by considering whether IT governance has the potential to act as a higher order capability (Bharadwaj 2000, Winter 2003) by adjusting IT management capabilities in the face of changing external pressures.

The findings of this thesis will also be relevant to the ongoing development of practitioner frameworks relating to IT governance, including COBIT (ISACA 2012) and the Information Technology Infrastructure Library (ITSMF 2007). These frameworks are under continual revision and development in order to reflect new academic and practitioner contributions regarding IT governance. The findings of this research should be informative for these purposes through examination of the interactions between specific IT governance and IT management capabilities relevant to these frameworks. In addition, knowledge of how technological and competitive pressures impact the performance of IT governance mechanisms and other IS/IT resources and capabilities will also be relevant to practitioners.

1.4 Research Method

The above research questions will be addressed via empirical quantitative analysis. As there are no existing data sets relevant for addressing the research questions, part of the research method applied in this thesis involves surveying business executives employed in medium and large Australian organisations. A structural equation modelling approach using Partial Least Squares (PLS) regression will be employed to examine the survey data. This approach provides several useful benefits including: the ability to focus the data collection on content that is specifically relevant to the research questions; a relatively cost effective and efficient data collection process; the potential to collect data from a large number of organisations; and enhance the generalizability of the findings.

The specific research questions addressed in this thesis have necessarily narrowed the focus of this research. While IT governance could potentially contribute to competitive advantage in a number of ways, the focus on the relationship between effective IT governance and AIS performance in this research precludes the exploration of these other

potential avenues. Accordingly, these potential additional effects are considered exogenous factors to the research.

The choice of research methodology has also resulted in the imposition of several additional delimitations. Firstly, attempting to draw RBV related conclusions from organisational data taken at single point in time has been found to hold number of weaknesses (Santhanam and Hartono 2003). Secondly, the level of detail obtained from a survey collection process is substantially limited when compared with more comprehensive methods such as interviews and case studies. The concepts under study, IT governance, IT management, AIS performance and competitive advantage, are complex organisational phenomena. While the survey based data capture approach provides the capacity to capture a broad set of organisational data on the research topic, the potential depth of the data set may not be as great as could be obtained via an in-depth case study approach, and the reliance upon a single respondent per organisation will increase the potential for measurement error due to the lack of corroborative data. While substantial effort has been taken to ensure that the data captured accurately and appropriately represents these concepts; it is accepted that it not possible to fully capture the complexity of these concepts in a survey data collection process. As a result this thesis is restricted to exploring issues addressed by the specific questions presented in the survey, limiting the potential to explore issues that arise post hoc.

Capturing organisational level data from a single respondent process also embeds an unavoidable, and largely immeasurable, amount of common method bias into the research process (Podsakoff et al. 2003). While a number of procedural steps can be taken to minimise this issue, it is not possible to completely remove the potential for common method bias in research based on single survey data collection. The final delimitation of this thesis is that each of the concepts under study will have a substantial number of

contributing factors which are not measured and assessed in the research model presented. This will limit the capacity to understand and comment on causal factors outside of concepts captured in the survey. This necessarily limits the strength of any causal arguments that may be implicitly or explicitly raised in the analysis findings.

1.5 Thesis Structure

Following this introductory chapter, the remainder of this thesis is organised as follows:

- The second chapter will provide a review of academic literature relevant to addressing the two research questions identified above. Relevant theory relating to RBV, IT governance, IT management and information systems will be considered with particular attention to the existing IT governance literature which utilises the resource based view of the firm as a theoretical framework.
- The third chapter of the thesis will utilise relevant details identified in the literature review to construct a model of the interactions between particular IT governance and IT management mechanisms, AIS technology and competitive advantage.
- Chapter four will explain how the concepts contained within the hypothetical model have been operationalised in the context of this research.
- The fifth chapter will describe the methods used to test the theoretical model and operationalised constructs, specifically with regards to the collection of relevant data and statistical analysis of this data.
- The sixth chapter will provide the results of the data analysis undertaken. This will include an analysis of the primary theoretical model, and several alternative models which seek to test a number a different issues.
- The final chapter will discuss the results in the context of the research questions as well as provide concluding statements in relation to limitations of the research and potential avenues for future research.

Chapter 2 Literature Review

2.1 Introduction

Academic researchers have applied a variety of theory frameworks to research questions relating to the concept of IT governance. Agency theory is commonly utilised in IT governance research due to the inherent connections between corporate governance and IT governance (Devos et al. 2012, Ferguson et al. 2013, Ling et al. 2011). Prior IT governance research has also made use of contingency theory (Chan and Reich 2007, Sambamurthy and Zmud 1999), relational theory (Prasad et al. 2013) and institutional theory (Jacobson 2009, Jewer and McKay 2012). This present research has utilised the Resource Based View of the firm (RBV) to frame the investigation of the research questions. RBV is a well-established theory base that is well suited to examining the interactions between the IS/IT related resources of an organisation (Melville et al. 2004, Wade and Hulland 2004), and has been applied by a number of other IT governance researchers (Ali and Green 2007, Ping-Ju Wu et al. 2015, Prasad et al. 2010).

This chapter first provides an examination of the existing connection between RBV theory and IS/IT management, followed by an examination of IT governance mechanisms and an assessment of their potential to provide competitive advantage. This assessment has been used to conduct an analysis of prior IT governance research that has utilised RBV as a theoretical base. The chapter concludes with an appraisal of the RBV related characteristics of the specific IT governance mechanisms, IT management capabilities and accounting information system (AIS) resources examined by this thesis. An examination of the historical development and underlying basis of RBV theory (1), IT governance theory (2), and DeLone and McLeans' IS Success model (3) was undertaken to ensure consistency of theoretical interpretations. A summary of these reviews has been included as Appendices 1-3.

2.2 RBV and IS/IT Management

RBV has been found to be a robust theory paradigm within which to consider IS/IT resources, capabilities and their contribution to organisational performance (Melville et al. 2004, Wade and Hulland 2004). However the presence of conflicting views in relation to the capacity of IS/IT to contribute to organisational competitive advantage (Aral and Weill 2007, Brynjolfsson 1993, Carr 2003, Mata et al. 1995, Wade and Hulland 2004) indicates that researchers should carefully consider how to conceptualise and operationalize IS/IT related variables with reference to RBV theoretical concepts. Specifically, the capacity for a particular IS/IT concept to be considered valuable, rare, inimitable, and non-substitutable should be assessed as part of the research process.

While there is no clear consensus regarding the role of pure technology resources in generating competitive advantage, there is more acceptance regarding whether effective management of these IS/IT resources can lead to a competitive advantage. As detailed in Appendix 1, Mata et al. (1995) identified four IS/IT "management skills" that are capable of doing so. While these authors do not address the concept of IT governance by name, they identify the importance of developing relationships and coordination between IT and non-IT stakeholders, and the capacity for IT management to understand and anticipate the current and future needs of stakeholders. These skills are not technical in nature and cannot be developed purely within the isolation of the IT department. It is possible to view these two "managerial" skills as related more to IT governance than IT management, as they require the building of strategic alignment between IT and business employees (Henderson and Venkatraman 1993) and the delivery of effective IT leadership (Armstrong and Sambamurthy 1999).

The third and fourth IT managerial skills identified by Mata et al. (1995) relate to the ability of the organisation to implement and support IS/IT solutions that meet needs of

stakeholders. In practice, these “skills” manifest in the ability of organisations to successfully deliver effective IS/IT projects and to provide effective IS/IT service and support (Ravinchandran and Lertwongsatien 2005). While both IT project management and IT service management activities utilise technical skills, it is the effective direction and control of these project and service activities with reference to organisational and stakeholder requirements that brings the potential for sustainable competitive advantage (Mata et al. 1995).

Organisations generally undertake IS/IT projects to substantially change and improve business processes and organisational capabilities (Anca 2013). Large IS/IT projects often require a significant investment of resource for the organisation (Seddon et al. 2010), and the capability of an organisation to successfully complete IS/IT projects is undoubtedly important to achieving benefits from these investments (Jugdev et al. 2007, Kearns and Sabherwal 2006). IT service management involves the provision of technical and business process support to internal and external stakeholders regarding the use of existing IS/IT infrastructure (Jia and Reich 2013, Kang and Bradley 2002). The presence of effective IT service and support within an organisation ensures that the IT systems supporting organisational activities are flexible, available, and secure (ITSMF 2007).

There have been a number of studies which utilise RBV theory to assess the impact of IS/IT capabilities on organisational performance (Bharadwaj 2000, Ravichandran and Chalermsak 2005, Santhanam and Hartono 2003, Tallon 2008, Wade and Hulland 2004). These studies invariably find that IS/IT capabilities are able to improve organisational performance and may contribute to achieving competitive advantage. There are also studies which consider whether IS/IT capabilities can act in a dynamic manner (Eisenhardt and Martin 2000, Teece et al. 1997), by enabling the change of business processes to outperform competitors in

rapidly changing environments. The concept of dynamic capabilities will be addressed further in section 2.5.

2.3 IT Governance Mechanisms

Recent theoretical and empirical work relating to the concept of IT governance has been influenced by Peterson's (2004) theory that, in addition to structural mechanisms, organisational IT governance is also established and maintained via procedural and relational mechanisms (De Haes and Van Grembergen 2009, Jewer and McKay 2012, Ko and Fink 2010, Peterson 2004). While structural, procedural and relational mechanisms interact with each other to a certain degree, there are specific distinctions and characteristics unique to each type of mechanism.

Structural mechanisms generally relate to organisational structure, patterns of decision making authority and the delegation of monitoring and control responsibilities to individuals and committees within the organisation. Important entities in regards to positional authority and responsibility for the delivery of IT governance include the Chief Information Officer (CIO) (Banker et al. 2011, Sutton and Arnold 2005) and the IT steering committee (Huang et al. 2010, Prasad et al. 2010). While other individuals and committees may also be involved in organisational IT governance, the CIO and IT Steering Committee generally hold the most responsibility and accountability for IT within the organisation, as well as the majority of delegated decision authority. Common responsibilities of the CIO and/or IT steering committee can include the design of delegated IT decision making structure, monitoring major IT project delivery and IT service effectiveness, and advising the remainder of the senior organisational representatives on appropriate IT governance actions. The CIO and IT steering committee are the focus of much of the existing research that examines IT governance effectiveness, particularly research applying survey and

archival data analysis (Banker et al. 2011, Chun and Mooney 2009, Huang et al. 2010, Khallaf and Skantz 2011, Preston et al. 2008).

Procedural mechanisms for IT governance are generally observed as best practice frameworks, methodologies and formal IT management techniques that are implemented in the organisation at the behest of those in charge of IT governance. Formal frameworks and methodologies include balanced scorecards, chargeback arrangements, COBIT, ITIL, PRINCE and many others; however informal and customised methodologies can also be implemented to assist IT managers in making appropriate decisions which meet the organisation's requirements (De Haes and Van Grembergen 2009). Senior organisational representatives in charge of IT governance are responsible for ensuring the most appropriate procedural mechanisms are implemented and followed, and that the specific guidance given by those mechanisms provides is sufficient to ensure managers make decisions in line with organisational objectives.

Relational mechanisms of IT governance focus specifically on formal and informal human interactions and usually refer to leadership, communication, culture and knowledge sharing processes within the organisation (Barney 1986, Ko and Fink 2010). Relational mechanisms provide an important capacity to detect opportunities and threats, particularly in environments that require rapid responses (Schwarz and Hirschheim 2003). Effective relational mechanisms of IT governance have been found to promote awareness of the strategic value of IT within the organisation (Ko and Fink 2010) and encourage collaborative behaviour between business and IT managers, allowing the organisation to identify and exploit technology related opportunities (Ali and Green 2012, Peterson 2004).

Some relational mechanisms possess tangible elements, such as co-location of IT representatives within business units or other formalised coordination arrangements between business and IT employees (De Haes and Van Grembergen 2009). However it is

possible to argue that these style of relational mechanisms are actually more procedural in nature as they are essentially mandated activities for the employees. These formalised arrangements are designed to encourage cooperation and synergy between IT and non-IT employees, although there is no guarantee that interaction and colocation will achieve this. While often difficult to implement and maintain, intangible mechanisms such as IT leadership (Armstrong and Sambamurthy 1999, Chun and Mooney 2009, Preston et al. 2008) and an organisational culture of alignment between IT and business (Henderson and Venkatraman 1993, Kearns and Lederer 2000, Kearns and Sabherwal 2006) are entirely relational in nature and differ in composition from organisation to organisation.

All three categories of IT governance mechanism will be present within an effective IT governance system and will operate in a complementary fashion (De Haes and Van Grembergen 2009, Ko and Fink 2010, Weill and Ross 2005b). The most effective CIO will be one that has sufficient positional and decision making authority, as well as exemplary leadership and inter-personal skills, and will also be supported by an organisation utilising best practice IT service and project methodologies. Attempts have been made to identify if particular mechanisms are more effective or more important in delivering IT governance than others (Ali and Green 2007, De Haes and Van Grembergen 2009, Ribbers et al. 2002), however the results of these inquiries indicate that the original observations of Sambamurthy and Zmud (1999) hold true in that the most effective design of IT governance mechanisms is likely to be contingent on specific organisational and industry based factors.

2.4 IT Governance Mechanisms and RBV

As discussed in the previous section, IT management capabilities have been established as potential sources of competitive advantage in the RBV literature (Barney 1991, Bharadwaj 2000, Mata et al. 1995); however IT governance capabilities have not been as clearly established. IT governance is unlikely to be a source of competitive advantage in isolation (Barney 1995) but may play a role as part of complex arrangement of organisational capabilities and resources (Aral and Weill 2007, Bhatt and Grover 2005, Hiekkanen et al. 2013). This section considers whether IT governance mechanisms hold the necessary characteristics to be classified as RBV organisational capabilities (Bharadwaj 2000, Makadok 2001, Ray et al. 2004).

The three types of IT governance mechanisms, structural, procedural and relational, generally operate in an interdependent manner (Peterson 2004, Sambamurthy and Zmud 1999). It is not possible to definitively determine whether the presence of one IT governance mechanism within an organisation is causal of another. Is a CIO an effective leader because he or she is a member of the senior executive team, or are they a member of the senior executive team because he or she is an effective leader? Does the organisation possess a culture of alignment between business and IT because they implemented COBIT best practices, or did the organisation choose to implement COBIT because the culture of the organisation was such that it recognised the importance of IT best practice? It is also important to note that the presence of one mechanism does not imply the presence of others. A CIO who is an ineffectual leader may still be part of the senior executive team, and an organisation which has nominally adopted COBIT principles may still have substantial cultural communication problems existing between IT and business employees.

Despite the interrelated and causally ambiguous nature of IT governance mechanisms, the distinction between structural, procedural and relational mechanisms is important when considering whether an IT governance mechanism possesses the necessary attributes to be classified as an RBV capability. Establishing clarity on how IT governance mechanisms should be classified from an RBV theoretical perspective is an important issue, as researchers are increasingly utilising RBV as a framework within which to consider the role and impact of IT governance (Ping-Ju Wu et al. 2015, Prasad et al. 2010, Tallon 2008).

As identified in the previous section, structural mechanisms are essentially formal positions, groups and roles within the organisation relating to decision making, authority and responsibility (Peterson 2004). This style of mechanism is commonly a focus of early IT governance research and is still prevalent in much of the recent IT governance research, possibly due to the fact that they are relatively easy to identify and observe. Specific structural mechanisms such as CIO reporting position (Bradley et al. 2012, Ping-Ju Wu et al. 2015), IT decision making structure (Debreceny and Gray 2013) and IT strategy and steering committees (Ali and Green 2007, Harguem et al. 2014, Prasad et al. 2010) have been utilised, at least in part, to assess organisational IT governance effectiveness in studies utilising RBV as a theory base. While structural mechanisms of IT governance are undoubtedly important and potentially valuable to an organisation, any organisation can decide to include their CIO in the executive team, convene an IT steering committee, or move from a centralised, to a de-centralised mode of IT decision making authority. On this basis it is unreasonable to expect that structural mechanisms can be rare or inimitable.

A number of procedural IT governance mechanisms, including the use of corporate performance measurement systems (Ali and Green 2007, Harguem et al. 2014, Prasad et al. 2013), adoption of governance best practice frameworks such as COBIT (Debreceny and Gray 2013, Turel and Bart 2014) and formal decision making processes (Ping-Ju Wu et al.

2015, Tallon 2008) have also been utilised in recent RBV-based research to assess the effectiveness of IT governance. Procedural mechanism are generally based on best practice guidance (De Haes and Van Grembergen 2009) and are systemic in nature. Organisations are generally encouraged to adopt best practices, and in many cases there are even templates laid out to assist them in doing so. Even taking into consideration that not all firms are equally adept at implementing standards and frameworks (Mata et al. 1995), the adoption of best practice cannot be a source of competitive advantage (Barney 2001). Therefore the implementation or presence of a procedural mechanism is unlikely to be indicative of an IT governance related competitive advantage.

Relational mechanisms for IT governance have appeared in recent RBV framed research as well, and tend to focus on organisational culture aspects such as compliance (Ali and Green 2007, Harguem et al. 2014) and entrepreneurialism (Bradley et al. 2012), as well as the level of involvement of business managers in IT issues (Ali and Green 2007, Harguem et al. 2014) and vice-versa (Kearns and Lederer 2003, Tallon 2008). Organisational culture is well established in the RBV literature as a resource with the potential for delivering sustainable competitive advantage (Barney 1986, Fiol 1991, Peteraf 1993) largely due to the complexity and specificity of organisational cultures.

Despite the fact that the CIO is generally recognised as the primary individual actor in the IT governance process (Peterson 2004), very few RBV framed IT governance studies have considered CIO leadership as a relational mechanism. This may be partly due to the fact that IT leadership is a complex and difficult to define concept (Chun and Mooney 2009, Pech 2003). However effective IT leadership can be considered an organisational capability from an RBV perspective as it can be valuable, complex, organisationally specific and not easily replicated by competitors (Bassellier and Benbasat 2004). Even in circumstances where an effective IT leader is obtained from a competing organisation, the effectiveness

of that leader may not be able to be replicated in the new organisation (Chun and Mooney 2009).

The IT governance literature identifies the importance of organisations implementing structural, procedural and relational mechanisms for effective IT governance. These mechanisms operate in conjunction and should be complementary of each other. The primary difference between the mechanisms, from a RBV theory point of view, is that structural and procedural mechanisms are largely based on best practice and industry accepted guidance whereas relational mechanisms have the capacity to be unique to their organisational environment (Bhatt and Grover 2005).

A review of recent journal-published IT governance research that utilises an RBV theoretical setting was undertaken (Appendix 4). While all authors of the papers reviewed identify that RBV theory was used to frame their study, only Kearns and Lederer (2003) and Bhatt and Grover (2005) provide a substantive assessment of whether the governance mechanisms under study meet RBV resource/capability criteria. In both of these cases, relational mechanisms of IT governance are theoretically and empirically supported as sources of organisational benefits and sustainable competitive advantage. Conversely the other articles reviewed in Appendix 4 rely substantially or entirely on the reported presence of structural and procedural mechanisms as a basis for the assessment of an IT governance capability.

As structural and procedural mechanisms are unlikely to be sufficient rare or inimitable to provide competitive advantage, the IT governance capabilities that are being defined and tested in a number of these papers appear to be flawed, at least from an RBV theory perspective. In the studies where a variety of IT governance mechanisms types have been tested to determine their distinct effects on organisational benefits, relational mechanisms tend to be the highest performing mechanisms (Ali and Green 2007, Bradley et al. 2012,

Harguem et al. 2014). This occurs even in studies which have focused predominately on structural and procedural mechanisms (Debreceny and Gray 2013).

Theory related problems are evident in a number of of the conclusions drawn by the various authors. For example, Ping-Ju Wu et al. (2015) assess decision making structure (structural), formal decision process arrangements (procedural) and communication approaches (relational) as mechanisms in an IT governance capability; however the measure used to assess communication approaches simply notes the presence or absence of the CIO on the executive committee. This would appear to be more in line with the definition of a structural mechanism and there would appear to be no relational mechanism utilised in the empirical assessment of IT governance capability in their paper. Accordingly the statement "*IT governance mechanisms are unique to the organization in that they provide the contextual setting for business and IT people to be involved in IT decision making and share knowledge in order to enhance IT support for business objectives*" is unsupported by their analysis. Similar issues arise with the conclusions drawn by Turel and Bart (2014).

2.5 Relational IT Governance Mechanisms as Higher Order Capabilities

The performance benefits and organisational value received from achieving a state of strategic alignment between IT and the wider business is well established in strategic alignment literature (Henderson and Venkatraman 1993, Kearns and Lederer 2000, Roepke et al. 2000). An organisational culture which encourages the mutual development of knowledge and participation between business and IT employees is an essential precursor to achieving a state of strategic alignment (Kearns and Lederer 2003, Kearns and Sabherwal 2006). Such a culture will be more likely to encourage business managers to proactively

utilise strategic applications of technology and also IT managers to engage with the opportunities and risks of the wider organisation. Despite the substantial benefits of achieving a state of strategic alignment, the presence of a well aligned culture is still a rarity (Peterson 2004, Ward and Peppard 1996).

Fostering specific cultural values is a socially complex task as it relies upon the participation of substantial percentage of employees to ensure that the cultural effort is large enough to take effect (Barney 1986, Fiol 1991). Given the widespread uptake of IS/IT in organisational environments, it is difficult to envisage any realistic substitute or replacement for a culture of alignment between business and IT. Even in circumstances where an external consulting company could be engaged to generate strategies for alignment of business and IT components, employees are still required to believe in and act upon these strategies. These observations suggest that an organisational culture of mutual engagement can possess value, rarity, inimitability and is largely irreplaceable, and therefore such a culture qualifies as a potential organisational capability according to RBV theory (Bhatt and Grover 2005).

One of the core responsibilities of the CIO is to provide oversight and governance over IT operations. CIOs will ideally be empowered and able to create an organisational environment where IT managers and employees can operate to their full potential (De Haes and Van Grembergen 2009). Organisations have demonstrated a preference for CIOs with strong business credentials who are able to direct and control IT investment and operations with business goals foremost in mind (Sobol and Klein 2009). Business-focused IT leaders, in contrast to technically focused IT leaders, focus on the organisational value of IT investments as opposed to the pursuit of technical excellence for its own sake (Chun and Mooney 2009). IT business experience has been found to be associated with competitive advantage (Bhatt and Grover 2005), and will be heterogeneously distributed between CIOs in different organisations.

Effective CIOs need to possess an understanding of external threats and opportunities as well as the capacity to direct and control the various organisational IT capabilities, resources and assets at their disposal in response to these threats and opportunities (Armstrong and Sambamurthy 1999, Bhatt and Grover 2005). The acquisition and maintenance of such knowledge is a complex learning task and requires the CIO to have experience in their specific organisation and industry environment (Smaltz et al. 2006). The organisational specificity of this knowledge forms a barrier which prevents organisations from simply acquiring a high performing CIO from another organisation and instantly achieving industry leading levels of IT leadership. Accordingly CIO leadership meets the requirements of an organisational capability under RBV (Barney 1986, Mata et al. 1995).

IT governance mechanisms interact with IT management activities and other organisational IS/IT resources. The direction and control that IT governance mechanisms exert over other organisational IS/IT resources indicates that IT governance can, and should, act as a higher order capability (Winter 2003) as referenced in Appendix 1. There is also the potential for IT governance mechanisms to act as dynamic capabilities if they can be used in this way to obtain competitive advantage when the organisation faces increased competitor and technological pressures (Tallon 2008, Wade and Hulland 2004).

2.6 IS/IT Project Management as an Organisational Capability

When an organisation implements a new IS, or significantly upgrades the capacity of an existing IS, the implementation or upgrade will generally be undertaken in the form of an IS/IT project. While the technology and scope of various IS/IT projects may differ substantially, all IS/IT projects can be considered in terms of standard project characteristics. These include the need to complete the implementation within a certain

budget, by a scheduled date, with specific outcome related deliverables and to an acceptable degree of quality. These project characteristics are relevant even in cases where organisations opt for informal implementations that do not follow formal project management processes.

Much of the extant research into project management does not seek to establish a theory framework in order to explain the empirical phenomena of organisational projects, focusing instead on practical considerations (Jugdev 2004, Killen et al. 2012). This research has found that the success of the initial IT project is crucial for initial and ongoing IS quality (Ram et al. 2014), and that high quality IT project capabilities are necessary to realise improved benefits from implemented systems (Thomas and Fernández 2008). Studies have also found that organisations with poor IT project management capabilities are at risk of competitive disadvantage (Bharadwaj et al. 2009, Kobelsky et al. 2008). The impact on organisational performance that stems from both successful and unsuccessful IS/IT projects is likely to be even more pronounced in the case of large scale enterprise systems and other IS that form part of the AIS environment, given the high level of reliance that most modern organisations have on their AIS functionality.

Studies that look at the organisational impact of project management capabilities have determined that effective project management is a necessary part of an organisations path to competitive advantage, but may be insufficient to drive competitive advantage by itself (Jugdev 2004, Jugdev et al. 2007, Ram et al. 2014). This would suggest that organisational project management capabilities may qualify as a standard capability, needing the influence of a higher order capability in order to substantially contribute to competitive advantage (Winter 2003).

In a similar manner as to how IT governance framework implementations can be copied or imitated by competing operations, it is possible for competing organisations to replicate IT

project management methodologies. However simply following these methods without taking into account specific organisational and environmental characteristics has been shown to be of little value (Ram et al. 2014). This implies that strong IT project management capabilities will have organisationally specific attributes, making such capabilities difficult to imitate or transfer between organisations. Accordingly a highly effective project management capability can be seen as a valuable, rare and inimitable organisational capability under RBV, although one that will require interaction with other capabilities and resources in order to contribute to a potential competitive advantage.

2.7 IS/IT Service Management as an Organisational Capability

In addition to managing the delivery of major organisational change through IS/IT implementation and upgrade projects, the IT management function is also required to service and support the existing organisational IS/IT infrastructure. The primary goal of IT service management is ensure the IS/IT infrastructure operates in an efficient and effective manner, supporting business processes and other organisational activities (Gorla et al. 2010). IT service management typically involves two key elements: technical maintenance of the IS/IT infrastructure and the technical support of employees using the IS/IT infrastructure. As IS/IT use within organisations has increased, the level of IT service and assistance expected by organisations has also risen substantially over the last few decades (ITSMF 2007, Jia and Reich 2013, Pitt et al. 1995). The increase in expectations and focus on the organisational value delivered by IS/IT services has also resulted in an increase in IT service outsourcing (Young Bong and Gurbaxani 2012).

The effect of IT services management on the performance of information systems and the optimal way to assess IT service quality have been the focus of considerable academic

research and debate (DeLone and McLean 2003, Kettinger and Lee 1997, Peppard and Ward 1999, Pitt et al. 1995). The Delone and McLean model (D&M Model) of information system success was updated in 2003 to include IT service quality as a core component of information system performance (DeLone and McLean 1992, DeLone and McLean 2003). However some observers suggested that IT service quality should be considered as a distinct concept to information system quality (Seddon 1997). While some studies have found that IS/IT service and support does provide significant value and even competitive advantage to organisations (Gorla et al. 2010), there are also a number of studies that refute or are unable to support this assertion (Petter et al. 2008).

In contrast to the major organisational changes and strategic impact of IS/IT projects, any organisational or IS/IT benefits received through the provision of IS/IT service and support are likely to be incremental in nature. The potential for IS/IT service and support to impact organisational performance will depend upon the characteristics and focus of the various information systems being supported. IS/IT support services that improve the quality and performance of an external facing business-to-consumer information system would appear to be more likely to generate clear organisational benefits (DeLone and McLean 2004). Conversely the direct organisational impact caused by effective IT support of an internal facing system, such as a warehouse or inventory management system, may be more muted.

Establishing an effective IT service and support capability within the organisation is not a straightforward or easily achieved process. This is partly due to the fact that in order to deliver effective IT services, the organisation needs to develop and maintain a strong IT service culture and also ensure that the IT service resources are continually applied to the IS/IT issues that are most important for supporting business processes. These observations suggest that despite easily obtainable guidelines on IT service and management best

practices (ISACA 2008, ITSMF 2007), highly effective IT service capabilities can be difficult to establish in practice. This has been confirmed in a number of academic studies (Jia and Reich 2013, Peppard and Ward 1999, Ross and Weill 2002).

As is the case with IT project capabilities, the endemic nature of information systems in the modern business environment means that there are no real substitutes for IT service capabilities. While it is possible to consider outsourcing of IT services and processes to third parties as a potential substitute; outsourcing simply changes the origin of the IT service capability rather than changing the necessity of having IT service support available to the organisation. The increase in outsourced IT service support also brings into question whether an effective IT service capability can still be considered a rare commodity – as an IT outsourcing provider could conceivably provide an expert IT service function to a large number of organisations (Young Bong and Gurbaxani 2012). This view fails to take into account the complexity of modern organisations and the information systems that they use. These observations indicate that, at least from an RBV perspective, IT service management shares many similarities to IT project management. As such this thesis will also consider IT service management as an ordinary organisational capability that holds the potential to contribute to competitive advantage but requires complimentary coordination with other capabilities and resources in order to do so (Winter 2003).

2.8 AIS and Accounting Information as an Organisational Resource

Accounting information systems (AIS) manage the collection, storage, processing and analysis of business event and accounting data, as well as the production and distribution of accounting information reports. This thesis uses the term AIS to refer to all technology and information system components contained within an organisation's IT infrastructure

used to provide these technology-based accounting processes. Accordingly an organisation's AIS could comprise of a single information system designed specifically for accounting, a single complex information system that supports multiple business processes including accounting, or a number of information systems which are each used to a greater or lesser degree to support the accounting process and potentially other business processes.

While business event and accounting data is managed by the AIS, accounting information generally manifests in organisational reporting documents such as official financial statements and organisational performance reports. Anthony et al. (2004: 3-5) identify four distinct types of accounting information:

- operational accounting information regarding individual transactions and summary reports relating to organisational activity;
- financial accounting information, such as formal accounting reports intended for use by both internal and external stakeholders to assess the high level performance of the organisations;
- tax accounting information, which can be described as a variation of financial accounting information prepared for tax regulation requirements; and
- management accounting information, which generally refers to transformations of business event data and other organisational information for internal decision making purposes.

While there is some similarity between the various accounting information outputs defined by Anthony et al, this thesis focuses on management accounting information. This type of accounting information is designed to be used for management decision making and strategic purposes relevant to obtaining competitive advantage. The information contained

in management accounting reports can focus either on current and historical business performance, which will be referred to as management reporting, or the forecasting, planning and prediction of future operations of the business, which will be referred to as future-oriented reporting (Peters and Wieder 2013).

While many types of accounting information reports can be generated through the use of similar base data and AIS processes, there may also be significant differences in the technology and procedures used to generate accounting information. For example forecasts, budgets and forward planning reports will likely benefit from the use of analytical tools, such as business intelligence and specialised forecasting software, whereas the reporting of current and historical business activities tends to require less analytical complexity and advanced technology. As a result there may be significant differences in the management reporting performance of an AIS and the future-oriented reporting performance of that same AIS (Wieder et al. 2012). On this basis it is appropriate to consider the management reporting AIS performance of an organisation as separate, but connected to, future-oriented AIS performance.

There are conflicting views as to whether technology based resources, such as an AIS, are capable of providing individual organisations with a sustainable advantage over their competitors. One viewpoint argues that IS/IT is neither rare nor inimitable, and any advantage obtained through the use of technology based resources is eroded through immediate competitor duplication (Brynjolfsson 1993, Carr 2003, Carr 2004, Mata et al. 1995). The opposing view is that the level of integration, customisation and complexity found in modern information systems and organisational IT infrastructures prevents simple duplication or imitation by competitors, allowing IS/IT to contribute a competitive advantage (Aral and Weill 2007, Barney 1991, Bharadwaj 2000, Wade and Hulland 2004). It has even been proposed that AIS can act in the role of a dynamic capability, by enabling the

rapid reorganisation of accounting and business procedures with reference to environmental dynamism (Prasad and Green 2015).

An AIS is an ideal example of an IT asset with which the capacity to contribute to competitive advantage can be argued from both points of view. All organisations possess some form of AIS and these systems all perform similar tasks for their respective organisations. On this basis it would appear AIS is a generic technology, homogenously distributed between organisations and therefore unsuitable as a potential resource under RBV. However AIS can also be highly customised to meet organisational requirements, provide substantial complex decision support capabilities and enable real time information for managerial decision making (Prasad and Green 2015). This complexity and organisational specificity has been increasing over the last decade with the introduction and use of disruptive new technologies.

Previous research has found that a high quality AIS can provide significant benefits to an organisation (Rom and Rohde 2007, Wilkin and Chenhall 2010). The brand, structure, quality, complexity and capacity of each technology component in an organisation's AIS are likely to vary considerably, despite the fact that organisations utilise AIS for broadly the same purposes. This generally results in complex, organisationally-specific, AIS environments which differ in their respective quality and capacities (Nelson et al. 2005). In addition to the complexity and uniqueness of the AIS hardware and software infrastructure, the AIS also contains a unique and inimitable set of business event data that has been collected, stored and processed in their own AIS technology (DeLone and McLean 2003).

Accordingly this thesis views AIS as a two dimensional IS/IT resource that may have differing levels of management reporting performance and future-oriented reporting performance. These two functions of the AIS potentially hold sufficient value, rarity,

inimitability and non-substitutability to act as complementary resources (Amit and Schoemaker 1993), interacting with other organisational capabilities and resources to obtain a competitive advantage.

2.9 Literature Review Summary

While there is substantial evidence and theoretical support in regards to the importance of structural and procedural mechanisms for enabling effective IT governance, these particular type of mechanisms are not sufficiently rare or inimitable as to provide a competitive advantage as defined by RBV theory. Contrary to these observations, the majority of empirical studies that seek to examine IT governance utilising an RBV framework use structural and procedural mechanisms, at least in part, to assess IT governance capability within an organisation (refer to Appendix 4). Following the requirements of RBV theory, this thesis focuses on how relational mechanisms of IT governance engage with other organisational resources and capabilities to achieve competitive advantage to address the first research question.

An effective IT leader will be able to identify changing marketing conditions and provide direction to the rest of the organisation on how to proceed. Similarly, an organisation which possesses a strong culture of alignment between business and IT will be better placed to take immediate action in response to new opportunities and threats that can be met with an IT related response than an organisation without this cultural capability (Kearns and Lederer 2003). It is the performance of these relational mechanisms that appears central to the question as to whether IT governance can act as a higher order capability, adapting and re-configuring other organisational capabilities and resources in response to changing strategic requirements. Examination of how these mechanisms

operate in environments of differing competitive and technological pressures may also provide insights as to whether IT governance can act as a potential dynamic capability (Eisenhardt and Martin 2000, Teece 2014, Teece et al. 1997).

The activities of IT project management and IT service management are critical for changing and upgrading IT infrastructure and processes (Jugdev et al. 2007, Ravinchandran and Lertwongsatien 2005). It is evident that IT project management capabilities and IT service management capabilities can be considered valuable, rare, difficult to imitate and do not have feasible substitutes, possessing the potential to assist an organisation to obtain a competitive advantage (Killen et al. 2012). However the direct benefits obtained from successfully completing IS/IT projects and providing high quality IS/IT service and support are more likely to be operational as opposed to strategic (Winter 2003). Simply possessing these capabilities does not necessarily mean that the organisation consistently selects the best IT projects or is able to identify the most appropriate focus for their IT service work efforts. It will take the direction and control of a higher order capability, IT governance, to maximise the benefits of IT management capabilities.

While the capacity for organisations to generate value through IT project capabilities is well supported, the same cannot be said for IT service capabilities (Gorla et al. 2010, Petter et al. 2008, Pitt et al. 1995, Seddon 1997). Despite these mixed findings it is broadly accepted that effective IT service is a vital component of information system performance (DeLone and McLean 2003, Petter et al. 2008) and is likely to serve at least in a complementary capacity (Amit and Schoemaker 1993). Regardless of specific classification, both IT project capabilities and IT service capabilities can be combined with other resources and capabilities in an effort to obtain competitive advantage.

The existing RBV literature provides conflicting opinions on whether a purely technical asset, such as AIS, is capable of generating competitive advantage (Bhatt and Grover 2005,

Mata et al. 1995, Wade and Hulland 2004). The middle ground of these diverse opinions appears to be that information systems may act as complementary resources (Amit and Schoemaker 1993), requiring interaction with other resources and capabilities in order to contribute to organisational performance and potential competitive advantage.

The most unique and valuable element of an organisation's AIS will be the management accounting information output. This thesis has divided management accounting information into two categories based on the temporal focus of their content. Management reporting provides accounting information regarding current and historical business events, whereas future-oriented reporting delivers forecasts, budgets and predictions of future business events and conditions. Organisational AIS needs to provide both of these types of management accounting information and, due to potential differences in applied technology and processes, the performance of the AIS for management reporting purposes may be different to the performance of that same AIS in future-oriented reporting.

Chapter 3 Hypotheses Development

The review of RBV, IT governance and IS Success literature undertaken in the previous chapter provides useful insights into the research questions posed in Chapter 1. On the basis that IT governance mechanisms have the capacity to operate as high level capabilities (Winter 2003), they will direct and control the use of other organisational resources and capabilities with reference to strategic needs, evolving opportunities and arising threats. As a higher order capability, any competitive advantage achieved by effective IT governance will be realised via adjustments and improvements to IT management capabilities and IS/IT resources. Therefore the first research question can be addressed by constructing a series of hypotheses that specify the relationships between the various aspects of IT governance, IT management, AIS and competitive advantage identified in Chapter 2.

The assessment of IT governance mechanisms undertaken in the previous chapter identified that relational mechanisms are likely to have the most substantial impact on an organisations ability to achieve competitive advantage from effective IT governance. The literature review identified two specific relational mechanisms that possess sufficient value, rarity, non-substitutability, and inimitability to be classified as higher order capabilities: CIO leadership capability and an organisational culture of alignment between business and IT.

While there is a clear distinction between the activities of IT governance and IT management, the CIO role is unique in that it carries both IT governance and IT management responsibilities (Chun and Mooney 2009, Sutton and Arnold 2005). This dichotomous role means that the leadership and performance of the CIO is an important bridge between the strategies determined at the governance level and the execution of those strategies at the management level, providing both “supply-side” technical leadership and “demand-side” strategic leadership (Preston et al. 2008). The governance responsibilities of the CIO relate to these “demand-side” leadership aspects and include the

identification and championing of strategically important IT investments, oversight of major IT projects delivery, and controlling IT service capabilities through strategy setting, staff selection and direct instruction (Chun and Mooney 2009, Preston et al. 2008). From an RBV-perspective, IT governance should act as a higher order capability, influencing, directing and controlling the relative performance of the IT management capabilities.

Despite strong evidence supporting the positive influence of CIO leadership on IT management capabilities, there are potential counter-arguments which imply that this relationship may not be as strong as identified in the literature review. For example it is possible that IT management capabilities are primarily determined by the individual skills of employees and contractors. Organisations are increasingly turning to IT outsourcing to improve IT management performance (Young Bong and Gurbaxani 2012) and this may substantially reduce the impact of CIO leadership on both IT project and IT service capabilities. Substantially more evidence supports the suggestion that CIO leadership will influence IT management capabilities and therefore Hypotheses 1a and 1b are proposed:

H1a: CIO leadership capability positively influences IT project capability.

H1b: CIO leadership capability positively influences IT service capability.

While a CIO leadership capability manifests in the actions of a single individual, cultural capabilities require a substantial number of employees to develop, maintain and exercise specific traits and knowledge based skills. Developing an organisational culture of business-IT alignment may be even more difficult than developing other desirable cultural traits due to the considerable differences in skills, experience and work tasks of the two groups of employees (Melville et al. 2004, Peppard and Ward 1999). However the benefits of establishing such a culture appear to justify the effort (Henderson and Venkatraman 1993, Kearns and Sabherwal 2006).

Previous studies do not appear to have thoroughly tested the direct association between strategic alignment and IT project and service capabilities. The alignment of business and IT employees will improve strategic decision making regarding IS/IT and reciprocal alignment between business and IT strategic decision making has been found to lead to competitive advantage through improved IS quality (Kearns and Lederer 2000, Segars and Grover 1999). Improving the strategic value of IS/IT decisions can improve IT management capabilities by ensuring that the IS/IT projects selected by the organisation are aligned with business needs, and will also ensure that IS/IT services are directed to areas of the IS/IT infrastructure that will be of the most benefit to the organisation.

It may be the case that organisations with strong IT leaders will receive reduced benefits from aligned business-IT culture. It is also possible to envisage that the capacity to utilise highly skilled IS/IT contractors through outsourcing arrangements for IT management activities may negate the benefits of an aligned culture. The majority of evidence examined supports the assertion that an organisational culture of business-IT alignment is a higher level capability, able to influence and improve the performance of IT management capabilities. On this basis, Hypotheses 2a and 2b are proposed:

H2a: An organisational culture of alignment between business and IT employees positively influences IT project capability.

H2b: An organisational culture of alignment between business and IT employees positively influences IT service capability.

The organisational IT management function is directly responsible for the initial implementation of an organisations AIS as well as the provision of ongoing service and support to maintain and improve the AIS (Anca 2013, Seddon et al. 2010). Any sustainable benefits generated from AIS performance will almost certainly require effective systematic management of the AIS environment (Prasad and Green 2015). From an RBV perspective, IT

managerial capabilities are able to enhance and develop organisational assets such the AIS. When operating effectively, the interconnections between IT governance, IT management and AIS hold the potential to form an overarching organisational capability in which the related capabilities and resources operate in a complex conjunction to generate competitive advantage (Winter 2003).

While IT project and IT service capabilities should improve the performance of all organisational IT/IS assets, their relative importance may change depending upon the characteristics of each particular IT/IS asset (DeLone and McLean 2004, Petter et al. 2012, Petter et al. 2013, Rosacker and Rosacker 2010). Similarly to IT governance, it is likely that IT management capabilities have an influence on other organisational IT resources which could contribute to competitive advantage in other ways. However the specific focus of this thesis is on the relationship between IT management capabilities and AIS performance.

Organisational AIS are typically complex systems comprising of multiple software packages and hardware environments that are updated and modified over time. The technology involved with these functions is more complex and evolves more quickly than the management reporting AIS elements. While each individual software or hardware element will inherently possess their own level of quality which will impact the quality of the overall AIS environment (DeLone and McLean 2003, Petter et al. 2012), the literature reviewed in Chapter 2 indicates that the performance of organisational AIS will still rely to a significant degree on the capacity for IT management to implement, support, maintain and develop these AIS assets (Gorla et al. 2010, Pitt et al. 1995, Ram et al. 2014, Seddon et al. 2010). Accordingly Hypotheses 3 and 4 are proposed:

H3: Better IT project capabilities positively influence AIS performance.

H4: Better IT service capabilities positively influence AIS performance.

Different types of IS/IT may improve organisational performance and potentially contribute to a competitive advantage in differing ways. For example E-commerce software is able to reduce operating costs, increase geographical sales coverage and improve the sales business process (DeLone and McLean 2004). A highly advanced and specialised Customer Relationship Management (CRM) system may provide unique and valuable insights into client behaviour (Coltman et al. 2011). Advanced logistics planning systems may provide a temporary cost and efficiency advantage over competitors, at least until the technology is replicated (Ram et al. 2014, Seddon 2005). The AIS is central to all financial operations within the organisation and plays a very important role in storing, processing, analysing and preparing accounting information for decision making purposes (Granlund 2011, Rom and Rohde 2007, Wilkin and Chenhall 2010).

An organisation with access to higher quality accounting information than their competitors may hold an advantage over these competitors as it provides them with better evidence upon which to base their strategic and operational decisions (Prasad and Green 2015). While there can be no guarantee that such an information advantage will be successfully exploited, it is generally accepted that organisations with higher quality information can potentially achieve an advantage over competitors with lower quality information (Porter and Millar 1985).

The literature review undertaken in the previous chapter identified that the AIS is a critical component for accounting and decision making processes. AIS performance is not spread homogenously between firms, and the actions of IT governance and IT management are expected to influence AIS performance beyond the quality of the technology-based components of the AIS. The previous chapter also identified two types of internal accounting information reports that may provide organisations with information that leads to competitive advantage: management reporting focusing on current and historical

business event activity, and future-oriented reporting focusing on planning, budgeting and forecasting activities. Due to differences in the technology-based components used for these different types of AIS reporting, and associated differences in the impact of actions of IT governance and IT management on those components, the performance of an AIS in regards to management reporting may differ from the performance in future-oriented reporting.

Future-oriented accounting information is more likely to assist strategic and tactical decision making by providing guidance on future organisational performance under a variety of differing circumstances (Prasad and Green 2015). By supporting strategic and tactical decision making, the capacity of the AIS to produce high quality future-oriented accounting reports is likely to be more important to achieving competitive advantage than the capacity to produce high quality management accounting reports focused on current or historical issues. Accordingly Hypotheses 5 and 5a are proposed:

H5: High performing AIS provides an organisational competitive advantage.

H5a: Future-oriented AIS performance will have a stronger association with competitive advantage than management reporting AIS performance.

The hypothesised relationships (H1 through H4) may be impacted by the level of environmental dynamism that an organisation experiences. The benefits received from an organisational culture of alignment between business and IT may be muted to some degree in low dynamism environments as the strategic IT decisions being made become less complex. Conversely an organisation experiencing high levels of competitor activity and technology churn may be rely more upon the strategic capacity of a broader set of business and IT managers rather than the leadership demonstrated by a single individual. Strategic decision making will almost certainly benefit from improved accounting information

regardless of technological or competitive pressures, so the relationship between AIS performance and competitive advantage is not expected to be significantly affected by environmental dynamism.

Organisations operating in environments where technology churn and competitor activity is low are likely to need to make fewer changes and alterations to their AIS in response to these pressures. This suggests that effective IT service management is likely to have lesser importance in establishing and maintaining AIS performance quality in such environments. Organisations operating in high dynamism environments, where technology is rapidly out-dated and competitors are very active, will likely need to make continual ongoing adjustments and changes to AIS capabilities in order to address changing demands and business needs (Drnevich and Kriauciunas 2011). These observations suggest that the effectiveness of IT service capabilities, which are relied upon for quick responsive upgrades and system adjustments, will have a stronger comparative influence on AIS performance in high dynamism environments.

With reference to the research model, market dynamism appears likely to play its most significant role in the interaction between the IT service management function and AIS performance (Tallon 2008, Wade and Hulland 2004). While the effectiveness of IT project management quality is likely to remain important regardless of market dynamism, it may be reduced to a secondary role behind IT service management quality when organisations experience differing levels of dynamism.

These observations indicate the potential for IT governance to act as a dynamic capability insofar as the IT governance function would direct and control other resource, notably IT management and AIS technology, in order to align them to best manage risks and exploit opportunities arising from external pressures. The relational mechanisms examined in this thesis may provide the organisation with the capability to accommodate and even thrive in

changing conditions, and the effects of dynamic capabilities on operational capabilities are expected to be moderated by environmental turbulence (Pavlou and El Sawy 2011). Accordingly, Hypotheses 6a and 6b are proposed:

H6a: IT project capability will have a stronger influence on AIS performance in low dynamism environments.

H6b: IT service capability will have a stronger influence on AIS performance in high dynamism environments.

By mapping H1 through H6 into a structural path model, the relationship between IT governance and competitive advantage can be visualised as a series of interconnected IS/IT related capabilities and resources (see Figure 2 below). The process of operationalising each of the elements in this structural model will be detailed in the following chapter.

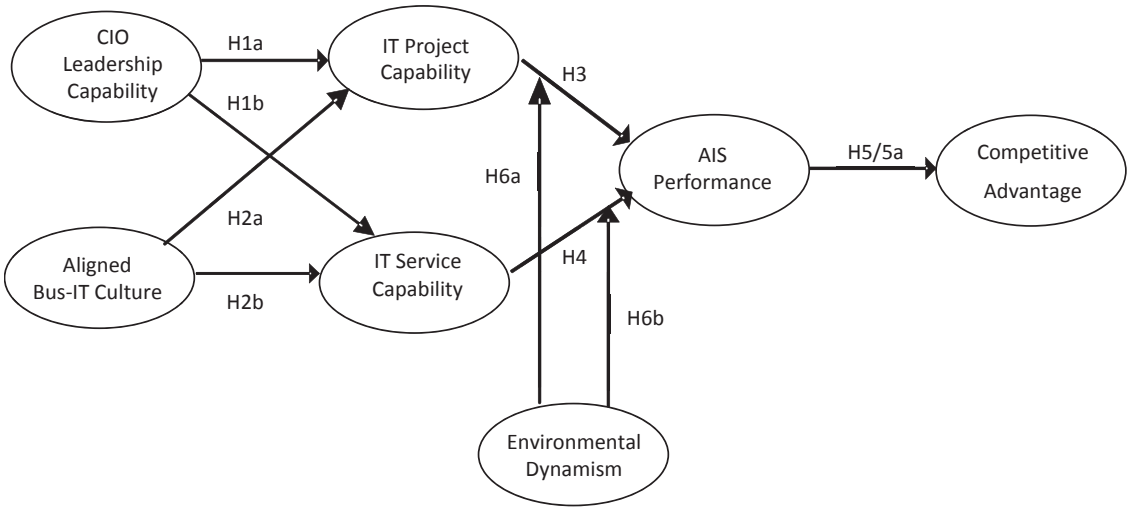


Figure 2: Structural Path Model and Hypotheses

Chapter 4 Research Method

4.1 Introduction

The hypotheses outlined in the previous chapter refer to intangible organisational concepts such as culture, leadership and competitive advantage, which are not directly observable or quantifiable. Constructed latent variables, or latent constructs, combine a number of directly measured indicators to create a constructed variable, providing an indirect measurement of the original unobservable concept. (Becker et al. 2012).

The operationalisation of the latent constructs in this thesis follows the guidance of Molloy et al. (2011) in regards to the use of intangible variables in RBV related research. The process suggested by Molloy et al. (2011) begins with clearly defining the latent constructs under study with reference to applicable theory. Suitable measurement factors should then be identified from prior literature where applicable. Measurement factors should be considered in regards to apparent validity, reliability and practicality, and amended where necessary. Following the actual measurement process, the resulting data set should undergo post-hoc reliability and validity checks.

This chapter details the process undertaken to create suitable latent constructs for the concepts of CIO leadership capability, culture of business-IT alignment, IT project capability, IT service capability, AIS performance and competitive advantage. Some explanation of the wording and structuring of the latent variable indicators appears in this chapter, however a thorough explanation of the development of the final survey instrument used to collect data relevant to these constructs is provided in the following chapter.

4.2 Latent constructs

The development of a latent construct, a logical representation of an otherwise unobservable concept, requires careful consideration of both the theory relating to the concept and the characteristics of the concept which may be used as indicators for measurement purposes (Molloy et al. 2011). Problems with the operationalisation of latent constructs, such as incorrect formative or reflective designation and other forms of model misspecification, have been subject to considerable debate and analysis in recent times (Finn and Wang 2012, Rodgers and Guiral 2011, Wilcox et al. 2008).

The indicators of a formative construct have a causal relationship with that construct (Hampton 2015). Formative constructs are a useful approach when developing indices or assessing latent variables which are caused by changes in well understood and clearly defined components. If a constructed latent variable is assessed through the use of formative indicators, then all relevant formative indicators of that construct must be taken into account during the measurement process (Peter et al. 2007). Failure to do so will introduce error into any statistical analysis involving the construct (Netemeyer et al. 2003: 92). On this basis a formative latent variable can be seen as a direct function of the indicators which are used to construct it.

Reflective constructs have an opposite flow of causation – changes to the latent variable itself cause changes to the indicators used to define the latent variable (Rodgers and Guiral 2011). Unlike with formative constructs, it is not necessary to identify and assess all potential indicators of a reflective construct. This is because indicators of a properly specified reflective construct will possess significant correlation with each other and utilising many correlated indicators is unnecessary for statistical analysis. In most cases four to six indicators will be sufficient to establish internal consistency as these measures should generally move in alignment with each other (Hampton 2015). Internal consistency is not

expected between formative indicators as they should be measuring different attributes of an overall construct.

Organisational research has predominately relied upon the use of reflective measures even in circumstances where the use of formative models may have been more appropriate (Neuberg et al. 1997). There is an argument that beliefs, perceptions, intentions and judgements supplied by a subject regarding an organisation, or organisational performance, are almost always reflective in nature, and therefore formative constructs should rarely if ever be used (Rodgers and Guiral 2011). However the decision on whether to design the measurement of latent construct as either formative or reflective should primarily be made on the basis of the relationship between the indicators and the construct (Petter et al. 2007).

A unidimensional construct has a single facet or aspect which is relevant to the construct. Indicators of such a construct will only be significantly related to that construct. However indicators in a multidimensional construct may require two or more factors to explain the correlation between indicators (Netemeyer et al. 2003: 22). Incorrect specification of dimensionality can have substantial negative consequences for the statistical analysis undertaken with the construct (Neuberg et al. 1997). In cases where latent constructs have been subjected to substantial prior examination the results of this research should provide sufficient guidance as to the dimensionality of a particular construct. In circumstances where a particular latent construct has not been subject to substantial theoretical development and empirical analysis previously it is recommended that factor analysis is undertaken to determine the correct dimensionality of the construct and the appropriate associations between indicators and dimensions (Netemeyer et al. 2003: 27).

Dimensionality should not be confused with the use of second order constructs which are complex constructs comprising of two or more sub-constructs. In circumstances where

several indicators of a primary construct can be logically grouped into a smaller construct it is appropriate to make this group of indicators a sub-construct and utilise a second order construct design (Bruhn et al. 2008). Sub-constructs act as latent variables in the same way as the primary construct and the same consideration is required regarding whether the associations between the sub-constructs and the primary construct are formative or reflective in nature.

4.3 CIO Leadership Capability

The CIO is a vital component of both IT governance and IT management. The CIO is often responsible for the identification and suggesting optimal procedural IT governance mechanisms for a given organisation (Chun and Mooney 2009, Huang et al. 2010) and leadership employed by the CIO has been identified as being critical for effective IT governance (De Haes and Van Grembergen 2009). It is insufficient to simply promote an IT manager into a high powered executive position and expect the mere presence of an appropriately positioned CIO to provide effective IT governance. A CIO at the executive level who lacks substantive leadership capabilities will be unlikely to provide effective governance over organisational IT, and may even prove to be counterproductive to IT governance efforts. As leadership is largely an intangible aspect of CIO performance, this section will detail how the executive perceptions of various CIO leadership indicators will be modelled as a latent construct.

Preston et al. (2008) examined the antecedents and consequences of CIO decision authority, determining that effective CIOs were perceived to have a high level of authority and responsibility within the organisation and also enjoyed the confidence of their peers. Sohal and Fitzpatrick (2002) examined the responsibility and roles of IT executives in an

Australian context finding that senior IT executives were expected to provide advice not only on IT issues but on business opportunities and threats. Obtaining the opinion of an organisational peer regarding these CIO characteristics appears to be a valid approach to collecting a perception based assessment of CIO leadership capability as the concept of a strategically effective CIO utilised by Preston et al. (2008) closely aligns with the concept of CIO leadership capability examined in this thesis. Accordingly an approach based on Preston et al. (2008) and Sohal and Fitzpatrick (2002) was used to develop a reflective latent construct for CIO leadership capability. Table 1 below provides the finalised list of statements which were utilised as indicators of CIO leadership capability in the survey instrument.

Indicator	Statement
CIO1	The CIO (or equivalent) is responsible for the strategic direction of IT.
CIO2	The CIO (or equivalent) has the authority to determine which IT initiatives should be pursued.
CIO3	The CIO (or equivalent) is an effective strategic leader.
CIO4	The CIO (or equivalent) is best described as a business focused executive as opposed to a technical expert.
CIO5	I have confidence in the performance of the CIO (or equivalent).

Table 1: Indicators of CIO Leadership

These indicators were considered appropriate statements for use as reflective assessments of perceived CIO leadership capability as they focus on leadership attributes such as authority, effectiveness, business involvement, and performance. Some adjustments were made to the initial wording following feedback received from the pilot testing, resulting in the finalised statements in table 1 above.

4.4 Culture of Business-IT Alignment

There are several methods which can be employed to assess the level of cultural alignment between business and IT employees within an organisation. Sabherwal and Chan (2001) obtained observations relating to business strategy, IT strategy, business performance and IT performance using a dual survey approach. These observations were then compared against strategic positioning that was considered to be 'ideal' for each organisation to determine the deviance from ideal strategic alignment. While providing useful data, the dual survey approach can be difficult to administer and also may suffer from low response numbers. A further complication identified by these authors is the nature of strategic alignment to be fluid and changeable, suggesting that a direct measurement of strategic alignment will only identify the level of strategic alignment at a given point in time.

To address this issue Kearns and Sabherwal (2006) utilised a method grounded in the knowledge based theory of the firm to capture the propensity for organisations to achieve strategic alignment. This was assessed by measuring the level of interaction between senior IT-focused managers and senior business-focused managers. Substantial interaction between these two groups of employees in the areas of both business strategic planning and IT strategic planning was found to be associated with high levels of strategic alignment. This research will utilise an approach similar to Kearns and Sabherwal (2006) collecting perception based observations from the survey respondents regarding business involvement in IT strategic planning and IT involvement in business strategic planning. The design of questions utilised in the survey instrument is predominately based on those used by Kearns and Sabherwal (2006) but will also consider the approach utilised by Armstrong and Sambamurthy (1999) who investigated the influence of senior leadership and IT infrastructures on IT assimilation in firms.

Business to IT alignment and IT to business alignment must be modelled as two distinct constructs that will act formatively to create an overall measure of the culture of alignment between the two groups (Kearns and Sabherwal 2006). Measuring these two aspects of alignment as a combined construct, or in a reflective-reflective model, would not appropriately allow for situations where one type of employees is aligned but the other is not. For example an organisation may have IT employees who are actively involved in aligning IT to business strategy needs; however the non-IT employees are not actively involved in planning for IT opportunities and threats. Accordingly the list of statements provided in Table 2 below are divided into two reflective constructs, CUL1 through CUL4 reflectively measure business managers cultural alignment with IT, and CUL5 through CUL8 reflectively measure IT managers alignment with business. A second order construct will then be created through a formative combination of these two reflective constructs. Table 2 below provides the finalised list of statements used in the survey to assess the organisational culture of business-IT coordination.

Indicator	Statement
CUL1	Business managers (non-IT) consider IT to be of strategic value.
CUL2	Business managers (non-IT) are aware of the organisation's IT assets.
CUL3	Managers from a variety of business functions are engaged in the IT planning process.
CUL4	IT planning involves an evaluation of future information needs of business managers.
CUL5	IT managers (IT specialists) regularly attend business strategy meetings.
CUL6	IT managers (IT specialists) participate in setting business goals and strategies.
CUL7	IT managers (IT specialists) participate in the early stages of major business projects.
CUL8	Business strategies address IT-related opportunities and threats.

Table 2: Indicators of Organisational Culture of Business-IT Coordination

Feedback received from the pilot testing of the survey instrument indicated that these statements were appropriately worded in regards to obtaining an executive's perceptions of organisational culture specific to coordination and involvement between IT and the broader business.

4.5 IT Project Management Capability

A standard method for assessing the project management capability of an organisation relates to the ongoing performance of organisational project portfolios against the "iron triangle" or "triple constraint" of project measures. The triple constraint indicators focus on whether projects are completed on time, completed within budget, and deliver the required scope of work. More recently, the iron triangle measures of project success have been expanded in recognition of the fact that a project that meets scope, schedule and budget requirements may still be considered a failure if the quality of the project is insufficient, or if the stakeholders of the project are unsatisfied with the final project output (Pinto, 2010:35).

Kearns and Sabherwal (2006) utilised perception based measures to assess the IT project performance of organisations. These performance aspects related to the classic triple constraint project measures as well as major issues which are considered to be related to project failure. This research will utilise a similar methodology to Kearns and Sabherwal (2006) to assess IT project capability, however the measures will be extended to encompass the broader definition of IT project success currently utilised by industry entities such as the Project Management Institute by means of including an assessment against quality of projects and also whether projects are accepted as meeting business requirements (Eveleens and Verhoef 2010). Table 3 provides the finalised list of statements

which will be utilised in the survey as reflective indicators of IT Project Management capability.

Indicator	Statement
ITP1	Significant IT projects always succeed in achieving their intended scope.
ITP2	Significant IT projects always stay within budget.
ITP3	Significant IT projects are always completed on schedule.
ITP4	Significant IT projects always produce high quality results.
ITP5	Significant IT projects always succeed in meeting business requirements.

Table 3: Indicators of IT Project Management Capability

Prior to pilot testing the survey, there were six indicator statements proposed for the IT project management capability construct; however one statement which related to on time delivery of projects was considered identical to the existing ITP3 indicator. Based on the feedback received this indicator was dropped and the indicators in Table 3 were retained.

4.6 IT Service Management Capability

IT service management interacts with organisational AIS in two ways: technical maintenance and upgrading of the AIS, and the provision of service support to the employees using the systems. The level of effectiveness with which IT management is able to undertake these activities is generally referred to as IT service quality (Gorla et al. 2010).

The SERVQUAL instrument was developed by Parasuraman et al. (1988) as a method to assess the difference between customer's expectations of service and their actual perceptions of service quality. SERVQUAL was adapted for use with IT service quality, and has often been applied to information systems research for this purpose (Kang and Bradley 2002). Investigations by Van Dyke et al. (1997, 1999) found that direct measures of service

quality were preferable to the gap measures employed in the SERVQUAL instrument as the results derived from gap measures have reduced reliability, poor convergent validity and unstable dimensionality. Accordingly, Kettinger and Lee (1997) recommend the use of direct measures, referred to as service performance or SERVPERF, as they provide improved predictive power, data reliability and data collection efficiency.

This research applied SERVPERF style measures to assess the concept of IT service quality (DeLone and McLean 2003), an approach that is increasingly common in information systems research (Gorla et al. 2010, Prybutok et al. 2008). The specific SERVPERF measures chosen for this research relate to the reliability, responsiveness, competence, empathy and commitment of the IT management function when supporting users of organisational IT/IS. Table 4 provides the final list of statements utilised in the survey as reflective indicators of IT service management capability.

Indicator	Statement
ITS1	The IT support function is responsive to technical problems.
ITS2	The IT support function meets promised deadlines.
ITS3	The IT support function is able to resolve problems on the first attempt.
ITS4	The IT support function communicates important information to IT users.
ITS5	The IT support function understands the needs of IT users.

Table 4: Indicators of IT Service Management Capability

The pilot testing feedback included suggestions for some minor wording changes to ITS5 which were implemented. The remainder of the feedback from the pilot testing was that these indicators were considered appropriate and within the capacity for a non-IT executive to answer.

4.7 AIS Performance

The concept of information system quality has been the subject of a substantial amount of previous research, resulting in numerous interpretations and measurement models (Petter and McLean 2009). While these previous models are informative for the current research it is important to tailor any assessment of information system quality to the specific type of information system assessed (Guimaraes et al. 2009). The primary purposes of organisational AIS are to facilitate accounting business processes, such as statutory reporting, and to produce reports that aid managers' decision making. Therefore the ability to meet the accounting requirements of users and the ease in which those users are able to use the system are clearly critical indicators of AIS performance (Petter et al. 2008, Seddon 1997). In addition to meeting existing user requirements, the flexibility of a system in terms of how quickly and easily it can be modified to meet new and future requirements is also an important AIS performance feature (Spathis and Ananiadis 2005).

It was determined that the customised set of measures developed and validated in prior research by Peters and Wieder (2013) would be an appropriate starting point for developing appropriate indicators of AIS performance. Peters and Wieder (2013) examine performance management information systems (PMIS), a conceptual IS closely aligned with the future-oriented and management reporting aspects of AIS defined in this thesis. Accordingly the measures that were developed and tested by Peters and Wieder were used as a basis for the AIS indicators used in this thesis.

As management reporting AIS and future oriented AIS are two aspects of the same conceptual system, it is to be expected that there are a number of similarities between these two types of AIS functionality. In particular the core accounting transaction data that is utilised by these systems will need to possess the same information quality attributes such as accuracy, reliability and consistency between various components of each system

(Nelson et al. 2005). However the actual analysis functionality and use of these systems by managers is likely to vary considerably. Management reporting AIS are focused on providing accounting information relating to specific known issues and immediate concerns. Conversely, future-oriented AIS focuses on providing accounting information relating to potential future scenarios and strategic possibilities. Due to these differences in focus and functionality, it is possible for organisations to have differing levels of performance in these two types of AIS functionality. As such management reporting AIS and future-oriented AIS are best considered as two related, but distinct sub-components of organisational AIS.

For the purposes of this present research, the AIS sub-components of management reporting AIS performance and future-oriented AIS performance will be combined using a formative approach to create a second level AIS performance construct. These two aspects of AIS were identified in Chapter 2 as having the potential to contribute to competitive advantage. While it could be argued that other technical and information aspects need to be included in a formative measure of AIS performance, these two sub-constructs represent AIS performance as it relates to potential competitive advantage and therefore the use of a formative measurement approach is considered appropriate (Petter et al. 2007, Rodgers and Guiral 2011).

The indicators selected for both types of AIS construct should reflect the fact organisations may utilise more than one application or system for reporting or forecasting purposes. Consistency between these systems will be essential for high levels of performance. Medium and large sized organisations often have multiple lines of business and wide-spread operations, therefore both current/historical reporting and future-oriented reporting should support this range of activities. Likewise, both systems should meet existing user needs and requirements in order to be classified as high performing.

The other selected indicators diverge in terms of performance aspects, reflecting the differences between the two types of AIS. Specific planning, budgeting and forecasting performance issues, such as complex scenario planning, and the ability to adjust forecasts due to changing information need to be assessed in future-oriented AIS performance. Conversely management reporting AIS has a much stronger focus on accuracy and currency of information provided. Table 5 and 6 respectively provide the final list of statements which were utilised in the survey as reflective indicators of future-oriented AIS performance and management reporting AIS performance.

Indicator	Statement
PBF1	Data is shared effectively between the various planning, budgeting and forecasting systems (if you only have one system please mark strongly agree).
PBF2	It is easy to modify or adapt forecasts and budgets in response to changing business requirements or new information.
PBF3	The planning, forecasting and budgeting systems meet our current business requirements.
PBF4	The planning, forecasting and budgeting systems support the planning of a wide range of performance.
PBF5	The planning, forecasting and budgeting systems provide the ability to forecast multiple scenarios.
PBF6	The planning, forecasting and budgeting systems strongly support multidimensional planning (e.g. by product line, region, distribution channel, etc).

Table 5: Indicators of Future-oriented AIS Performance

Feedback from the pilot testing process suggested that future-oriented AIS components should be identified by using accounting terminology that respondents would associated with future-oriented AIS activity. As a result the term “planning, forecasting and budgeting systems” was used in the indicator statements as opposed to “future-oriented accounting information systems”.

Indicator	Statement
MRS1	There is a high level of consistency between the figures reported by the various reporting systems (please mark strongly agree if you only have one management reporting system.
MRS2	The values reported in the management reporting systems accurately reflect actual activities.
MRS3	The values reported by in the management reporting systems are always up to date.
MRS4	The management reporting systems provide customised reporting based on different information needs.
MRS5	The management reporting systems strongly support multidimensional reporting (e.g. by product line, region, distribution channel, etc).
MRS6	The management reporting systems meet our current business needs.

Table 6: Indicators of Management Reporting AIS Performance

The feedback from the pilot testing indicated that these statements were appropriate for obtaining the perceptions of management reporting AIS performance from a non-IT executive.

4.8 Competitive Advantage

Seeking to understand how some organisations are able to achieve sustainable competitive advantage is a core focus of RBV related research (Barney 1991, Grant 1991, Peteraf 1993). Accordingly competitive advantage is the ultimate dependant variable in the majority of RBV studies. There is ongoing disagreement and conflicting guidance regarding the most appropriate approaches to assess competitive advantage (Ray et al. 2004). This thesis follows the guidance of Wade and Hulland (2004) who suggest that a competitive advantage measure should contain three key attributes: an assessment of performance, a comparison of that performance with competitors, and whether that performance has been sustained over time.

These three aspects of competitive advantage were addressed in the latent construct indicators developed by Peters and Wieder (2013), and so these measures have been applied in this thesis. A fourth measure relating to an overall performance comparison was added to provide additional reliability for the latent construct on the advice of those authors. Table 7 provides the finalised list of statements which will be utilised in the survey as reflective indicators of competitive advantage.

Indicator	Statement
CAD1	Relative to your competitors, how has organisation performed over the last year in the following area – Sales Growth.
CAD2	Relative to your competitors, how has organisation performed over the last year in the following area – Market Share.
CAD3	Relative to your competitors, how has organisation performed over the last year in the following area – Profitability.
CAD4	Relative to your competitors, how has organisation performed over the last year in the following area – Overall.

Table 7: Indicators of Competitive Advantage

As competitive advantage was the primary dependent variable it was decided that this set of statements would be structured in a slightly different way in the survey instrument (Podsakoff et al. 2003). All other indicators in the survey were assessed on a 5 point Likert scale; however a 7 point scale was used for the statements on competitive advantage. The indicator statements were also presented in a matrix structure in the final survey instrument as opposed to a set of discrete questions. This provided a visual “breakpoint” in the survey instrument, refocusing respondents’ attention through a change in layout (Dillman 2007). Feedback from the pilot testing indicated that the modified structure and layout of this set of questions was successful in this regard.

4.9 Environmental Dynamism

Environmental dynamism relates to external technological and competitive pressures that apply to the industry and marketplace that an organisation operates in. Organisations operating in high dynamism environments will experience substantial competitor activity and rapid changes in customer preferences and IS/IT business requirements with the opposite occurring in low dynamism environments (Pavlou and El Sawy 2011). Prior RBV related research examining the concept of environmental dynamism including Pavlou and El Sawy (2011) and Drnevich and Kriauciunas (2011) was used to identify appropriate measurement indicators.

The environmental dynamism factors of competitor, customer and technological pressures collectively impact the opportunities and risks faced by an organisation. These pressures are expected to modify the relationships hypothesises in the structural model proposed in the previous chapter. Table 8 provides the finalised list of statements which will be utilised in the survey as reflective indicators of environmental dynamism.

Indicator	Statement
ENV1	The technology in our industry is changing rapidly.
ENV2	In our kind of business, customers' preferences change quite a bit over time.
ENV3	It is very difficult to predict who might be our future competitors.
ENV4	One hears of a new competitive move almost every day.
ENV5	It is difficult to predict customer preference changes in our marketplace.
ENV6	It is very difficult to forecast where the technology in our industry will be in the next 2 to 3 years.

Table 8: Indicators of Environmental Dynamism

The pilot test survey had eight proposed indicator statements for this latent construct. The feedback received following pilot testing identified that two of the statements were essentially duplicates of ENV1 and ENV4 except written as reverse coded statements.

Following the guidance of Podsakoff et al. (2003), it was determined that no reverse coded statements would be used in the survey to avoid measurement error. Accordingly the two reverse coded statements were removed from the final survey instrument.

4.10 Conclusion

This chapter has identified that CIO leadership capability, IT project capability, IT service capability, environmental dynamism and competitive advantage can each be assessed via the use of first order reflective latent constructs. It was also determined that organisational culture of business-IT alignment and AIS performance would be most appropriately assessed through second order formative constructs with two first order reflective sub-constructs. The inclusion of formative constructs in a measurement model introduces specific statistical requirements which will need to be addressed during the analysis of the data collected (Becker et al. 2012, Hair et al. 2011).

Indicator statements for each of the constructs under study have been adapted from previous research using latent constructs to assess similar concepts. Some of the indicator measures have been adjusted to better align with the definition of the constructs under study in this thesis. Some indicator statements were removed and others amended following eternal validity checking via a pilot test of the survey instrument. While substantial efforts were made to maximise validity and reliability of the indicators measures for the constructs prior to data collection, the validity and reliability of the reflective indicators and constructs can only be confirmed via post-hoc statistical testing of the collected data as outlined in the following chapter.

Chapter 5 Measurement Method

5.1 Introduction

This chapter describes the data collection process undertaken for this thesis. This includes an explanation of the reasoning behind the selection of a survey based collection method and the design and deployment of the survey. Summary statistics of the response data are provided along with the results of reliability and validity testing of the data, latent constructs and proposed structural model. This chapter also addresses the steps taken to avoid and check for common method bias, non-response bias and other data quality problems.

5.2 Selection of Data Collection Method

No existing reports, databases or other readily attainable records contained the data required to test the proposed hypotheses. Therefore a substantial part of the research effort involved collecting appropriate data from organisations. As the constructs developed in the previous chapter relate to perceptions about performance and quality, the data collection could be undertaken via “Delphi” expert panel (De Haes and Van Grembergen 2009), case study or by a survey approach. Utilising the expert panel or case study approach to obtain direct evidence from CIOs, executive management, operational managers, IT managers and human resource professionals would be a useful way to obtain in-depth qualitative data. These approaches would also be useful in exploratory research as they are likely to provide rich data sets for in-depth examination. However these approaches require a substantial investment of time and effort per organisation reviewed, generally reducing the number of organisations that data can be gathered from. This would in turn reduce the generalisability of any findings.

A survey based data gathering approach provides the potential to capture data from a large number of organisations and is more facilitating of a quantitative approach to analysis; but of course these benefits would be obtained at the expense of detail and qualitative content. The number of persons within each organisation that can participate in a survey process would be restricted and survey methods substantially reduce the ability to obtain complex responses to issues of interest. Given that most of the concepts under consideration have been explored by prior research and the hypotheses are more confirmatory than exploratory in nature, a quantitative approach allowing for greater generalisability is likely to provide greater potential for meaningful contribution to the existing body of knowledge regarding RBV and IT governance. For these reasons a survey based data gathering method was selected.

Careful consideration must be taken in regards to maximising the valid data points for analysis while still obtaining sufficiently detailed survey data to enable meaningful analysis. An important factor in collecting organisational observations is to determine whether to collect observations from a single employee's perspective, or attempt to collect multiple points of view from a variety of employees within each organisation. Obtaining survey responses from multiple persons with differing roles within the organisation will almost certainly enrich the data collection due to the additional number of perspectives and opinions captured; however the difficulty in ensuring participation of more than one person within each organisation makes this approach prone to substantially lower response rates. Using a single respondent per organisation approach is likely to improve response rates at the risk of reducing the depth of the response data and may also introduce some error due to the potential for the single respondent to lack sufficient organisational knowledge to answer questions relating to all the constructs under examination.

With reference to these considerations, it was determined that a single respondent survey would be utilised due to the difficulty in obtaining responses from multiple organisational representatives with sufficient seniority to accurately assess the governance mechanisms. The determination to utilise a single organisational respondent then requires further consideration as to which role the respondent should have within the organisation and what organisational information such a respondent will generally possess. This in turn has implications for the measurement approach and indicator statements for the latent constructs under study.

The ideal respondent for this survey would have awareness of organisational culture and management capabilities as they relate to IT, be an experienced user of organisational accounting information systems, and possess an understanding of organisational competitive performance. A senior IT executive, such as the CIO, may meet these requirements; however the research requires an assessment of effective IT leadership as well as the performance of other IT management capabilities. CIO responses in this situation create an elevated risk of self-reporting bias. The ideal respondent should possess an awareness of IT issues at a managerial level but not be directly responsible for IT performance. The respondent also needs to be a user of the organisation's AIS but not hold responsibility for the technical performance of this system. Finally, the respondent needs sufficient seniority so that they are aware of the comparative competitive performance of the organisation (Henri 2006), and should have held the position for a reasonable period of time. Considering these factors it was determined that the target respondent should be a senior manager or executive within the organisation with accounting or financial responsibilities, holding a title similar to Chief Financial Officer, Finance Director, or Senior Commercial Manager.

5.3 Survey Instrument Design

The pilot and final survey instruments were constructed and delivered using the online survey tool "Surveymoz" (www.surveymoz.com). The design of the survey was undertaken with reference to the guidance provided by Dillman (2007). An Internet-based survey for data collection was chosen as the sole delivery method, as opposed to a hard copy survey delivery or combination of these methods, primarily to reduce the potential for answer miscoding and certain other methodological errors that can occur when utilising manual methods. This methodological choice is supported by prior research which has found that survey responses completed via web based methods have been found to be statistically equivalent to those completed by paper based methods (Grandcolas et al. 2003).

Each of the construct indicators identified in the previous chapter were coded into the survey application. In addition to the construct indicators, the survey asked respondents to provide information about their job title, length of service in that position and in the organisation overall, the industry their organisation primarily operates in, and the size of the organisation in terms of gross revenue and number of employees.

Six academics and five professionals were asked to review the survey instrument and provide feedback on the style, length, content and relevance of the survey. The academic reviewers came from several disciplines including accounting, information systems, management and organisational psychology. The practice based reviewers were selected due to their current or previous experience as senior financial or accounting executives in organisational settings. Each pilot tester was asked to review the introduction email and survey instrument. Feedback was sought in regards to presentation quality, clarity of wording, and question relevance, as well as the overall length of survey. The feedback received from the reviewers lead to a number of changes to the overall presentation of the

survey and the introduction letter, as well as the removal of some survey questions and question wording changes for clarity purposes as detailed in the previous chapter.

Common method bias is a known issue when collecting empirical observation data from a single source. The primary concern with common method bias is that it may substantially inflate the correlation between indicators and their construct, and correlations between constructs, resulting in spurious positive findings. With respect to the present research, there are several specific potential sources of common method bias identified by Podsakoff et al. (2003) that bear specific attention:

1. Implicit theories or illusory correlation – this form of bias may occur where the respondent, consciously or otherwise, attempts to interpret the goals of the research and provides answers in line with the imagined theory.
2. Social desirability – this form of bias may occur where the respondent feels compelled to answer in a certain way due to social pressures or to present themselves in a favourable light.
3. Leniency bias – this form of bias may occur where the respondent is answering questions relating to a person that they have a substantial positive or negative connection with.
4. Item complexity and/or ambiguity – this form of bias may occur where constructs and indicators have an inherent complexity or are worded in such a way that their meaning is not clear to the respondent.
5. Scale format and answers – The use of similarly scaled and formatted questions has been suggested to artificially increase the co-variation of responses.
6. Time and location of measurement – Obtaining measures of both predictor and dependent variables at the same time using the same instrument may cause the respondent to form implicit associations between the constructs.

Podasakoff et al. (2003) suggest that common method bias should primarily be controlled through the application of procedural remedies in the design of the data collection process as opposed to attempting post-hoc statistical remedies. While the procedural and design methods which can be applied to this research are limited due to the data collection method chosen, the issues identified above were considered and addressed where possible in the survey design and deployment. A copy of the final survey instrument is contained as Appendix 6.

Podsakoff et al. (2003) advise against complete randomisation of the indicator questions due to the cognitive displacement this can cause in the respondent. While all indicators for each construct remained as a group (i.e. all questions relating to the CIO were presented together); each group of questions were presented in a random order with no correlation to the theorised structural model to reduce the potential of implicit theory building by respondents.

In order to address concerns for social desirability and leniency bias, respondents were advised that survey responses were anonymous and would be held in confidence. Additionally, obtaining responses from senior financial managers as opposed to senior technology managers reduces the likelihood of social desirability bias in relation to self-promoting responses.

There was some initial concern in regards to the complexity of certain indicators. A number of the questions which respondents would be answering related to information technology concepts as opposed to finance or accounting issues. However the adjustments made to the survey questions following the feedback from the pilot testers working in senior finance and accounting roles have addressed the problems identified with regards to question complexity.

While the use of a common scale across indicators may also artificially inflate the correlation between indicators as well as predictor and dependent variables, use of varying indicator scales can cause measurement error as respondents will lack a useful reference point with which to scale their responses. As either varied or common scale indicators may cause statistical problems, it was decided that a middle ground would be taken, where five point scales would be used for the indicators of the explanatory variables and a seven point scale would be used for competitive advantage, the primary dependent variable in this study. The statistical differences resulting from the use of five and seven point Likert scales for collecting survey response data has been determined to be negligible (Dawes 2008).

While Lindell and Whitney (2001) advocate the use of a marker variable to check for common method bias there have been substantial concerns raised regarding the value of this approach (Sharma et al. 2009, Podsakoff et al. 2003). In addition to this, the cognitive concern that may arise in respondents when they observe a clearly unrelated series of questions was considered to be a substantial risk factor in regards to increasing the number of non-response surveys. On this basis it was determined that the survey would not include indicators for a marker variable.

5.4 Survey Delivery and Response

The contact data for potential respondents was purchased from a marketing database provider – IncNet. IncNet supplied the name, organisation, position title, and contact details for persons employed in financial responsibility positions, at the first and second level of authority, in Australian organisations with a reported revenue larger than $100 million AUD and with more than 50 employees. A total of 1,637 contacts were obtained from the provider. Contacts were excluded from the final potential respondent list if they

were employed in inappropriate organisations, held a position titles that was not suitable for the survey, or were employed within the same organisation as another selected contact.

Organisations were considered inappropriate for involvement in the data collection if they were too small, were government agencies or were otherwise considered "not-for-profit", as this would invalidate the measures used for comparative competitive advantage. Respondents with position titles that implied they may not be a member of senior management, such as "Accountant" were excluded on the basis that the respondent may not possess sufficient high level organisational knowledge to answer the survey effectively. Finally online searches were made to determine if there was a record of the potential respondent leaving the organisation, and these potential respondents were also removed from the list. Table 9 displays the results of this contact exclusion process. The remaining 1,006 contacts were used as the potential respondent base.

Total Contacts Provided	**1637**
Contacts excluded due to same organisation as another contact	414
Contacts excluded due to inappropriate industry	62
Contacts excluded due to inappropriate role	36
Contacts found to have left organisation	117
Duplicate records	2
Total Contacts Excluded	**631**
Potential Survey Recipients	**1006**

Table 9: Exclusion of contacts

Dillman (2007) suggests that potential respondents should be alerted to the survey with a preliminary notification prior to actually providing access to the survey. Providing potential respondents with an introduction to the researcher and research topic prior to making the demand on their time in regards to completing the survey would appear to be useful when dealing with time poor respondents, particularly where the time required to complete the

survey is substantial. However in this case there were several factors which indicated that a more direct approach to inviting survey participation would be more appropriate.

Feedback from the pilot testing indicated that the survey could be completed within ten minutes. Given this relatively small amount of time, the advertisement of this fact may influence the potential survey respondents to complete the survey immediately upon receipt of the survey notification. Secondly, given that that the delivery of the survey and survey notifications was only through electronic means, feedback from the pilot testing indicated that recipients may read the first email sent by a researcher but ignore further emails once they became aware of the sender's purpose. As a result the initial email contained a direct invitation and link to the survey.

The initial survey invitation was sent out on 18 November 2013 and the final follow-up on 14 January 2014. The last survey response was received on 24 January 2014. Copies of the three invitation emails are contained in Appendix 5. The initial invitation was sent to the 1,002 potential respondents via email; however 183 of these emails were returned undelivered with error messages indicating that that email address was not valid. This indicated that the potential contact was no longer employed by the organisation. As a result, the final number of survey recipients was ascertained to be 823. Following Dillman (2007), two reminders were sent to all potential respondents who had not advised that they had completed the survey or did not want to participate in the survey through a response to the email invitation.

A total of 222 responses were received during the survey period and all responses were examined to ensure that they met required response characteristics. Responses were excluded from further analysis where the respondent did not complete all survey answers, did not have an appropriate position title, indicated that they had worked in the organisation for 1 year or less, worked in organisation/industry settings that provided

information systems or processes to client organisations, or worked in organisations with less than 50 employees or with less than $30 million AUD in revenue. The Internet survey tool was able to track the amount of time respondents took to complete the survey with the average length of completion being 9 minutes. Responses from survey respondents that took less than 5 minutes to complete the survey were also excluded on the basis that the respondent may not have taken the time to fully comprehend the survey questions. A final useable response rate of 22.5% was considered satisfactory considering that the survey was administered via electronic means. Table 10 summarises the statistics regarding the invitations and responses to the survey.

Potential Survey Recipients	**1006**
Emails returned undelivered	183
Total surveys delivered	**823**
Responses received after first notification	114
Responses received after second notification	58
Responses received after third notification	29
Total Survey Responses Received	**222**
Partial Responses excluded	21
Total Complete Responses Received	**201**
Excluded responses:	
Industry of Organisation	2
Size of Organisation (Employees or Revenue)	6
Respondent title	1
Respondent experience	4
Time to complete	3
Final Sample	**185**
Usable Response Rate (Final Sample/Total Surveys Delivered)	**22.5%**

Table 10: Survey Response Statistics

The respondent information from the usable surveys was reviewed to identify trends in respondent background information, particularly if there was evidence to indicate that certain industry sectors were over or under represented in the sample data. Table 11 provides a breakdown of the usable survey responses by ANZSIC industry sector.

Industry Sector	Responses
Agriculture, Forestry and Fishing	3
Mining	4
Manufacturing	46
Electricity, Gas and Water	6
Construction	19
Wholesale Trade	26
Retail Trade	15
Accommodation, Cafes and Restaurants	5
Transport and Storage	9
Communication Services	8
Finance and Insurance	11
Property and Business Services	21
Government Services & Defence	1
Education	1
Health and Community Services	7
Cultural and Recreational Services	2
Other	1

Table 11: Industry Response Statistics

The low participation rates of certain sectors, such as education and health and community services, is to be expected as the survey targeted organisations which are explicitly "for-profit" as these industry sectors contain higher numbers of not-for-profit organisations. During the survey there were several respondents from the accommodation industry who declined the survey invitation, providing an explanation that they do not complete surveys under any circumstances. It is possible that this is a standard approach to surveys in this industry, resulting in the very low response rate from this sector. Conversely the higher response rates from organisations operating in manufacturing, wholesale trade, communication services, finance and insurance, and electricity, gas and water may be partly explained by the increased reliance of these organisations on information systems and technology for business process support when compared with organisations from other sectors.

Regardless of actual causes driving the observed industry participation rates, it is possible that the results of this analysis may be more applicable to organisations operating in

manufacturing, construction, trading, finance, insurance, property and other business services due to the higher number of responses from these industry sectors. The applicability of the findings for the remaining industry sectors may need to be considered in light of their lower participation rates.

The size of organisations participating in the research varied considerably with a median of $180 million AUD revenue and 600 employees. In particular there were several responses from very large organisations well above the median organisational size. Table 12 displays the size statistics of the participating organisations.

Size Category	Min	1st Quartile	Median	3rd quartile	Max
Revenue ($AUD millions)	--	70	180	500	$60,000
Revenue (excluding Non-reports)	30	99	213	724	$60,000
Employees	50	240	600	1,750	300,000

Table 12: Organisational Size Statistics

The intended survey respondents were senior level managers with sufficient understanding of the cultural environment, executive performance, IT management capabilities and accounting and financial IS/IT in place at their respective organisation. While efforts were made to ensure that survey requests were sent to respondents who held these roles, it was still likely that responses would be received from employees who were very new in their positions or held different employment positions than first thought. Accordingly the survey required all respondents to enter their position title as well as provide their length of employment in that role and overall with the organisation. Table 13 provides a summary of the job titles of the survey respondents that were retained in the sample.

Title	Responses	%
CEO/Managing Director	2	1.1%
CFO/Deputy CFO	38	20.5%
Commercial/Operations Manager	12	6.5%
Finance Director/Manager/Controller/Treasurer	93	50.3%
GM Finance	18	9.7%
Group CFO/Financial Controller/Finance Director/Finance Manager	22	11.9%
Total	**185**	

Table 13: Respondent Title Statistics

5.5 Data Validity and Reliability Tests

This section provides details of the data validity and reliability checks undertaken on the raw indicator data as well as the latent constructs generated from the indicator data. IBM SPSS (Version 21) was used to assess the univariate statistical properties of the indicator and construct data. The unstandardized latent construct values generated by the SmartPLS software (Smart PLS 3.1) were used for the construct univariate data analysis.

It is common for data collected through Likert scale indicators to follow either normal or gamma distribution patterns (Zeis et al. 2001). Examination of data skewness and kurtosis was undertaken to confirm data distribution characteristics. Data sets can be considered normally distributed if the values of their skew and kurtosis divided by the standard error are less than -2 or greater than 2. Data sets that exceed these values possess non-normal distributions (Cramer 1997: 85-87). Appendix 7 contains a full listing of the indicator and construct descriptive statistics.

The majority of indicators and constructs had a significant negative skew and many indicators and constructs also demonstrated significant kurtosis effects. Due to these non-normal distribution patterns it was considered appropriate to utilise partial least squares regression and bootstrapping techniques as the primary data analysis techniques, as these

are non-parametric in nature and do not operate under the assumption that data is normally distributed.

Analysis of the descriptive statistics also found that the mean values of most indicators and constructs assessed on a 5 point Likert scale were between 3.25 and 4. The mean values for the management reporting AIS performance indicators were substantially higher than the mean values of indicators relating to future-oriented AIS performance. This difference may be due to the increased complexity of future-oriented AIS functionality when compared to management reporting AIS functionality. A further observation is that most of the IT project capability indicators reported much lower mean values than the indicators of other constructs. This is not unexpected as academics and industry reports have continued to identify that successful completion of IT projects is an ongoing struggle for many organisations (Nelson 2007, Eveleens and Verhoef 2010).

While the response rate to the survey was substantial, it is still possible that the data may be affected by non-response bias. If present, non-response bias implies that the data collected is not entirely random on the basis that the characteristics of survey respondents differ to those that do not respond. This often results in an over representation of positive responses to the survey questions. Non-response bias is a concern that limits the generalisability of any findings to these "interested" organisations.

Armstrong and Overton (1977) postulate that survey responses from recipients who complete the survey towards the end of the testing period, generally after several reminders, will have similar characteristics to those recipients who do not complete the survey at all. Accordingly these authors propose that the presence of significant differences between early and late responses to a survey may be indicative of non-response bias. While this style of response "wave" analysis is considered to have low explanatory power (Rogelberg and Stanton 2007) , the source of data and anonymous

response process utilised in this present research prevents the application of other suggested methods such as the use of comparable archival data, follow-up of non-respondents and benchmarking analysis.

To conduct the non-response bias test, the sample data was divided into two sub-sets: 105 responses received prior to the second survey notification and 80 responses received after the second and third notifications. Levene's test of independent samples was undertaken which found that three measurement indicators had a significantly (< 5%) different mean in the early respondent set when compared with the late respondent set. The results of the independent samples test for these three indicators are contained in Table 14:

	Levene's Test		t-test for Equality of Means					
							Confidence Int.	
	F	Sig.	t	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PBF4	1.199	.275	-3.857	<.001	-.580	.150	-.877	-.283
PBF6	1.964	.163	-2.655	.009	-.457	.172	-.796	-.117
MRS5	13.479	.000	-1.992	.048	-.321	.161	-.639	-.003

Table 14: Levene's Test of Independent Samples

This result demonstrates that differences between the means of the two sets of responses is not a widespread problem; however it is interesting to note that the three indictors (refer to Table 15) which do have a significant mean difference are all AIS performance measures, and in each case the mean of the late respondents' responses was higher than those of the early respondents.

Indicator	Question
PBF4	The planning, forecasting and budgeting systems support the planning of a wide range of performance indicators
PBF6	The planning, forecasting and budgeting systems strongly support multidimensional planning (e.g. by product line, region, distribution channel, etc)
MRS5	The management reporting systems strongly support multidimensional reporting (e.g. by product line, region, distribution channel, etc).

Table 15: Indicators Identified in Levene's Test

The analysis of the early and late respondents also identified a higher percentage of respondents from the retail and wholesale trade industries in the late sample (30% of responses) than in the early sample (16% of responses). The reason for the delayed response from participants in these industries is possibly that the survey was released at the end of the calendar year, a very busy time period for the retail and wholesale trade industries. This industry variance provides a potential explanation for the differences in these AIS indicators as well. The majority of retail and wholesale trade organisations handle a large variety of products when compared with other industries and this would increase the likelihood of retail and wholesale trade organisations requiring multidimensional planning and reporting. A Mann-Whitney independent samples test was undertaken on the distribution of the latent construct scores generated by Partial Least Squares calculation for the early and late respondents. This test found no significant differences between the latent construct scores generated by the early and late responses.

Post-hoc statistical tests are not considered to be a completely satisfactory method for identifying the presence of common method bias (Sharma et al. 2009). However the use of Harman's single factor test may identify if there is substantial common method bias problems present within the data, even though it cannot entirely rule out the presence of common method bias. A Harman single factor test identifies if the majority of the variance in the model can be explained through a single factor. Running the test with no rotation across the set of 55 indicators identified 12 factors with eigenvalues greater than 1.0 with

the first of these factors explaining 23.7% of total variance. These results indicate that there is no single factor that explains the majority of the variance in the results.

5.6 Partial Least Squares Regression

Partial Least Squares (PLS) path modelling is a structural equation modelling (SEM) technique developed by Wold (Wold et al. 1984) using a sequence of regressions on component weight vectors. PLS estimates construct item loadings of exogenous constructs based on their capacity to predict connected endogenous constructs, thereby maximising the explained variance in a structural model. The PLS algorithm undertakes an iterative estimation of latent variable scores much like co-variance based SEM; however the PLS algorithm is variance-based, allowing for the direct calculation of formative constructs in the structural model. Co-variance based SEM cannot calculate formative constructs directly, making component based PLS-SEM the preferred method for modelling formative constructs (Wetzels et al. 2009).

Bootstrapping is a non-parametric statistical process which can be used to determine the statistical significance of the outer weights, construct indicator loadings and path coefficients of a structural model (Hair et al. 2011). The bootstrapping process involves taking a set number of observations from the original set of samples, noting that each observation may be sampled one or more times, to create a large data set which is used to estimate the standard error present in each weight, loading and coefficient.

While increasing the number of samples taken during the bootstrapping process enhances the reliability of the standard error estimates, the final standard error estimates may change slightly when comparing two different bootstrap processes run on the same data set. This is caused by differences in the samples being selected in the two processes;

however it does not significantly impact the reliability of the bootstrap process assuming a sufficiently large number of samples are taken. Following the advice of Hair et al. (2011) a bootstrap of 5,000 samples was used for each of the PLS regressions undertaken in Chapter 6.

There are a number of advantages in utilising a PLS based analysis method for this analysis, most notably the capacity to easily manage formative constructs in the path model. The other primary reason for the use of PLS as opposed to co-variance based SEM is that PLS is generally better at handling independent variables with non-normal distributions and which possess some level of collinearity (Gefen and Straub 2005).

It was also considered more appropriate to utilise PLS for the moderation analysis (Low and High Dynamism samples). When there are multiple moderation effects expected across several paths in the model it is often more efficient and informative to conduct a multi-group analysis (MGA). An MGA is undertaken by splitting the full sample into sub-samples with regards to the expected moderation variable. In this research, the data collected regarding the environmental dynamism experienced by the respondent's organisation has been used to divide the full response data set into high and low dynamism groups. This is the same approach as utilised in Peters and Wieder (2013).

The sub-sample size for the moderation analysis falls just below the generally recommended low end size of 100 samples for co-variance based SEM but still meets the criteria for low PLS sample size of 10 times the number of items contained in the most complex construct. SMARTPLS version 3.2.1 (Ringle et al. 2015) was used to perform the PLS and bootstrapping analysis on the data. Prior to assessing the results of the PLS regression, the indicator reliability and the convergent and discriminant validity of each of the latent constructs has been assessed to determine if there are any statistical concerns regarding these constructs (Hulland 1999).

5.7 Indicator reliability and validity – Reflective Constructs

The PLS regression algorithm calculates indicator loadings for each reflective construct which reflect the correlations between each indicator and the construct to which it is assigned. A standard rule of thumb is that construct indicators that have a loading of 0.7 or more are sufficiently correlated with the other indicators to be considered appropriate for use in a reflective construct. A loading factor above this value demonstrates that most of the variance observed in the indicator is explained by the latent construct. In practice it is common to find indicators that are still appropriate to retain that fall below the 0.7 threshold (0.6-0.7) if there is a theoretical justification for their retention (Hulland 1999). Indicators that reported a value of less than 0.7 were reviewed for theoretical relevance and retained as they were still reasonably strong indicators and the average variance extracted (AVE) for the affected constructs was at least 0.5 (Ringle et al. 2015). Appendix 8 contains the loading and cross-loading factors for the indicators and their respective first-order constructs.

From a validity perspective, the indicators for reflective constructs should also load onto their respective constructs with a significant t-value (Gefen and Straub 2005). The significance of the indicator loadings can be ascertained through a bootstrapping process run through SmartPLS. Using the recommended settings of 5,000 samples and no sign changes, a bootstrap sample was created with the SmartPLS Bias-Corrected and Accelerated Bootstrapping method (Ringle et al. 2015). Table 16 demonstrates that all indicators report a t-value in excess of 1.96 and therefore have significant loading on their assigned construct.

	Original Sample (O)	Sample Mean (M)	Std Error (STERR)	T Statistic (|O/STERR|)
Competitive Advantage				
CAD1 <- CAD	0.951	0.949	0.039	24.462
CAD2 <- CAD	0.912	0.91	0.042	21.831
CAD3 <- CAD	0.825	0.807	0.092	8.93
CAD4 <- CAD	0.954	0.944	0.056	17.147
CIO Leadership				
CIO1 <- CIO	0.672	0.666	0.069	9.723
CIO2 <- CIO	0.669	0.664	0.065	10.283
CIO3 <- CIO	0.887	0.885	0.02	45.393
CIO4 <- CIO	0.82	0.818	0.032	25.376
CIO5 <- CIO	0.834	0.834	0.023	36.42
IT Project Capability				
ITP1 <- ITP	0.857	0.856	0.024	35.023
ITP2 <- ITP	0.781	0.779	0.035	22.067
ITP3 <- ITP	0.796	0.794	0.038	20.991
ITP4 <- ITP	0.851	0.85	0.024	35.198
ITP5 <- ITP	0.831	0.83	0.027	30.869
IT Service Capability				
ITS1 <- ITS	0.742	0.735	0.053	14.016
ITS2 <- ITS	0.815	0.813	0.034	24.011
ITS3 <- ITS	0.798	0.797	0.029	27.428
ITS4 <- ITS	0.808	0.807	0.037	21.997
ITS5 <- ITS	0.836	0.835	0.031	27.108
Management Reporting AIS				
MRS1 <- MRS	0.755	0.753	0.034	21.962
MRS2 <- MRS	0.722	0.721	0.044	16.404
MRS3 <- MRS	0.675	0.673	0.051	13.113
MRS4 <- MRS	0.714	0.713	0.046	15.669
MRS5 <- MRS	0.777	0.777	0.033	23.309
MRS6 <- MRS	0.836	0.836	0.027	30.735
Future-oriented AIS				
PBF1 <- PBF	0.769	0.768	0.039	19.745
PBF2 <- PBF	0.794	0.793	0.031	25.398
PBF3 <- PBF	0.816	0.817	0.025	32.587
PBF4 <- PBF	0.742	0.74	0.044	17.024
PBF5 <- PBF	0.62	0.617	0.065	9.613
PBF6 <- PBF	0.694	0.693	0.042	16.38
Business-IT Alignment				
CUL1 <- BUS-IT	0.66	0.657	0.057	11.593
CUL2 <- BUS-IT	0.698	0.695	0.053	13.119
CUL3 <- BUS-IT	0.752	0.751	0.04	18.798
CUL4 <- BUS-IT	0.725	0.724	0.043	16.714
IT-Business Alignment				
CUL5 <- IT-BUS	0.839	0.839	0.025	34.052
CUL6 <- IT-BUS	0.844	0.844	0.027	31.14
CUL7 <- IT-BUS	0.743	0.741	0.039	18.937
CUL8 <- IT-BUS	0.747	0.746	0.04	18.793

Table 16: Construct-Indicator Loading Significance

5.8 Construct Validity – Reflective Constructs

While the indicators of each construct have sufficient reliability and validity, the overall latent construct must also be examined for convergent and discriminant validity to ensure internal consistency. Convergent validity, also referred to as composite reliability (Hulland 1999), refers to the degree to which each of the latent constructs' indicators are related. Discriminant validity, on the other hand, refers to the degree by which the indicators of a particular latent construct relate specifically to that particular latent construct rather than the other latent constructs under study. Assessed together, convergent and discriminant validity provide an assessment of whether latent constructs in the measurement model have been specified correctly.

Convergent validity is initially assessed through examination of the average variance extracted (AVE) by each construct, with values of at least 0.5 being ideal (Hair et al. 2011). Further statistical analysis of convergent validity can include the use of Cronbach's Alpha, however Fornall and Lacker's (1981) test of composite reliability is considered a more appropriate method to apply during PLS analysis as it does not assume all indicators are equally reliable (Hair et al. 2011). Constructs which score in excess of 0.7 in these tests are considered to have sufficient convergent validity.

Table 17 reports the AVE, Cronbach's Alpha and composite reliability statistics for each reflective construct. The results indicate that the constructs generally met all three convergent validity tests (Hair et al. 2011); although the Cronbach Alpha scores for the Business-IT culture sub-construct reports a value of just under 0.7. As mentioned above, the composite reliability scores are considered more valid for this form of analysis.

Construct	AVE	Cronbachs Alpha	Composite Reliability
CIO Leadership	0.610	0.844	0.885
Bus-IT Alignment	0.504	0.671	0.802
IT_Bus Alignment	0.631	0.804	0.872
IT Service Capability	0.640	0.860	0.899
IT Project Capability	0.679	0.882	0.913
Future-oriented AIS	0.551	0.835	0.880
Management Reporting AIS	0.560	0.842	0.884
Competitive Advantage	0.832	0.934	0.952

Table 17: Measures of Convergent Validity

There are a number of methods which can be used to assess the discriminant validity of reflective constructs. The most widely utilised methods include the examination of indicator cross loadings, which assess the loadings of all indicators against all constructs to determine if the loading on the desired construct is sufficiently higher than on any other construct, and the Fornell-Larcker criterion; which suggests that constructs possess sufficient discriminant validity when the square root of the average variance extracted (AVE) for each latent construct is higher than the highest correlation with any other latent construct (Fornell and Larcker 1981). However both the cross loading method and the Fornell-Larcker criterion have been found to be potentially flawed in their underlying assumptions, particularly in relation to variance based structure equation modelling, as undertaken in PLS analysis (Henseler et al. 2015). Statisticians conversant in variance based structural equation modelling have recently developed a new method for determining the discriminant validity of latent variables, the heterotrait-monotrait (HTMT) ratio of correlations (Henseler et al. 2015).

Henseler et al. (2015) state that a strict test of discriminant validity is observing the HTMT values generated between two latent constructs are less than 0.85. Any pair of constructs with a HTMT score above this threshold could essentially be the same concept. Table 18

contains the HTMT values for the constructs under study in this thesis. While all constructs meet the strict criterion for discriminant validity it is useful to note that the two organisational culture constructs (Bus-IT and IT-Bus) and the two AIS constructs (FO AIS and MR AIS) possess high HTMT values, indicating a strong correlation between these construct pairs. This is unsurprising as these concepts are related; however the HTMT results validate the approach to separate these indicators into separate constructs.

	BUS-IT	CAD	CIO	ITP	ITS	IT-BUS	MR AIS	FO AIS
BUS-IT								
CAD	0.271							
CIO	0.385	0.157						
ITP	0.433	0.251	0.571					
ITS	0.572	0.088	0.458	0.592				
IT-BUS	0.801	0.249	0.539	0.55	0.357			
MR AIS	0.268	0.142	0.43	0.457	0.336	0.276		
FO AIS	0.38	0.339	0.369	0.451	0.389	0.363	0.762	

Table 18: HTMT Values for Discriminant Validity

Table 19 provides a comparison of the square root of the AVE of each latent construct against the highest Spearman's Rho correlation with any other construct. This demonstrates that all the reflective latent constructs also meet the Fornell and Larcker (1981) criterion for discriminant validity. The indicator cross loadings presented in Table 16 above demonstrate that the constructs also meet the cross loading test for discriminate validity as well.

	Bus-IT	CAD	CIO	ITP	ITS	IT-Bus	MR AIS	FO AIS
Bus-IT	**0.710**							
CAD	0.218	**0.912**						
CIO	0.314	0.132	**0.781**					
ITP	0.334	0.233	0.526	**0.824**				
ITS	0.436	0.046	0.432	0.523	**0.800**			
IT-Bus	0.593	0.214	0.468	0.463	0.303	**0.795**		
MR AIS	0.189	0.126	0.384	0.396	0.279	0.227	**0.748**	
FO AIS	0.275	0.303	0.328	0.392	0.327	0.288	0.655	**0.742**

Table 19: Fornell Larcker Criterion for Discriminant Validity

It should be noted that the Business-IT construct reports an AVE of less than 0.5 in the low dynamism sub-sample, although the composite reliability and HTMT criterion values are still in acceptable ranges.

5.9 Construct Validity – Formative Constructs

As discussed in the previous chapter, formative constructs are substantially different to reflective constructs from both a theoretical and statistical point of view. Because the elements of formative constructs should not be significantly correlated, it is not possible to utilise a correlation based analysis to determine the validity of a formative construct (Petter et al. 2007). From a measurement perspective, the second-order formative latent variables were calculated following the guidance of Wetzels et al. (2009). Specifically the second-order formative latent variables, culture of business-IT alignment and AIS performance, were constructed using the block of underlying first-order indicators from the two underlying first order reflective constructs.

From a measurement perspective, the second-order formative latent variables were calculated following the guidance of Wetzels et al. (2009). Specifically the second-order formative latent variables, culture of business-IT alignment and AIS performance, were constructed using the block of underlying first-order indicators from the two underlying first order reflective constructs. While a lesser level of correlation and covariance is required between formative elements, the primary characteristic that differentiates formative from reflective is the direction of causality.

Formative constructs are also required to provide complete coverage of the expected inputs to the construct (Petter et al. 2007). Undertaking the measurement of a formative construct with significant indicators missing creates a bias problem equivalent to a

significant omitted variable in ordinary least squares regression (Diamantopoulos 2011). Both formative constructs utilised in the research model are comprised of two reflective sub-constructs. Therefore the validity of using a reflective-formative modelling approach should be assessed by determining whether each of the first order reflective constructs are distinct from the other, and whether the concept measured at the second level is sufficiently addressed by the combination of the concepts measured at the first level.

The discriminant validity tests presented in the previous section have identified that the first level sub-constructs used to create both second level formative constructs are all distinct constructs in their own right. While there is some level of correlation between the first order constructs it is not to a degree which would indicate they are measuring the same concept. Additionally, the convergent validity tests conducted on the four first order constructs indicate that all of these lower level constructs are best measured as reflective constructs rather than formative. The theory examined relating to culture of business-IT alignment construct strongly supports that this cultural mechanism is a two sided concept, requiring alignment from both IT and business directions.

The AIS performance construct has not been defined in prior literature which makes an assessment of formative factors difficult. As discussed in Chapter 2 there are other elements of AIS that may be considered related to performance, such as external financial and taxation regulatory reporting; however these elements were not considered relevant for obtaining competitive advantage (Becker et al. 2012).

The weights of the respective sub-constructs were calculated using the PLS algorithm and are reported in Figure 3 below. In the final structural model analysis, the latent variable scores calculated for the top level formative construct were substituted into the PLS algorithm to allow the algorithm to calculate the path coefficients leading to AIS performance. This is a common approach when handling an endogenous formative

construct in a path model, leaving the full reflective-formative model in place in the structural equation would crowd out the effects of any explanatory variables linked to the formative construct.

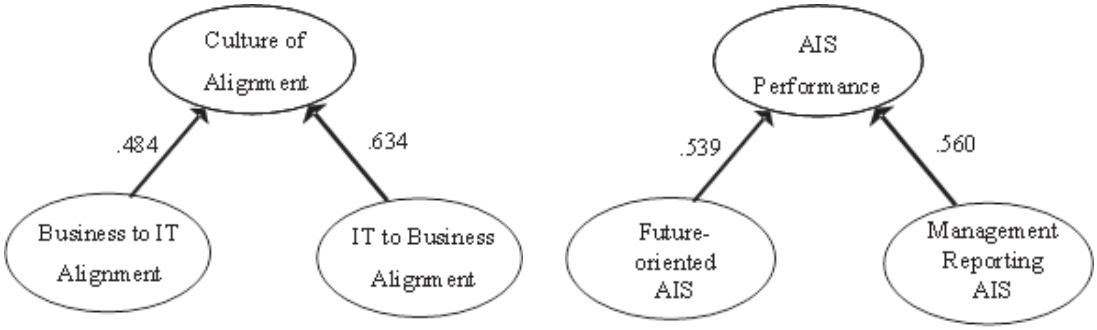


Figure 3: Formative-Reflective 2nd Order Constructs and Weighting Values

5.10 Structural Model Fit

There is some contention that the PLS algorithm does not provide a useful method for measuring the validity of the overall structural model (Aguirre-Urreta 2014, Rönkkö and Evermann 2013). However the standardised root mean square (SRMR) has been recently put forward as a meaningful statistical approach to identifying whether the structural composite factor model is a "good fit" for the underlying data (Henseler et al. 2014). It is suggested that a SRMR value of less than 0.10 indicates that the model tested is a good fit for the data under analysis. Using the results of a 5,000 iteration bootstrap, the SmartPLS3 application determined that the SRMR composite model value for the structural model shown in Figure 2 was 0.098 and therefore meets the fit criteria specified in Henseler et al. (2014), however it should be noted that this is a borderline result in relation to the benchmark.

5.11 Conclusion

The survey process was successful in collecting valid and reliable data to test the hypotheses and also achieved a substantive response rate. A review of the statistical characteristics of the survey data collected identified that the majority of the data is non-normally distributed and non-parametric analysis techniques such as bootstrapping and PLS will be preferred for analysis of this data. Statistical analysis of the constructed latent variables and the overall structural model has confirmed that the indicators, constructs and model all meet acceptable levels of validity and reliability. The next chapter will detail the findings of the structural model analysis.

Chapter 6 Data Analysis and Results

6.1 Introduction

This chapter reports on the results obtained from the PLS regression tests and bootstrap functions for the primary analysis model (Hypotheses 1-5) and two additional analysis models (Hypotheses 5a and 6). The SmartPLS 3 PLS algorithm and bootstrap functions generate a variety of statistical values pertaining to the performance of the structural model. These include path coefficients (direct effects), indirect effects, indicator loadings/weights, latent variable scores, residuals, R-square values, confidence intervals and t-statistics. SmartPLS 3 also provides the capacity to perform multi-group analysis, which identifies differences in the performance of the structural model for sub-samples of the main data set (Ringle et al. 2015).

With regards to the results presented in the following sections, the models were initially tested with organisational size used as a control variable. Organisational size was not found to be a significant explanatory factor for any of the endogenous variables and was removed from final model results.

6.2 Primary Model Results

The PLS analysis results of the primary structural model, displayed in Figure 4 and Table 20 below, broadly support all of the hypothesised relationships between constructs (Hypotheses 1 through 5). The hypothesised relationships between the IT governance capabilities and the IT management capabilities (Hypotheses 1 and 2) are strongly supported, as are the relationships between IT project capability and AIS performance (Hypothesis 3), and AIS performance and competitive advantage (Hypothesis 5). The relationship between IT Service capability and AIS performance (Hypothesis 4) is found to

be positive and significant in the primary analysis model, although it should be noted that this relationship was not significant in the additional analysis models.

The indirect effects of both relational IT governance mechanisms on competitive advantage and AIS Performance are significant, as are the indirect effects of IT project and IT service capabilities on competitive advantage (Table 20). While these indirect relationships are not addressed by formal hypotheses, they show that the effects of IT governance mechanisms flow through to competitive advantage through the constructs identified in the structural model as well as via other means that have not been modelled.

With regards to the R^2 values of the endogenous latent constructs, it is evident that the joint effects of the two IT governance relational mechanisms explain a moderate amount of the variation in both IT project (34%) and IT service capabilities (24%). Likewise the variance in the performance of organisational AIS is moderately well explained (20%) by the combination of the IT management capabilities, with IT project capabilities having a substantially more influential role than IT service capabilities. The amount of variation in competitive advantage explained by AIS performance is very low (6%), which is an expected result considering the multi-faceted and highly complex nature of competitive advantage (Barney 2001).

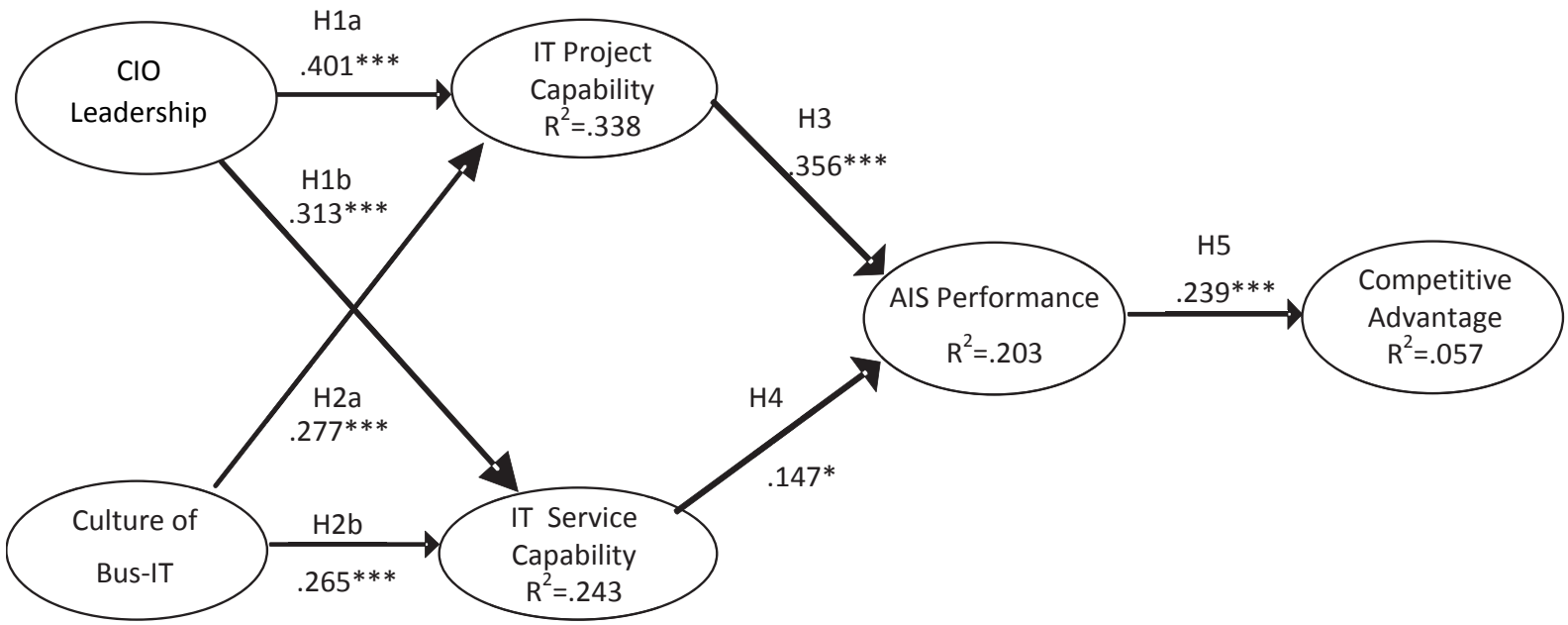


Figure 4: Primary Research Model

Direct Effects	Beta
CIO Leadership -> IT Project Capability	0.401***
CIO Leadership -> IT Service Capability	0.313***
Culture of Business-IT Alignment -> IT Project Capability	0.277***
Culture of Business-IT Alignment -> IT Service Capability	0.265***
IT Project Capability -> AIS Performance	0.356***
IT Service Capability -> AIS Performance	0.147*
AIS Performance -> Competitive Advantage	0.239***
Indirect Effects	
CIO Leadership -> AIS Performance	0.189***
Culture of Business-IT Alignment-> AIS Performance	0.138***
CIO Leadership -> Competitive Advantage	0.045***
Culture of Business-IT Alignment-> Competitive Advantage	0.033***
IT Project Capability -> Competitive Advantage	0.085***
IT Service Capability -> Competitive Advantage	0.035*

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 20: Primary Research Model Beta Values

6.4 Hypotheses H5a Test – Contrasting AIS functions

Hypothesis 5a proposed that the future-oriented component of AIS will have a stronger relationship with competitive advantage than the management reporting component of AIS. This hypothesis has been tested by altering the primary model so that only one of the AIS performance components is represented in the AIS construct, rather than both together as a formative construct. The PLS algorithm and bootstrapping was then run on both models, the first with future-oriented AIS performance and the second with management reporting AIS performance.

Initially an alternate structural path model including both the future-oriented AIS performance and management reporting AIS performance as separate constructs was considered; however the high correlation between the two AIS performance constructs causes a substantial suppression effect to occur (Cheung and Lau 2008). This suppression effect artificially inflated the strength of the relationship between future-oriented AIS performance and competitive

advantage, and deflated the relationship between management reporting AIS performance and competitive advantage. While some researchers have propose that suppression effects can be effectively interpreted, there are a number of others who have argued against this claim (Cheung and Lau 2008). Considering both points of view it was determined that it would be more informative to run independent models of AIS performance and contrast the differences in these models rather than attempting to interpret the suppression effects. Figure 5 and Table 21 display the results of the future-oriented AIS structural model, and Figure 6 and Table 22 display the results of the management reporting AIS structural model.

Direct Effects	**Beta**
CIO Leadership -> IT Project Capability	0.401***
CIO Leadership -> IT Service Capability	0.312***
Culture of Business-IT Alignment -> IT Project Capability	0.278***
Culture of Business-IT Alignment -> IT Service Capability	0.268***
IT Project Capability -> Future-oriented AIS Performance	0.305***
IT Service Capability -> Future-oriented AIS Performance	0.167*
Future-oriented AIS Performance -> Competitive Advantage	0.301***
Indirect Effects	
CIO Leadership -> Future-oriented AIS Performance	0.174***
Culture of Business-IT Alignment-> Future-oriented AIS Performance	0.129***
CIO Leadership -> Competitive Advantage	0.053**
Culture of Business-IT Alignment-> Competitive Advantage	0.039**
IT Project Capability -> Competitive Advantage	0.092**
IT Service Capability -> Competitive Advantage	0.050*

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 21: Future-oriented AIS Model Beta Values

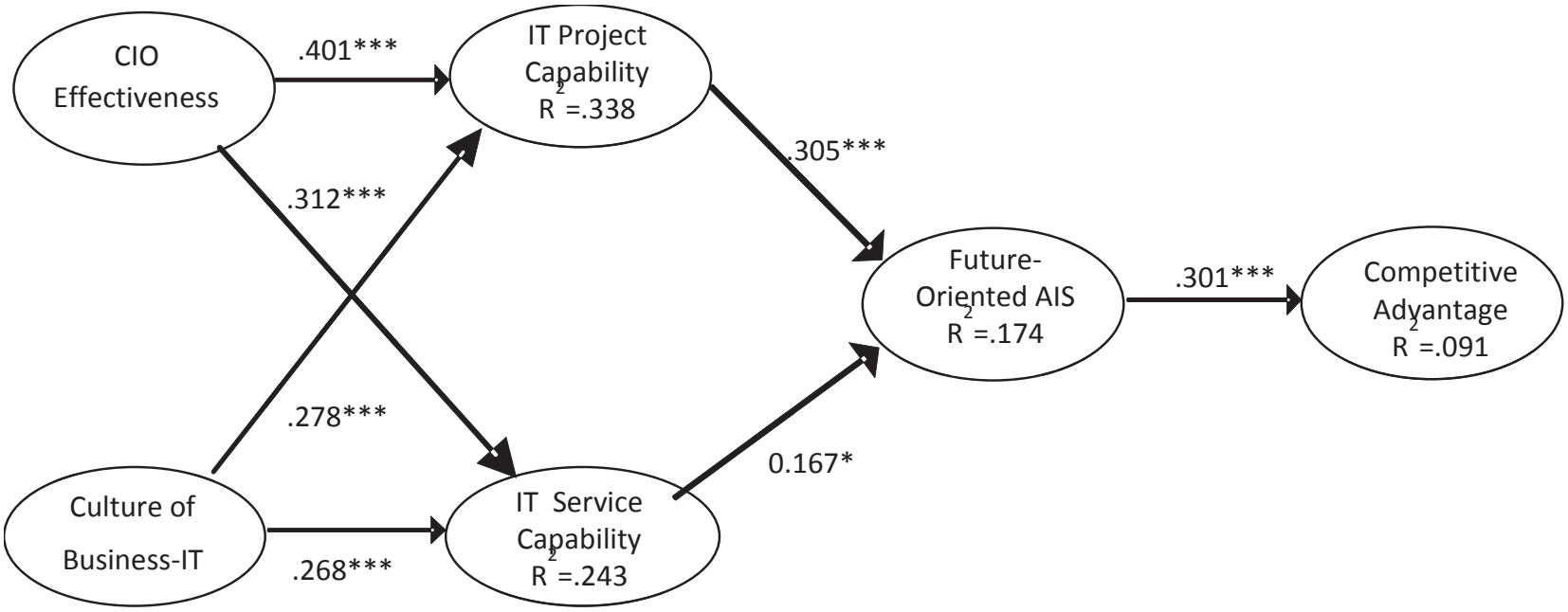


Figure 5: Future-oriented AIS Model

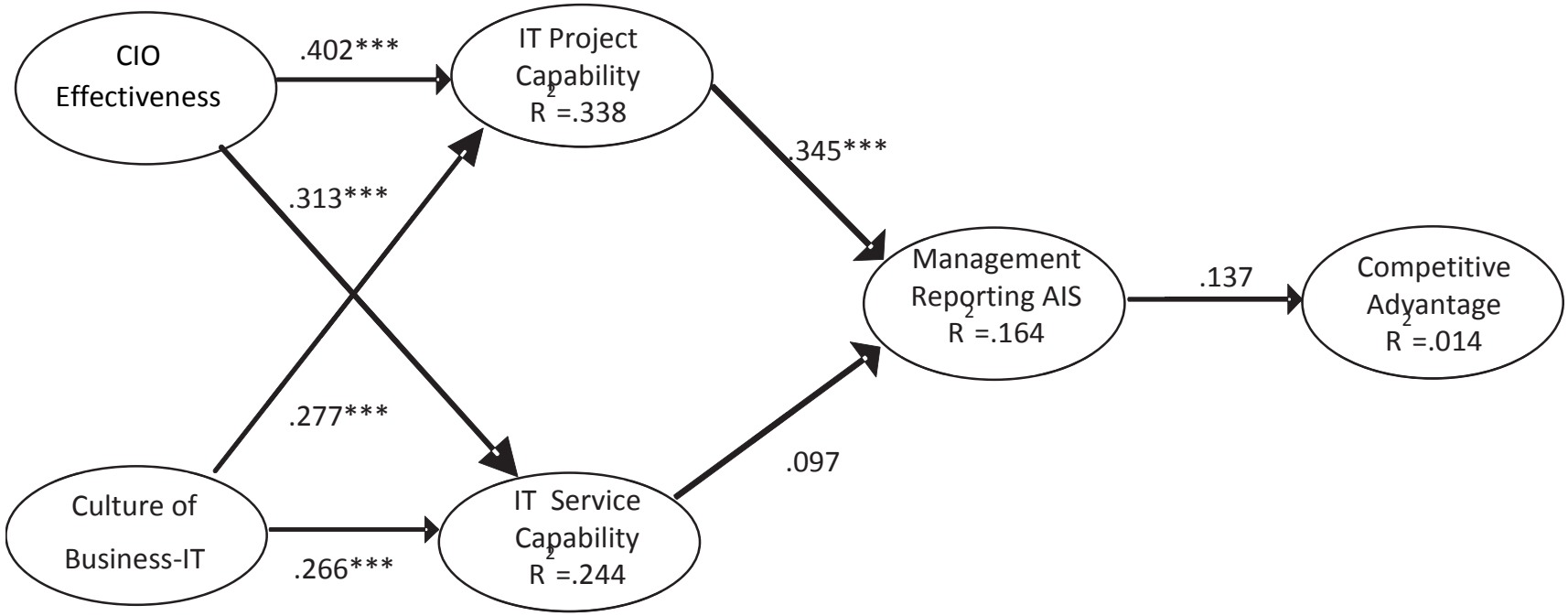


Figure 6: Management Reporting AIS Model

Direct Effects	Beta
CIO Leadership -> IT Project Capability	0.402***
CIO Leadership -> IT Service Capability	0.313***
Culture of Business-IT Alignment -> IT Project Capability	0.277***
Culture of Business-IT Alignment -> IT Service Capability	0.266***
IT Project Capability -> Management Reporting AIS Performance	0.345***
IT Service Capability -> Management Reporting AIS Performance	0.097
Management Reporting AIS Performance -> Competitive Advantage	0.137
Indirect Effects	
CIO Leadership -> Management Reporting AIS Performance	0.169***
Culture of Business-IT Alignment-> Management Reporting AIS Performance	0.122***
CIO Leadership -> Competitive Advantage	0.023
Culture of Business-IT Alignment-> Competitive Advantage	0.017
IT Project Capability -> Competitive Advantage	0.047
IT Service Capability -> Competitive Advantage	0.013

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 22: Management Reporting AIS Model Beta Values

The results support Hypothesis 5a in that the relationship between future-oriented AIS performance and competitive advantage is substantially stronger and significant. The indirect effects of the relational IT governance mechanisms on both future-oriented AIS and management reporting AIS are strong and significant, indicating that IT governance plays an important role regardless of the type of information system examined. The indirect effects on competitive advantage are only significant in the structural model for future-oriented AIS, as a result of the insignificant effect of management reporting AIS on competitive advantage.

A further important difference between the two structural models is that the significance and effect of IT service capability is substantially different with regards to future-oriented AIS performance and management reporting AIS performance. Both IT project capability and IT service capability significantly affect the performance of future oriented AIS; however only IT project capability has a significant impact on the performance of management reporting AIS.

6.5 Hypothesis 6 Test – Dynamism as a Moderator

Hypotheses 6a and 6b propose that organisations facing different levels of competitive and technological pressures will require differing combinations of IT management capabilities and AIS resources in order to achieve competitive advantage through AIS performance. A single split of the sample based on the total sum of environmental dynamism indicator responses was considered the most appropriate way to identify distinct environmental dynamism behaviours. This resulted in a low dynamism group of 93 organisations and a high dynamism group of 92 organisations.

The resulting sample sizes of the groups are at the lower end of the acceptable number of observations for PLS analysis, increasing the measurement standard error and making it more difficult to identify significant differences between the groups. Despite these statistical issues, the PLS-MGA analysis provided a useful approach to testing hypotheses 6a and 6b as well as allowing for further insight into other potential differences in the structural model between the high dynamism and low dynamism groups which were not identified ex-ante.

As the previous test of Hypotheses 5a identified a substantial difference in the relationship between IT service capability and the different types of AIS functionality, three separate PLS-MGA tests were undertaken to test Hypotheses 6a and 6b. The first PLS-MGA analysis was conducted with the formative AIS construct as part of the structural model, the other two analyses were conducted on the first level future-oriented AIS performance sub-construct and the management reporting AIS performance sub-construct respectively.

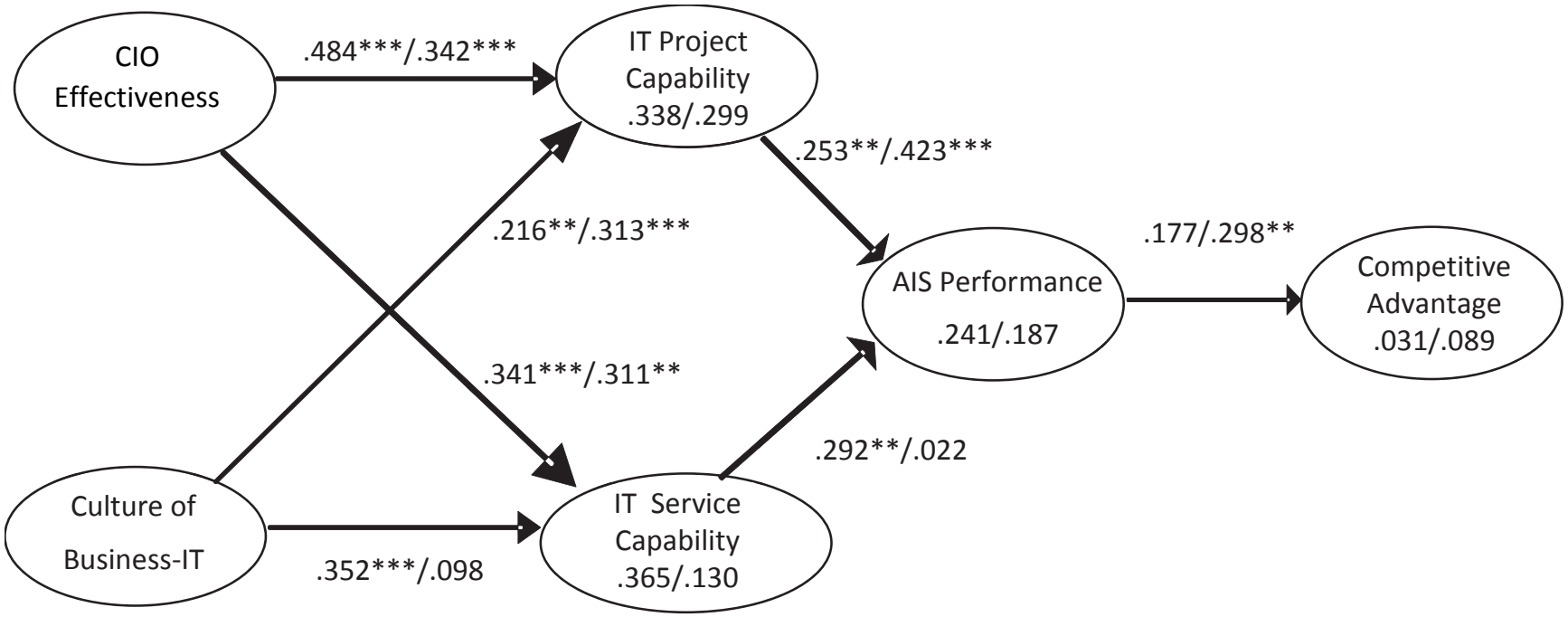


Figure 7: High/Low Dynamism Model – Formative AIS Construct

Direct Effects	High Dyn β	Low Dyn β	MGA Sig.
CIO Leadership -> IT Project Capability	0.484***	0.342***	0.145
CIO Leadership -> IT Service Capability	0.341***	0.311**	0.435
Culture of Business-IT Alignment -> IT Project Capability	0.216**	0.313***	0.763
Culture of Business-IT Alignment -> IT Service Capability	0.352***	0.098	0.108
IT Project Capability -> AIS Performance	0.253*	0.423***	0.870
IT Service Capability -> AIS Performance	0.292**	0.022	0.048*
AIS Performance -> Competitive Advantage	0.177	0.298**	0.805
Indirect Effects			
CIO Leadership -> AIS Performance	0.222***	0.152**	0.209
Culture of Business-IT Alignment-> AIS Performance	0.157**	0.135**	0.391
CIO Leadership -> Competitive Advantage	0.039	0.045*	0.555
Culture of Business-IT Alignment-> Competitive Advantage	0.028	0.040*	0.634
IT Project Capability -> Competitive Advantage	0.045	0.126*	0.878
IT Service Capability -> Competitive Advantage	0.052	0.007	0.180

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 23: High/Low Dynamism Model (Formative AIS) Beta Values

Direct Effects	High Dyn β	Low Dyn β	MGA Sig.
CIO Leadership -> IT Project Capability	0.484***	0.342***	0.151
CIO Leadership -> IT Service Capability	0.340***	0.309**	0.437
Culture of Business-IT Alignment -> IT Project Capability	0.216*	0.313***	0.759
Culture of Business-IT Alignment -> IT Service Capability	0.355***	0.106	0.115
IT Project Capability -> FO AIS Performance	0.216*	0.363***	0.821
IT Service Capability -> FO AIS Performance	0.320**	0.036	0.047*
FO AIS Performance -> Competitive Advantage	0.240*	0.360***	0.780
Indirect Effects			
CIO Leadership -> FO AIS Performance	0.213***	0.132*	0.167
Culture of Business-IT Alignment-> FO AIS Performance	0.160**	0.114*	0.280
CIO Leadership -> Competitive Advantage	0.051*	0.047*	0.462
Culture of Business-IT Alignment-> Competitive Advantage	0.038*	0.041*	0.523
IT Project Capability -> Competitive Advantage	0.052	0.127*	0.848
IT Service Capability -> Competitive Advantage	0.077*	0.013	0.136

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 24: High/Low Dynamism Model (Future-oriented AIS) Beta Values

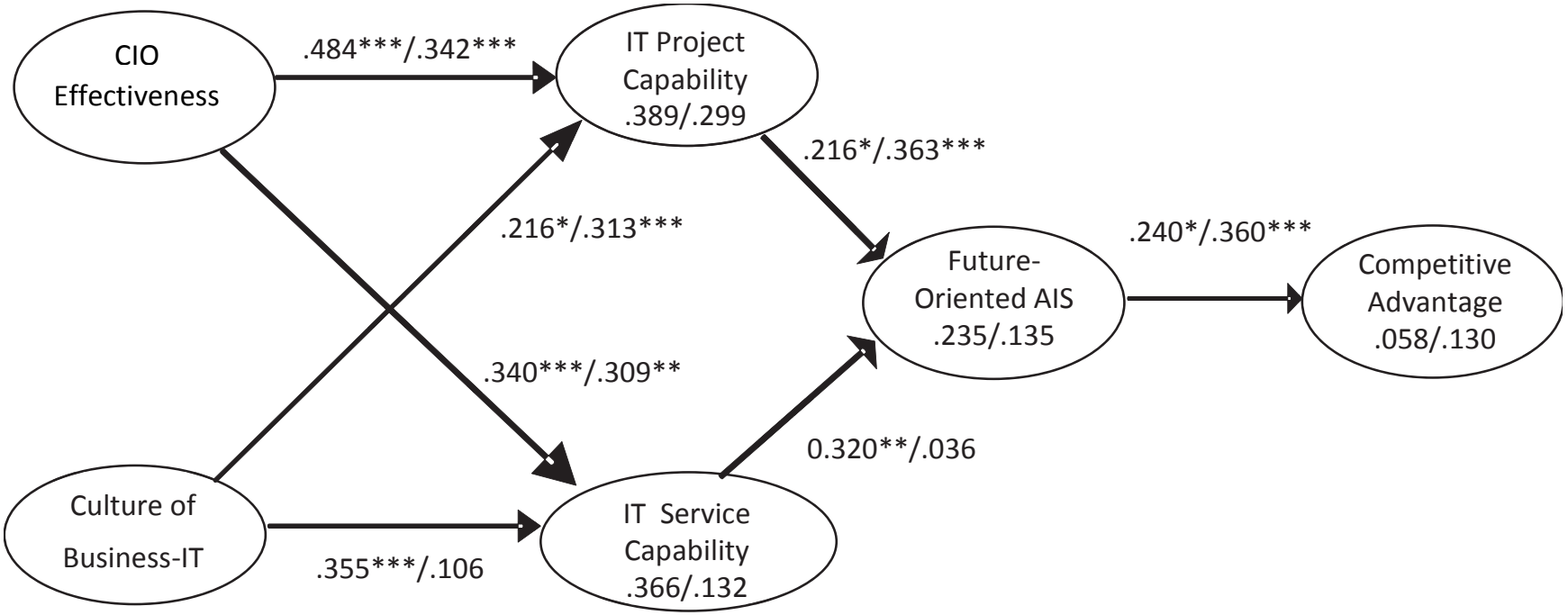


Figure 8: High/Low Dynamism Model – Future-oriented AIS Construct

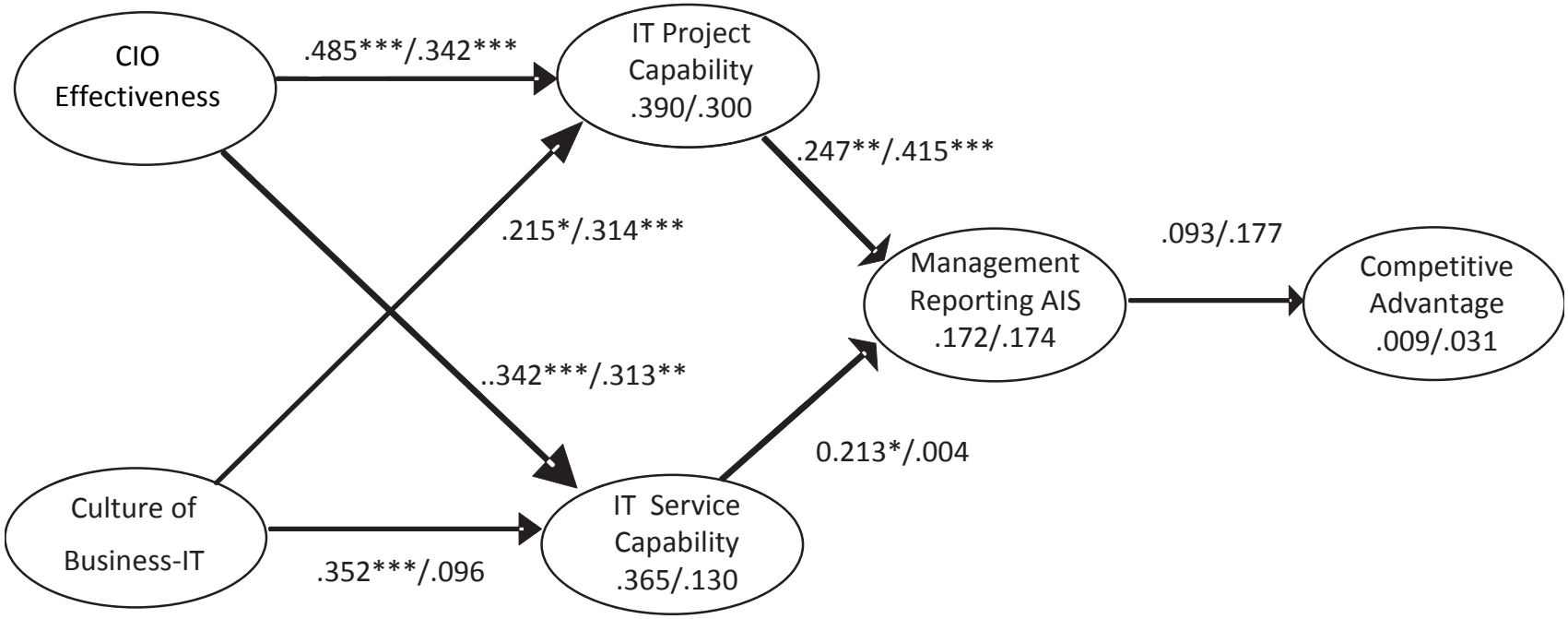


Figure 9: High/Low Dynamism Model – Management Reporting AIS Construct

Direct Effects	High Dyn β	Low Dyn β	MGA Sig.
CIO Leadership -> IT Project Capability	0.485***	0.342***	0.146
CIO Leadership -> IT Service Capability	0.342***	0.313**	0.438
Culture of Business-IT Alignment -> IT Project Capability	0.215*	0.314**	0.764
Culture of Business-IT Alignment -> IT Service Capability	0.352***	0.096	0.113
IT Project Capability -> MR AIS Performance	0.247**	0.415***	0.876
IT Service Capability -> MR AIS Performance	0.213*	0.004	0.110
MR AIS Performance -> Competitive Advantage	0.093	0.177	0.692
Indirect Effects			
CIO Leadership -> MR AIS Performance	0.192**	0.143**	0.296
Culture of Business-IT Alignment-> MR AIS Performance	0.128**	0.131**	0.523
CIO Leadership -> Competitive Advantage	0.018	0.025	0.566
Culture of Business-IT Alignment-> Competitive Advantage	0.012	0.023	0.648
IT Project Capability -> Competitive Advantage	0.023	0.074	0.791
IT Service Capability -> Competitive Advantage	0.020	0.001	0.318

1-tailed Significance (***<0.1%, **<1%,*<5%)

Table 25: High/Low Dynamism Model (Management Reporting AIS) Beta Values

Despite some substantial differences in path coefficients between the two groups, the results of the three PLS-MGA tests displayed in Figures 7-9 and Tables 23-25 show that there is only one significant difference (< 0.5%) in the structural model when comparing organisations operating in high and low dynamism environments. IT service performance was significantly more important for AIS performance in high dynamism environments, when AIS performance was assessed as a combined formative construct and also when focusing specifically on future-oriented AIS. The difference was present but not significant in the management reporting AIS model, which aligns with the findings detailed in the previous section. This finding supports Hypothesis 6b, confirming that organisations facing differing levels of competitive and technological pressure need to consider their investment and focus on IT service capabilities with reference to these pressures and anticipated changes in these pressures.

Even though the remainder of the differences in the structural model comparison between high and low dynamism groups were not found to be significant, there are still some substantial differences that are worth noting. Hypotheses 6a proposed that the importance of IT project capability with regards to AIS performance would change in environments with differing competitive and technological pressures. There was a substantial increase in the effects of IT project capability in low dynamism settings, offsetting the decrease in the effects in IT service capability. This provides some support for Hypotheses 6a but would require further testing with a large sample size for confirmation. The proposal that AIS performance would be associated with competitive advantage (Hypotheses 5) was previously found to be supported; however it is interesting to note that the relationship between AIS performance and competitive advantage appears to be stronger in low dynamism environments than in high ones.

A further difference between the models relates to the role of culture of business-IT coordination in differing dynamism conditions. While CIO leadership capability is strongly significant in regards to building both IT management capabilities regardless of environmental pressures, the culture of business-IT coordination has little, if any, role to play in IT service capability in organisations operating in relatively stable competitive and technological environments.

A comparison of the R-squared values for the latent constructs also indicates that the amount of variance explained in some of the constructs is substantially different for the high and low dynamism organisations. This is most notable in the IT service capability construct, where the relational IT governance mechanisms explain approximately double the variance in organisations experiencing high levels of competitive and technological pressure. IT project capability and AIS performance is also slightly better explained in the high dynamism sub-set; however the reverse is true in relation to competitive advantage.

6.6 Conclusion

The primary analysis model addresses the first research question of this thesis by testing a path model of relationships connecting IT governance with competitive advantage. The findings support Hypotheses 1 through 5, demonstrating that the relationship between IT governance and competitive advantage flows through a series of connected organisational capabilities and resources. These findings support the proposition that the IT governance is a higher order capability which exerts direction and control over operational capabilities, such as IT project and IT service, in response to changes in organisational strategy, opportunities and threats.

The results of the secondary analysis model testing Hypothesis 5a confirm that it is the planning, budgeting and forecasting elements which are crucial to obtaining competitive advantage from AIS performance. This finding does not preclude the importance of the management reporting components of the AIS to an organisation, it simply indicates that competitive advantage is not associated with high performing management reporting AIS.

The secondary analysis model testing hypotheses 6 addresses the second research question of the thesis and shows that the performance of future-oriented AIS is significantly more reliant upon IT service capability in high dynamism environments. Management reporting AIS also benefits from strong IT service capabilities in high dynamisms environments, although not to the degree that future-oriented AIS does. Conversely there were no AIS performance benefits linked with IT service capability in low dynamism environments. The above analysis findings are discussed in more detail in the following chapter, which will conclude the thesis.

Chapter 7 Discussion and Conclusion

7.1 Research Summary

The research undertaken in this thesis has sought to expand existing knowledge regarding IT governance, particularly with regards to whether the benefits received from effective IT governance change when organisations face differing levels of external environmental pressures. It is hoped that this research will contribute to the existing body of knowledge relating to IT governance by exploring the role of IT governance as a higher order capability which can be used to direct and control IT management capabilities and other IS/IT related resources such as organisational accounting information systems with reference to external and internal demands.

The resource based view (RBV) of the firm has been used as a theory framework within which to base this research. The review of RBV literature conducted in Chapter 2 confirmed that specific aspects of IT governance and IT management can be considered organisational capabilities as they possess sufficient value, rarity, inimitability and irreplaceability (VRIN) requirements. In particular, relational mechanisms of IT governance were found to be more likely to contribute to competitive advantage than structural or procedural mechanisms. However the review of existing literature indicates that few papers which examine IT governance in the theoretical context of RBV pay sufficient attention to the importance of relational mechanisms of IT governance. By way of addressing this issue, this thesis focused on two specific relational IT governance mechanisms: CIO leadership and organisational culture of business-IT alignment.

Chapter 2 also provides a review of relevant information systems literature, particularly relating to the Delone and McLean model of information system success. This review provides useful insights in regards to IT service management and AIS performance criteria, which were used in conjunction with findings from the review of IT governance and RBV

literature to form a series of hypotheses which were presented as structural path model. The structural model links the relational IT governance mechanisms of CIO leadership capability and organisational culture of business-IT coordination with the IT management elements of IT project capabilities and IT service capabilities, which in turn are linked with AIS performance and then competitive advantage.

The IT governance mechanisms, IT management capabilities, and AIS performance and competitive advantage concepts specified in the structural model were conceptualised as latent constructs; specialised variables which utilise a series of observations to reflect or form a single constructed variable. This approach is commonly used in IT governance and RBV related research, particularly when utilising structural equation modelling and analysis of concepts which cannot be measured directly. The indicators for each latent construct were adapted from existing research and then coded into a survey instrument to be used for data collection. Adjustments to the survey instrument were made following pilot testing and then the survey was deployed to 823 financial and accounting executives in medium to large Australian organisations. The survey achieved a usable response rate of 22.5% resulting in a final data set of 185 complete survey responses. Statistical analysis of the indicator data confirmed the reliability and validity of the indicator data as well as the reflective latent variables constructed from the indicator data.

The SmartPLS 3 analytics package (Ringle et al. 2015) was used to conduct partial least squares and bootstrap analysis on the primary structural model relating to hypotheses H1 through H5. PLS regression allows for the simultaneous assessment of relationships between the constructs under study. The results of the analysis confirmed the suitability of the structural model as well as providing support for the first five hypotheses. Slight variations were made to the primary structural model to test hypotheses 5a and 6. These additional tests supported the propositions that future-oriented AIS performance was

more strongly associated with competitive advantage than high management reporting AIS performance and that IT service capability was more influential on AIS performance in high dynamism environments. IT project capability was found to be more influential on AIS performance in low dynamism environments providing some support to Hypothesis 5b; however the difference between the beta values in this relationship in comparative high and low dynamism settings was not found to be statistically significant.

The remainder of this final chapter will discuss the analysis findings and what has been learned in regards to IT governance, IT management, AIS performance and the potential to achieve competitive advantage through these organisational capabilities and resources. Specific attention will be paid to the impact of environmental dynamism on the ability to obtain competitive advantage via these IT related capabilities and resources, as well as the academic and practical contribution of the findings. The thesis will conclude with a commentary on the limitations of the present research and potential future research opportunities.

7.2 Relational Mechanisms of IT Governance

The literature review in Chapter 2 determined that relational mechanisms of IT governance possess necessary characteristics to be considered as organisational capabilities from an RBV theory perspective. Structural and procedural mechanisms for IT governance, which have often been the subject of prior IT governance research utilising RBV theory, do not possess these characteristics. The analysis in the preceding chapter research tested the proposition that relational mechanisms of IT governance lead to competitive advantage by influencing and improving other organisational capabilities and resources. CIO leadership was strongly associated with high performing IT management capabilities, improved AIS performance and competitive advantage. While not as strong in all circumstances, an

organisational culture of business-IT alignment was also found to have a significant association with improved IT management capabilities, AIS performance and competitive advantage.

These findings support the proposition that relational mechanisms of IT governance are valid RBV capabilities from both theoretical and empirical perspectives. It is not suggested that this result directly invalidates the empirical results of prior research in regards to the association between structural and procedural mechanisms of IT governance and positive organisational outcomes; however it does raise important questions about the causality and relationships between relational, structural and procedural IT governance mechanisms.

Structural and procedural mechanisms for IT governance are essentially best practice methods for establishing IT governance. Mechanisms such as having the CIO report to the CEO, establishing IT governance committees and implementing a COBIT framework, are relatively easy to implement from an organisational perspective. Structural and procedural mechanisms are unlikely to achieve competitive advantage by themselves as they cannot be considered unique and are too easy for competing organisations to replicate should they be found to be effective. However these mechanisms may help to develop, enhance and maintain relational mechanisms of IT governance.

It is evident however, that structural and procedural mechanisms of IT governance cannot assist an organisation to achieve competitive advantage in isolation of relational mechanisms. The reporting position of the CIO does not really matter if the CIO is an ineffectual leader. The adoption of COBIT will not improve IT management performance if there is no cultural alignment between IT and business units. Therefore future IT governance researchers applying RBV theory principles are strongly encouraged to ensure that consideration of relational IT governance mechanisms is present their research design.

7.3 IT Governance and Competitive Advantage

The analysis results supporting Hypotheses 1-5 have answered the first research question of this thesis by demonstrating how IT governance interacts with other IS/IT resources to provide competitive advantage. This research has also found that differing levels of environmental dynamism alter the optimal combinations of IT governance mechanisms and IT management capabilities. The secondary model analyses also identified that while high performing future-oriented AIS was associated with achieving competitive advantage, the performance of management reporting AIS was not. This result confirms that that not all organisational IS/IT resources and investments are capable of providing competitive advantage as posited by Mata et al. (1995).

A summary of the effective combinations of IT governance mechanisms and IT management capabilities, as they apply to increasing AIS performance and achieving competitive advantage under differing levels of environmental dynamism, appears in Figures 9 (Future-oriented AIS) and 10 (Management Reporting AIS) below. Dark cells indicate that the respective IT governance or management capability was found to be strongly influential on AIS performance, intermediate cells indicate that the capability had a weaker but still significant influence. Clear cells indicate that the capability had no significant association with AIS performance. Figures 10 and 11 also include an indication as to whether this combination of IT governance, IT management and AIS sub-type performance was associated with competitive advantage.

Future-oriented AIS in High Dynamism		
IT Governance	CIO Leadership Capability	Culture of Business-IT Alignment
IT Management	IT Project Capability	IT Service Capability
Competitive Advantage	Minor/Short Term	

Future-oriented AIS in Low Dynamism		
IT Governance	CIO Leadership Capability	Culture of Business-IT Alignment
IT Management	IT Project Capability	IT Service Capability
Competitive Advantage	Moderate/Medium Term	

Figure 10: IT Governance and Management for Future-oriented AIS Performance

Mgt-Reporting AIS in High Dynamism		
IT Governance	CIO Leadership Capability	Culture of Business-IT Alignment
IT Management	IT Project Capability	IT Service Capability
Competitive Advantage	None	

Mgt-Reporting AIS in Low Dynamism		
IT Governance	CIO Leadership Capability	Culture of Business-IT Alignment
IT Management	IT Project Capability	IT Service Capability
Competitive Advantage	None	

Figure 11: IT Governance and Management for Mgt-Reporting AIS Performance

7.4 IT Management Capabilities

IT management capabilities explain substantially more variance (higher R-squared) in future oriented AIS performance when organisations operate in highly dynamic environments. This finding may reflect the additional development and investment required in customising a future-oriented AIS to meet organisational requirements in turbulent environments. Organisations operating in more stable conditions will likely have less urgency in the implementation of their new systems and will need to upgrade and adjust their systems less often. As a result the performance of future oriented AIS in these environments appears to rely more on the quality of the various applications themselves when compared to the high dynamism sample.

IT project capability is significantly associated with AIS performance regardless of the level of environmental dynamism or the sub-type of AIS. This result is in alignment with the existing IS literature regarding the importance and influence of IT project capabilities in

regards to ongoing IS performance. Conversely the importance and influence of IT service capabilities on AIS performance is significantly contingent upon the level of competitive and technological pressure that the organisation faces. Higher level of environmental dynamism will increase the need to update and amend AIS performance in response to changing customer preferences, competitor activity and technology churn. As organisations need to be immediately responsive to these issues, the incremental adjustments to AIS performance will generally fall into the domain of IT service management, as opposed to a considered IT project management process.

The fact that IT service capability was found to have a contingent relationship with AIS performance is interesting in the context of the contested addition of IT service quality to the Delone and McLean model of IS success (Petter et al. 2008, Seddon 1997) discussed in Chapter 2. IT service quality was added to the existing model following recognition that many external-facing information systems required round-the-clock service and customer support (DeLone and McLean 2004). AIS are predominately designed and implemented to service compliance and internal business requirements, so the reduced interaction between external customers and this type of IS may be another contributing reason for the varying significance in the relationship between IT service capability and AIS performance.

7.5 AIS Performance

The analysis of the primary structural model found an association between AIS performance and competitive advantage. While the relationship is significant, the amount of variance in competitive advantage which is explained by AIS performance is relatively low (R^2 of 5.2% in the primary model). This is not an unexpected results, as competitive advantage has many potential causal factors, and AIS performance could only play a small role in overall competitive advantage.

Further examination of this association in the secondary analysis models found that this association was primarily driven by future-oriented AIS performance. As identified in Chapter 2, the primary difference between the two classifications of AIS is the type of the accounting information produced from each system. Information and reports generated by future-oriented AIS functionality is more likely to be used for strategic and long term decision making; whereas the information generated from management reporting AIS will be more useful for operational decision making, status updates and reporting on historical activity for compliance purposes.

A further potential explanation as to why only future-oriented AIS has a significant association with competitive advantage is that there was more overall variance identified within the future-oriented AIS construct compared with the management reporting AIS construct. This additional variance may reflect the fact that the technology utilised in future-oriented AIS is often more complex and customised to specific organisational requirements. Future-oriented AIS may include the use of advanced business intelligence and data analytics applications; whereas the functionality of management reporting AIS is often focused on supporting compulsory regulatory and established business requirements. This additional complexity suggests that there is more potential for organisations to implement and maintain a future-oriented AIS which can outperform the equivalent systems possessed by competitors.

The level of environmental dynamism experience by an organisation also appears to have some effect on the capacity for the organisation to derive competitive advantage from future-oriented AIS performance. Increased levels of environmental dynamism appear to reduce the strength of this advantage compared with organisations that face lower levels of competitive and technological pressures. This finding may reflect a shorter duration of competitive advantage in higher dynamism environments due to a more advanced rate of

technological and strategic change. It is also possible that high performing future-oriented AIS may not be as common in low dynamism environments, allowing organisations that possess high performing future-oriented AIS to hold a greater advantage over their competitors for a longer period of time. This supposition may also explain why IT service capability does not significantly impact the performance of future-oriented AIS in low dynamism environments. Low levels of competitor pressure mean that these organisations make few adjustments to strategy and the pace of technology change is also lower. Therefore these organisations do not find it necessary to regularly upgrade and evolve their future-oriented AIS to outperform competitors.

IT Project capability has a strong association with management reporting AIS, regardless of the level of environmental dynamism. IT service capability plays a much lesser role in management reporting AIS performance, and only in high dynamism environments. As the functionality of management reporting AIS is also used for compliance purposes, there is also likely to be a natural tendency to keep these systems quite stable in comparison to future-oriented AIS and therefore there will be less call for upgrades and functionality changes. It should also be noted that high performing management reporting AIS does not lead to competitive advantage, regardless of the level of environmental dynamism faced by the organisation. This is likely due to the type of accounting information produced by management reporting AIS. It is, by necessity, focused on historical events and lacks the analytical insights designed to assist strategic decision making which are present in the accounting information generated by high performing future-oriented AIS.

7.6 IT Governance as a Higher Order (Dynamic) Capability

The results have demonstrated that strong relational IT governance mechanisms interact and improve IT management capabilities in order to increase AIS performance and associated competitive advantage. These interactions indicate that when IT governance has sufficiently strong relational mechanisms in place, it can act a higher order organisational capability (Winter 2003). Strong IT governance functions have sufficient structural power, appropriately designed procedures and, most importantly, the relational arrangements to ensure that IT decision making, resource changes and other investments provide consistent organisational benefits.

The results have also demonstrated a series of contingent behaviours relating to the arrangement and strengths of the various IT governance mechanisms and IT management capabilities with regards to improving AIS performance and achieving competitive advantage. Of particular note is that the increased competitive pressures and technological churn present in a high dynamism environment appears to result in a scenario where IT service capability becomes the paramount factor in future-oriented AIS performance and associated potential competitive advantage. Conversely in low dynamism environments, AIS performance is much more reliant upon the organisation's IT project capability than its IT service capability.

The fact that IT governance acts as a higher order capability with regards to IT management capabilities and other IT resources, and that the benefits of IT management capabilities have been found to be is contingent on environmental dynamism, suggests that IT governance may perform as a dynamic capability. Standard organisational capabilities can take on the role of dynamic capabilities when an organisation faces increased environmental pressures, allowing organisations to adjust other capabilities and resources in response to changing competitive and technological pressures (Tallon 2008, Wade and

Hulland 2004). However a stricter interpretation of the dynamic capability concept implies that dynamic capabilities must not only adjust other organisational resources in response to environmental dynamism, but need to actively identify and exploit new opportunities that arisen due to the competitive and technological turbulence (Eisenhardt and Martin 2000). The data collected in the survey does not contain sufficient detail to confirm whether IT governance is capable of meeting this stricter definition of dynamic capability. Further research, most likely some form of longitudinal study, will be required to address this issue.

7.7 Theoretical Implications

This thesis has sought to provide two primary contributions to the existing academic body of knowledge in relation to IT governance. The first contribution, relating to research question 1, involves furthering the understanding of how IT governance contributes to organisational performance and competitive advantage. As identified in Chapter 2, most current research investigating the effects of IT governance focuses on structural, procedural and relational mechanisms that organisations use to develop and employ their IT governance efforts. A sub-set of these IT governance studies have then sought to understand the benefits of IT governance by framing it as an organisational capability using RBV theory. The majority of papers following this approach appear to have focused on structural and procedural mechanisms of IT governance when assessing IT governance capabilities despite the fact that structural and procedural mechanisms are not well suited to obtaining competitive advantage according to RBV theory. Conversely relational mechanisms, and specifically intangible mechanisms such as leadership and cultural behaviours, would appear to have the required traits for true RBV capabilities.

With this issue in mind, this research has focused on identifying organisational IT governance capabilities based on relational mechanisms of IT governance. The two chosen mechanisms, CIO leadership capability and an organisational culture of business-IT alignment, meet the theoretical requirements of RBV capabilities. The empirical testing conducted in the thesis has confirmed that these mechanisms are associated with a number of organisational benefits including improved IT management capabilities, higher performance AIS and, under certain conditions, competitive advantage. It is recommended that future researchers intending on utilising an RBV theory framework to address research questions on IT governance carefully consider the nature of the IT governance mechanisms under study and whether they are appropriate for use under such a framework.

The other key theoretical contribution made by this thesis pertains to the second research question. The analysis results indicate that the relative importance of IT service capability in regards to increasing future-oriented AIS performance is contingent on the strength of competitive and technological pressures experienced by the organisation. This finding highlights the importance of establishing and maintaining high quality IT service capabilities in organisations operating in high dynamism environments. The results also identify that the overall influence of IT governance and IT management capabilities on future-oriented AIS quality is generally stronger in turbulent environments, although the competitive advantage achieved from high performing future-oriented AIS is lower in such environments. While these findings may imply a simplistic arrangement where investment and focus on IT capabilities should increase or decrease to match comparable increases or decreases in competitive and technological pressures; organisations cannot simply buy these capabilities when needed. Those responsible for IT governance should continually work towards establishing flexible IT management and IS capabilities that can be quickly adjusted in response to changing strategic imperatives.

The analysis findings present a scenario where IT governance could conceivably act as a higher order capability (Winter 2003), enabling organisations to leverage IT/IS resources and capabilities to obtain a competitive advantage in a highly dynamic environment (Teece 2014). Unfortunately the data analysed does not possess sufficient detail to conclusively determine whether those responsible for IT governance in the sample organisations actually respond to environmental dynamism in this way, or whether it is simply the case that higher performing organisations are simply structured in this way regardless of environmental dynamism. As a result it would appear that further research, via case study and across multiple points in time, will need to be undertaken to confirm whether IT governance can be confirmed as a dynamic capability.

7.8 Practical Implications

The findings of this research broadly support the existing recommendations of the IT Governance Institute, which highlight the important of designing, constructing and enabling effective IT governance in order to maximise the benefits received from organisational IS/IT (ISACA 2012, ITGI 2011). In particular, this research finds that organisations seeking to maximise the value derived from IS/IT investments should ensure that their CIO is empowered with sufficient organisational authority, possesses a strong understanding of industry issues from both business and IT viewpoints, and is able to establish the respect and cooperation of other executives and managers within the organisation.

This research concurs with prior academic and practitioner guidance in advising that establishing an organisational culture of business-IT alignment should be a high priority for organisations seeking to maximise IS/IT investment value. IT executives and managers

should not be allowed to operate in a functional 'silo', effectively removed from the business operations which they should be supporting. Organisations should encourage IT executives and managers to participate in business processes, particularly in relation to processes related to strategy identification and planning. Likewise non-IT focused executives and manager should be encouraged to actively participate in the consideration and creation of IT strategies, particularly in regards to how IT solutions may enhance their respective areas of the business. Both business and IT managers should be encouraged to communicate, coordinate and develop knowledge of the IS/IT and business functionality of the organisation.

The interactions between IT governance, IT management capabilities, and IS/IT resources need to adapt and evolve in alignment with changing competitive and technological pressures. Organisations facing high levels of environmental dynamism need their IT governance capabilities to focus on improving and maintaining IT service quality; whereas organisations in more stable environments need their IT governance capabilities to drive improvements in IT project capabilities. Those responsible for the IT governance function of the organisation should adjust organisational strategy and the direction providing to the IT management function with reference to changes in environmental pressures. For example an organisation expecting new competitors and market turbulence should consider bolstering their IT service capabilities to ensure that information systems can be upgraded and modified quickly in response to emerging threats and opportunities.

7.9 Research Limitations

In addition to the delimiters identified in Chapter 1, there are a number of limitations that have arisen during the execution of the research. These limitations predominately relate to the total number of complete survey responses received and the characteristics of those

responses. While the survey response rate of 22.5% was acceptable and the resulting data set of 185 usable responses was ample for the full model analysis; even a single split sub-sample analysis reduces each sub-sample size to a point where finding statistically significant results is difficult. This is the case even when there are large differences in the comparative beta values as evidenced in the dynamism moderation analysis testing Hypotheses 6. As a result there is little capacity to conduct further categorical investigation of the concepts under study.

One particular categorical analysis that would have been informative and useful to undertaken would have been to examine industry based differences in the research model. Unfortunately the total number of survey responses were insufficient to allow this level of categorical analysis and it was also identified that the survey responses were not representational of overall industry participation in Australia. As a result, industry participation could not be used as a control variable, and the findings of this thesis may be of limited application to certain industry types with lower participation rates, such as education, agriculture, forestry and fishing, accommodation, cafes and restaurants, and health and community services. The over-representation of the manufacturing industry may imply that the analysis results are more aligned with this industry type than with others.

The measures of competitive advantage collected in the survey were restricted to financial indicators in order to align the measures with the survey respondent's capacity to provide information. A survey designed to accurately capture non-financial indicators such as customer satisfaction and ability to attract talent, would provide a more comprehensive assessment of competitive advantage.

7.10 Future Research Opportunities

There have been a number of issues identified in the present research which may be appropriate for further investigation. As noted above, further survey based research that can successfully collect observations from a larger set of organisations would allow for a more detailed analysis of industry effects and provide more opportunity for identifying significant differences during MGA split sample analysis, potentially enhancing the findings of this research.

The single survey approach taken for this research reduces the capacity to delve into new issues that arise from the analysis. The potential for IT governance mechanisms to identify and exploit opportunities caused by environmental dynamism is an example of this, as the present data set does not have sufficient detail to confirm if this is the case. Further research can be undertaken to ascertain if IT governance is able to meet this extended dynamic capability criteria through a longitudinal organisational study.

This research has identified that IT governance mechanisms and IT management capabilities are able to contribute to organisational performance and competitive advantage through improving the performance of future-oriented AIS. However the same IT governance and management capabilities do not provide the capacity to achieve competitive advantage by improving management reporting AIS performance. Not only does this finding highlight that competitive advantage can only be achieved by specific combinations of IS/IT capabilities and resources, it also indicates that not all information systems are viable resources for attaining competitive advantage. Future research could further examine which categories of IT/IS are capable of providing or enabling competitive advantage.

Appendix 1 The Resource Based View of the Firm

Building on Porter's work on competitive industry environments (Porter 1980, Porter 1985) and the work of early authors focusing on the use of resources in organisational settings (Lippman and Rumelt 1982, Penrose 1959), the resource based view of the firm ("RBV") was initially developed by a series of authors including Wernerfelt (1984), Peteraf (1993) and Barney (1986, 1991). The overarching objective of the most RBV related research is to better understand how sustainable competitive advantage is achieved by organisations in industry settings where resources and capabilities are heterogeneously distributed between competing organisations. In contrast to Porter's "five forces" approach to understanding competitive pressures, which focuses primarily on understanding the external environment in which the organisation operates, RBV examines the internal resources available to the organisation which may be applied to achieve a sustainable competitive advantage (Barney 1991). A relatively recent summary of the development and progression of RBV to date is provided by Barney et al. (2011).

The key units of analysis in RBV related research are organisational resources and capabilities. Organisational resources are generally defined as tangible or intangible assets which, with appropriate management leverage, can be used by an organisation to outperform competing firms (Wernerfelt 1984). As competing organisations will almost certainly seek to erode this advantage, the sustainability of the performance benefits relies upon whether the resource in question possesses certain characteristics. The resource must have inherent value or capacity to generate value; the resource must possess an inherent rarity else competing organisations will simply obtain it; the resource must be difficult to copy or imitate for the same reason; and there must be a lack of easily substitutable resources which could replicate the effects of the resource – i.e. the resource is non-substitutable (Barney 1991).

As an extension to the initial RBV framework, Barney (1995) later theorised that it was not sufficient for a resource to be valuable, rare, and inimitable; the organisation possessing the resource must also have the capability to exploit the resources. This adaption of RBV is sometimes referred to as the VRIN requirement (Value, Rarity, Inimitability, Non-substitutability, and Organisationally Supported). As part of this extension of RBV theory, Barney (1995) also referred to the notion of a complementary resource (Amit and Schoemaker 1993), which is defined as a resource with limited capability to drive competitive advantage but with the capacity to operate in combination with other resources to this end.

Organisational capabilities are a special category of resource which relate to a firms capacity to organise and exploit combinations of resources with the goal of generating sustained competitive advantage (Amit and Schoemaker 1993). Capabilities are generally complex and firm specific, rendering them difficult to imitate by competitors, most often relating to organisational processes in specific functional areas of the firm, and generally combined physical, human, and technological characteristics (Amit and Schoemaker 1993). Grant (1991) suggests that capabilities are the primary source of sustained competitive advantage, observing that due to their inherent complexity capabilities are generally more immobile and it is more difficult for competitors to find appropriate substitutes.

Despite the wide application of RBV theory in a variety of business and social science disciplines, there have been a number of criticisms levelled at the RBV framework since its inception. One of the primary criticisms relates to the inconsistency in the way that RBV researchers have defined and related the concepts of resources, capabilities, and dynamic capabilities (Wade and Hulland 2004). As a result some observers suggest that the RBV theory base is suffers from unclear definitions (Kraaijenbrink et al. 2010, Priem and Butler 2001) and associated theoretical problems with regards to how thoroughly RBV theory

explains the concept of competitive advantage (Barney 1986, Wernerfelt 1984). The importance placed upon whether or not a competitive advantage is completely sustainable, essentially meaning that it outlasts competitors' attempts to erode it (Barney 1991), has also been a contentious theoretical issue.

As competitive advantage is the primary dependant variable for most RBV related research it is important to develop a clear understanding of this concept. Barney (1991) defines competitive advantage as the process of "*implementing a value creating strategy not simultaneously being implemented by any current or potential competitors"*, and further defines 'sustainable' competitive advantage as when the benefits received from implementing such a strategy cannot be duplicated by current or potential competitors. From this definition, it is clear why it is so important for RBV resources and capabilities to possess the VRIN requirements discussed above.

Critics of RBV theory have asserted that competitive advantage cannot be effectively sustained ad infinitum and as a result sustainable competitive advantage is not a viable unit of analysis (Kraaijenbrink et al. 2010). This critique of RBV holds merit only if the resources, capabilities and strategies applied in an RBV framework are expected to be held static. Simply acquiring resources and setting a single strategic approach might achieve a competitive advantage over the short term, but changes to competitive pressures originating from the external environment, such as customer preference and government regulation, can act to erode this competitive advantage. This would eventually occur without competing organisations ever having to imitate or duplicate the original firm's resources.

Noting that the concept of sustainable competitive advantage has proven difficult to operationalise in RBV research, Wade and Hulland (2004) provide some useful guidelines in regards to determining an appropriate construct with which to assess competitive

advantage. They suggest that the three elements that should be present within an appropriate measure of competitive advantage are an assessment of performance, an element of competitive comparison, and also address the notion of performance over time.

Environmental Dynamism and Higher Order/Dynamic Capabilities

Environmental dynamism (Teece et al. 1997) comprises of the level of strategic competitor activity, customer preference change and technology churn. Organisations operating in high dynamism environments will experience a higher number of strategic manoeuvres by competing firms, volatile customer switching and technology that rapidly becomes outdated. Conversely a low dynamism environment will have few impactful competitor actions, steady customer patterns and a more stable pace of technological change.

The concept of higher order capabilities was proposed by Winter (2003) as an extension of RBV theory. Essentially higher order capabilities operate at the strategic level to acquire, combine and improve organisational assets, resources and other capabilities to allow organisations to establish and sustain a competitive advantage via those combined resources and capabilities (Winter 2003). Higher order capabilities generally manifest in the executive and senior management levels of the organisation where there is sufficient decision authority and organisational expertise to make strategic changes that will affect the nature and behaviour of operational level capabilities and resources.

Dynamic capabilities are specialised higher order capabilities that provide the capacity to make continual adjustments and modifications to other organisational resources and capabilities in response to the rapidly changing opportunities and threats in high dynamism environments (Eisenhardt and Martin 2000). Dynamic capabilities hold the same RBV qualities of value, rarity, inimitability and non-substitutability as standard resources, however generally take the form of managerial processes that provide the capacity for the

organisation to coordinate, learn and reconfigure their other resources and capabilities positions (Kogut and Zander 1992). While the coordination and integration of available resources in response to standard business conditions is considered to be a largely static requirement of the organisation, dynamic capabilities reside in the ability of executive and managerial employees to learn and adapt to rapidly changing market conditions (Teece et al. 1997).

When markets are moderately dynamic capabilities will essentially resemble standard higher order capabilities. In contrast, dynamic capabilities produce adaptive solutions and take advantage of unpredictable scenarios when competitive and technological pressures are more intense (Eisenhardt and Martin 2000). Dynamic capability theory also suggests that it is possible for minor technological advances to be leveraged into a substantial competitive advantage via a strong dynamic capability. It has also been theorised that "standard" IS/IT resources and capabilities may take on dynamic attributes when organisations are faced with turbulent environments (Tallon 2008, Wade and Hulland 2004).

Resource Based View and IS/IT

Mata et al. (1995) examined the characteristics of four IT related resources as potential sources of competitive advantage: access to capital for IS/IT investment, proprietary technology, technical IS/IT skills and managerial IS/IT skills. These authors found that access to substantial amounts of capital which could be used to develop and apply IS/IT solutions would not be capable of generating competitive advantage as capital can be raised from a variety of sources. Proprietary technology was theorised to provide a potential short term advantage, however this advantage would likely be eroded due to the rapid rate of technology change, as well as risk of knowledge transfer via employee movement, reverse engineering and other security leakages (Mata et al. 1995). The technical IS/IT skills

required to build and support proprietary technology can undoubtedly be valuable, but employees possessing such skills cannot really be considered a rare resource (Mata et al. 1995). Despite not being sources of competitive advantage in their own right, these three organisational assets might be viewed as complementary resources (Amit and Schoemaker 1993).

The final IT related resource examined by Mata et al. (1995), managerial IT skills, is described as '*management's ability to conceive of, develop, and exploit IT applications to support and enhance other business functions'.* Mata et al. theorise that managerial IT skills meet the VRIN RBV requirements, and identify four examples of IT managerial skills: the ability of IT managers to understand the business needs of stakeholders; the ability to anticipate future IT needs of stakeholders; the ability to work with stakeholders to develop appropriate IT applications; and the ability to coordinate IT activities in ways that support stakeholders. Unlike the other IT related resources examined by Mata et al, IT managerial skills are tacit, socially complex and are developed over lengthy periods of time. These characteristics imply that IT managerial skills are not only valuable and non-substitutable, but are also rare and very difficult to transfer between organisations (Mata et al. 1995).

While early RBV related research on IS/IT generally described organisational IS/IT assets as resources (Mata et al. 1995, Barney 1996), current RBV research has framed IS/IT as a complex organisational capability comprised of inter-related IS/IT capabilities, resources and assets. Bharadwaj (2000) empirically tested an RBV-based model with IT infrastructure, IT human resources and IT enabled intangible capabilities, finding that organisations possessing these capabilities outperformed matched competitor firms in regards to profit and efficiency performance. However the identification of organisations with these capabilities was somewhat problematic as the selection of the "high performance" firms

relied upon external expert opinion rather than direct measurement of IT capability performance (Santhanam and Hartono 2003).

Extending upon Bharadwaj (2000), Wade and Hulland (2004) suggest that IS/IT plays a complementary role, acting as a necessary but insufficient component for competitive advantage. Individual IS/IT capabilities require interaction with a complex organisational chain of assets, resources and capabilities in order to contribute to competitive advantage. Wade and Hulland also introduced a more detailed typology of IS/IT capabilities based on the origin and direction of the activities undertaken by the capability. *Outside-in* capabilities, such as external relationship management and market responsiveness, focus on the capability of the organisation to manage vendor and client relationships. These capabilities also identify and act upon pertinent information from the external environment. *Inside-out* capabilities, which include traditional IS/IT resources such as IS infrastructure, technical skills, development and cost effective operations, operate in the opposite direction – utilising internal resources to improve organisational performance ideally out-performing competitors. *Spanning* capabilities are required to ensure that information gathered by the outside-in capabilities is appropriately disseminated and utilised by the inside-out capabilities. Spanning capabilities include IS-business partnerships and IS planning and change management. In a number of ways, Wade and Hulland's framework of capability classifications is similar to the concept of absorptive capacity (Roberts et al. 2012).

Appendix 2 IT Governance Theory

In the last decade the concept of IT governance has received increasing attention, partially as a by-product of the increasing attention on corporate governance (OECD 2004) and also because effective IT governance has been theorised to improve the organisational value of IS/IT related investments (Dehning and Richardson 2002, ITGI 2011, ITPI 2009). The terms "IT governance" and "IT management" are often used interchangeably because a key objective of both governance and management is to derive improved value from investments. However the role and responsibilities of these two functions are significantly distinct from each other (Sohal and Fitzpatrick 2002).

The term IT governance first appeared in academic usage in the early 1990's and was associated with the research on strategic alignment of IT (Henderson and Venkatraman 1993). From this starting point, the academic view of IT governance has been expanded to encompass a holistic framework relating to the direction and control of organisational IT activity and investments. IT governance theory is still in an emergent phase, having primarily evolved from two preceding areas of knowledge: strategic information systems planning ("SISP") and corporate governance theory (Webb et al. 2006). These two antecedent bodies of knowledge provide important foundations for the key principles of IT governance theory.

Strategic information system planning is the organisational process of identifying and specifying a portfolio of information systems that will assist the organisation in meeting specific business plans and strategies. SISP addresses various organisational characteristics, assets and processes with the aim to achieve an alignment between information systems strategy with broader business planning objectives (Lederer and Hannu 1996). These organisational characteristics include the internal and external environments, planning

resources and processes, and the information systems plan. In essence SISP is based around inputs, processes and outputs to the strategic planning process; with the key output being the design, selection and implementation of information systems that support the organisation's business strategy.

An important evolutionary step following on from SISP theory is the concept of strategic alignment. Strategic alignment utilises the same IS/IT strategic planning elements as SISP; however also requires the wider organisation to undertake business-related strategic planning activities with reference to IT-related opportunities and threats – essentially "aligning" the strategic activities of both the IT and non-IT parts of the organisation (Henderson and Venkatraman 1993, Kearns and Lederer 2000). The most effective strategic alignment occurs not only when there are linkages between business and IT strategies but also when these aligned strategies are integrated with people, infrastructure and processes to build an organisational culture of business and IT alignment (Avison et al. 2004, Shpilberg et al. 2007).

Corporate governance guidance provided by the Cadbury Committee (1992) and the Organisation for Economic Co-operation and Development (2004) states that while senior organisational representatives can delegate the responsibility of managing organisational resources, the accountability for appropriate and efficient use of these resources remains with the senior organisational representatives. This implies that the direction and control over the organisational resources provided to the management level remains the responsibility of the governance level. The responsibilities of senior organisational representatives are also a key focus of legislation such as the Sarbanes Oxley Act of 2002 and Corporate Law Economic Reform Program (CLERP 9) Act of 2004 with particular reference to the accountability of these persons in relation to the accounting information released to the public through official financial reports. There are substantial repercussions

for executives and board members should material errors be found in these reports and, as the accounting information contained in these reports is generated from the organisation's AIS technology, senior organisational representatives should ensure they employ effective governance over organisational IT in general and AIS in particular.

The focus of early academic IT governance research was often related to IT decision making authority and the patterns in which it was delegated throughout the organisational structure (Bergeron et al. 2004, Gordon and Gordon 2002, Karimi et al. 1996) as well as the patterns of consultation relating to IT decision making and strategy (Weill and Ross 2005a). These patterns were initially determined to as centralised, decentralised and federal, which represents the middle case where certain IT decisions are centrally controlled and others are delegated to the business units (Weill and Ross 2005a). More recent IT governance research views structural authority patterns as one of three types of IT governance *mechanism* types. The other mechanisms are procedural, which relate to implementation and adherence to beneficial IS/IT policies, and relational, which relate to largely intangible concepts such as communications, culture and leadership.

Appendix 3 DeLone and McLean IS Success Model

Academic research into IS performance is extensive with numerous theoretical frameworks and models being proposed over the last 40 years. In particular the DeLone and McLeans model (D&M Model) of information systems success (DeLone and McLean 1992, DeLone and McLean 2003, Petter et al. 2008) is a cornerstone of academic research into information systems performance and it is appropriate for this thesis to consider in respect of understanding AIS quality and performance outcomes.

Building upon Shannon's mathematical theory of communication (Shannon and Weaver 1949) and Mason's information theory (Mason 1978), the D&M model was first proposed by DeLone and McLean after finding that the previous information systems literature referenced a wide variety of disparate and conflicting measures and aspects (DeLone and McLean 1992). Delone and McLean identified that the existing research into information system performance required consolidation so that results from different studies could be compared and an agreed upon. They identified six interrelated categories of information systems success: *system quality, information quality, information use, user satisfaction, individual impact and organisational impact*. The authors collectively refer to these six categories the "dependant variable" of information system success.

The D&M model (DeLone and McLean 1992) defines *system quality* as the quality of hardware and software contained within an IS. *Information quality* relates to the quality of the information that is produced by an IS, primarily the reports that are generated for consumption by users of the system. *Information use* relates to the level of interaction between the information output of the system and the user. *User satisfaction* with the information system was included as a component of overall information system success as information or system use was an unreliable measure in circumstances where use of the information or system was compulsory for task completion (DeLone and McLean 1992).

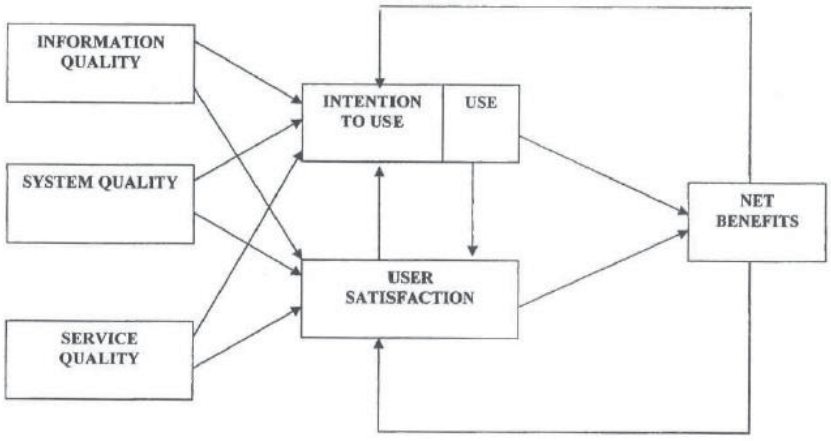
Individual impact relates to the effect of information on the behaviour of the recipient and can also be viewed as the performance impact on the individual resulting from the use of the information output of the system. The final category, *organisational impact*, relates to the effect of the information output from the system on overall organisational performance.

Whilst the D&M model was widely accepted and applied in research following the initial publication there were several criticisms made of the model as well as suggestions for re-specification. Seddon's (1997) criticisms pertained to DeLone and McLean's claim that the model provided insights to both process and causal means of information system success and that their definition of information/system use was particularly problematic. Notably, Seddon suggested that rather than having information/system use and user satisfaction leading to individual and organisational impact, that the benefits received by individuals and organisation would instead lead to improved user satisfaction – essentially reversing the implied causal relationship in the D&M model. Several researchers (Kettinger and Lee 1997, Pitt et al. 1995) suggested that a further aspect of quality, information system service quality, needed to be included in the D&M model. Seddon (1997) disagreed with this notion, noting that the D&M model referred to information system success, and the human resources utilised to provide service to this system are not characteristics contained within an information system.

DeLone and McLean published an update to the D&M model in 2003 (DeLone and McLean 2003) which included a review of the research which had utilised the model since initial publication. They largely disagreed with Seddon's assertions, arguing that IS service quality was a useful additional element of the D&M model on the basis that it could singularly, or jointly with information and system quality, affect subsequent use of and user satisfaction with the information system. DeLone and McLean also consolidated the concepts of actual

use and intention to use the information system, identifying that combining all potential benefits into a single component would provide a clearer and more applicable model.

A core tenet of the D&M Model is that none of model elements are inherently better or worse than any of the others in regards to assessing IS performance, but all have some role to play. As can be seen in the figure below, the six characteristics are interdependent with various factors influencing others to determine overall IS performance. Delone and McLean asserted that system quality, information quality and service quality singularly and jointly affect user intention and actual use of the system as well as user satisfaction. These two factors interact with each other as well as being determinants of individual and organisational benefits received from the information system. The D&M model does not specify an explicit association between service quality and system quality despite the operational connection between these concepts.



The Delone and McLean (2003) model of information system success

Since initial publication, the D&M model has been referenced in over one thousand publications and has been empirically examined, in part or in whole, in at least one hundred and fifty published studies (Petter and McLean 2009). Petter et al. (2008) undertook an exhaustive literature review on studies that make use of the D&M model with particular attention to the causal associations specified by the arrows between each of

the model components. They found moderate to strong support for the majority of the associations specified in the updated model; however found mixed support for the associations between information/system use and user satisfaction/benefits and had insufficient data to assess the associations with service quality in the model. The lack of studies examining the relationship between IT service quality and system use/user satisfaction may inherently justify Seddon's (1997) initial concerns regarding this inclusion.

Appendix 4 Review of IT Governance Research Utilising RBV Theory

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Kearns and Lederer 2003	A RBV of Strategic Alignment: How Knowledge Sharing Creates Competitive Advantage	**Relational:** Involvement of CIO in business planning Involvement of the CEO in IT planning	References the VRIN requirements for RBV resources and how strategic alignment meets these requirements. While the paper does not directly reference governance mechanisms, it does focus on relational aspects of IT governance, specifically the involvement of the CIO in business planning and the involvement of the CEO in IT planning.	SEM analysis of survey data collected from 161 CIOs. Path model links relational mechanisms to strategic planning outcomes and then to use of IT for competitive advantage.	The indicators used in the latent constructs for the primary exogenous variables in the path model reflect the relational nature of these two mechanisms. Taken together, they are closely related to a cultural IT-business strategic alignment measure. The findings of the study reflect the importance of a culture of mutual engagement between business and IT employees as a relational mechanism for achieving competitive advantage.
Bhatt and Grover 2005	Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study	**Relational:** IT Business Experience Relationship Infrastructure	While not directly addressing the concept of IT Governance, this paper looks at two important relational mechanisms of IT governance and provides an extensive RBV analysis to identify them as IT related capabilities.	SEM analysis of survey data from 202 manufacturing firms. Path model tests whether the two mechanisms, and a construct for IT infrastructure, are significantly associated with sustainable competitive advantage.	Results of the analysis indicate that the two relational mechanisms are associated with sustainable competitive advantage; whereas the IT infrastructure construct was not. These findings provide substantial support regarding the importance of relational IT governance mechanisms.

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Tallon 2008	Inside the adaptive enterprise: an information technology capabilities perspective on business process agility	**Procedural:** Strategic planning procedures Post-implementation reviews **Relational:** IT-business partnership culture	Stated as theoretically based in RBV based capabilities theory – no specific RBV theory analysis provided regarding IT governance mechanisms under study	PLS analysis of matched survey data (IT and business executives) from 241 firms. Structural model links IT governance mechanisms (referred to as Managerial IT capabilities) to technical IT capabilities and then to performance, moderated by environmental dynamism.	This study examines the relationships between IT managerial skills (which are defined more along the lines of IT governance mechanisms), technical IT capabilities and business process agility, moderated by environmental dynamism. The three IT governance mechanisms under study were combined in a second order construct, so it is not possible to identify the performance of the individual mechanisms on the dependant variables in the model.
Prasad et al. 2010	A capabilities-based approach to obtaining a deeper understanding of IT governance effectiveness	**Structural:** IT Steering committee **Procedural:** Formal decision process arrangements **Relational:** Top mgt commitment to IT Shared organisational knowledge	Stated as theoretically based in RBV based capabilities theory – no specific RBV theory analysis provided regarding IT governance mechanisms under study	PLS analysis of survey data from 216 senior executives. Structural model links IT governance mechanisms to IT capabilities and then to performance.	The path model specified in the study finds that the presence of an IT steering committee, with specific remits, will improve top management commitment to IT, shared organisational knowledge and flexible IT infrastructure; however a substantive counter-argument could be made regarding the modelled causality between the IT governance mechanisms in the path model

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Ali and Green 2012	Effective information technology (IT) governance mechanisms: An IT outsourcing perspective	**Structural:** IT strategy committee IT steering committee **Procedural:** Performance Measurement System **Relational:** Involvement of Sen mgt in IT Culture of Compliance **Unclear:** Communication Systems (?)	Stated as theoretically based in RBV- no specific RBV theory analysis provided regarding IT governance mechanisms under study	SEM analysis of survey data from 110 ISACA members. Path model links IT governance mechanisms to a latent construct for effective IT governance which is also impacted by IT intensity	Results of the analysis indicate that the relational mechanisms generally have a significant influence on effective IT governance; whereas the structural mechanisms do not. The procedural mechanism, corporate performance measurement systems may have been impacted by a suppression effect due to the unexpected signage and it was not possible to determine if corporate communication systems was procedural or relational as the survey indicators for this construct were not listed in the paper.
Bradley et al. 2012	An empirical examination of antecedents and consequences of IT governance in US hospitals	**Structural:** CIO structural position **Relational:** IT-business mutual participation Entrepreneurial culture	Stated as theoretically based in RBV- no specific RBV theory analysis provided regarding IT governance mechanisms under study	SEM analysis of survey data from 164 US Hospital CIOs. Path model links each mechanism to an overall IT governance construct.	The latent construct for IT governance used in this study is essentially an identification of the presence of procedural mechanisms. However, from a causal perspective, it is interesting to note that the two relational mechanisms were much better predictors of the presence of these procedural mechanisms than the structural mechanism.

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Debreceny & Gray 2013	IT Governance and Process Maturity	**Structural:** Board level committees established IT decision making structure **Procedural:** Adoption of governance framework **Relational:** Business/IT alignment	Stated as theoretically based in RBV- no specific RBV theory analysis provided regarding IT governance mechanisms under study	Multivariate analysis of field study data collected from 51 organisations.	While the dependant variable in this analysis is IT process maturity and not competitive advantage, it is interesting to note that the structural and procedural mechanisms, the main focus of attention in the theory development section, are not significant in their analysis; whereas business/IT alignment mechanism is found to be significant.
Turel and Bart 2014	Board-level IT governance and organizational performance	**Procedural:** Board best practice information gathering	Synthesis of RBV and contingency theory with corporate governance theory. No specific RBV theory analysis provided regarding IT governance mechanism under study	SEM analysis of survey data from 171 board members. Structural model links IT governance mechanisms with perceived organisational performance moderated by organisational factors.	The method for measuring the level of IT governance exercised by the board involved asking respondents to indicate whether the board raised specific questions relating to IT Governance best practice. While the authors do not discuss structural, procedural and relational mechanisms, this measure of board related IT governance would best be described as procedural in nature.

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Harguem et al. 2014	Impact of IT governance on org performance: proposing an explanatory model	**Structural:** IT Steering Committee **Procedural:** Performance measurement systems Communication systems **Relational:** Senior mgt involvement in IT Compliance culture	Stated as theoretically based in RBV- no specific RBV theory analysis provided regarding IT governance mechanisms under study	SEM analysis of survey data collected from 200 IT executives. Path model links IT governance mechanisms to IT management sophistication.	The model presented hypothesises that these mechanisms lead to improved IT management sophistication, and that this in turn leads to improved strategic alignment. Survey items are not provided. Unlike Ali and Green, performance measurement systems is the strongest mechanism in this study, although involvement of senior management in IT is still significant.
Bernroider et al 2014	From dynamic capabilities to ERP enabled business improvements	**Structural:** IS/IT represented at board level **Procedural:** Formal IT strategy Formal Risk mitigation strategy **Relational:** IT strategy alignment Top mgt commitment to IT	Utilises dynamic capability theory and refer to IT governance in general as a "spanning capability" (Wade and Hulland 2004) – however no specific RBV analysis provided regarding IT governance mechanisms under study	PLS analysis of survey data from 57 large organisations adopting ERP systems. Path model combines IT governance mechanisms formatively into a single latent construct for dynamic IT capability.	The use of only a single indicator for each mechanism, along with the combination of these indicators into a formative construct make it difficult to identify any substantive insights into the IT governance mechanisms under study. The authors also indicate statistical problems with the IT Governance latent construct.

Review of IT Governance Research Utilising RBV Theory					
Authors	**Title**	**IT Governance Mechanisms Referenced in Study**	**RBV Analysis of IT Governance Mechanisms**	**Empirical Approach**	**Results and Comments**
Ping-Ju Wu et al. 2015	How IT Governance mechanisms and Strategic Alignment influence Org performance	**Structural:** Decision making structure **Procedural:** Formal decision process arrangements **Structural/Relational:** Communication approaches	The study states that it utilises RBV as a framework to explain the impact of IT governance on IS strategic alignment. While Wu et al. show substantial consideration of the connections between IT governance theory and strategic alignment theory, there is little consideration of the VRIN characteristics of the mechanisms under study.	PLS analysis of matched survey data (IT and business executives) from 132 firms, cross-validated with archived data from 72 firms. Path model links IT governance mechanisms with strategic alignment and then organisational performance.	This study models and tests a causal link between IT governance and strategic alignment state (as opposed to cultural strategic alignment). While Wu et al. find strong support for their hypotheses that the presence of structural and procedural IT governance mechanisms leads to an improved state of strategic alignment, the study is somewhat compromised from a theoretical perspective as their IT governance variable lacks the necessary VRIN characteristics to qualify as an RBV resource or capability.

Appendix 5 Survey Invitations

First Invitation:

Good morning **recipient**,

My name is Peter Chapman and I am a lecturer at the University of Technology, Sydney. I am writing to ask for your assistance in my current research project – an examination of the competitive performance benefits associated with financial and management information systems.

I am seeking the views of financial and commercial managers of medium and large Australian organisations on this topic. I would greatly appreciate it if you could spare around 10 minutes of your time to complete an online survey on the topic with reference to your organisation. Please note that all data collected is anonymous and the answers you give are not connected to you or your organisation.

The link to the survey: http://www.surveymoz.com/s/UTS_Survey

In appreciation for your time I would like to offer you an executive report on the insights obtained from this research. If you would like to receive a copy of the report, or have any questions about the survey process or the research in general, please let me know in a reply to this email or by phone on 02 9514 3628.

Finally, it is standard practice to contact potential survey respondents multiple times to maximise survey response rates. As the survey responses are anonymous I cannot determine if you have previously completed the survey. Once you have completed the survey, or if you do not wish to receive further requests from me, please let me know by sending a brief reply to this email.

Thank you and regards,

Peter

Peter Chapman | Lecturer

Accounting DG

UTS Business School

e: peter.chapman@uts.edu.au | ph: +61 2 9514 3628 w:business.uts.edu.au

City Campus | PO Box 123 Broadway | NSW 2007

Second Invitation:

Good Morning **recipient**,

You may recall that I contacted you two weeks ago to request your assistance with a research project that I am currently undertaking - an examination of the competitive performance benefits associated with financial and management information systems in Australian organisations.

As all the survey responses are anonymous I cannot determine if you have completed the survey already. If you have not already completed a survey response I would greatly appreciate it if you could do so.

The survey - http://www.surveymoz.com/s/UTS_Survey - should take around 10 minutes to complete.

If you have already completed the survey, I thank you very much for your assistance - please do not fill the survey out a second time. I can remove your name from my reminder list if you send a short reply to this email informing me of such. Likewise if you do not wish to participate in the research and do not wish to be notified further, a short reply to this email informing me of this will prevent further notifications.

In appreciation for your time I would like to offer you an executive report on the insights obtained from the research. If you would like to receive a copy of the report, or have any questions about the survey process or the research in general, please let me know in a reply to this email or by phone on 02 9514 3628.

Regards,

Peter

Peter Chapman | Lecturer
Accounting DG
UTS BUSINESS SCHOOL

e: peter.chapman@uts.edu.au | ph: +61 2 9514 3628
w:business.uts.edu.au | fb: facebook.com/utsbusiness | tw: @UTS_Business
University of Technology, Sydney
City Campus | PO Box 123 Broadway | NSW 2007

Third Invitation:

Good morning **recipient**,

This email is a reminder of the request for assistance sent to you late last year. I will be finalising the data collection for my research project - an examination of the competitive performance benefits associated with financial and management information systems in Australian organisations - in the next few weeks.

As all survey responses are anonymous I am not able to determine if you have already completed the survey. If you have not completed a survey response to date I would greatly appreciate it if you could do so.

The link to the survey: http://www.surveymoz.com/s/UTS_Survey - It should take around 10 minutes to complete.

If you have already completed the survey, I thank you very much for your assistance - please do not fill the survey out a second time. I can remove your name from my contact list if you send a short reply to this email informing me of such. Likewise if you do not wish to participate in the research and do not wish to be notified further, a short reply to this email informing me of this will prevent further notifications.

In appreciation for your time I can offer you an executive report on the insights obtained from the research. If you would like to receive a copy of the report, or have any questions about the survey process or the research in general, please let me know in a reply to this email or by phone on 02 9514 3628.

Regards,

Peter

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Appendix 6 Survey Instrument

Competitive Financial and Management Accounting Systems in Australian Organisations

University of Technology Sydney, School of Business

The purpose of this survey is to collect the knowledge and opinions of senior Australian financial and commercial officers in relation to their organisation's financial and management information systems, organisational support of these systems, and competitive performance benefits.

Please note that all answers should relate to your views on the **national operations** of your organisation where possible. The survey should take approximately 10 minutes to complete and all data is collected on an anonymous basis, so any answers you give will not be directly connected to you or your organisation.

In appreciation for your time I would like to offer you an executive report on the insights obtained from this research. If you would like to receive this report, or have any questions about the survey or research, please contact the researcher at peter.chapman@uts.edu.au or on 02 9514 3628.

Planning, Budgeting and Forecasting Systems

These first few questions relate to the applications and information systems used by your organisation to undertake financial planning, budgeting and forecasting activities. These may include specialised financial information systems, spreadsheets and any other technology based tool used for these purposes.

Data is shared effectively between the various planning, budgeting and forecasting systems (if you only have one system please mark strongly agree).

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

It is easy to modify or adapt forecasts and budgets in response to changing business requirements or new information.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The planning, forecasting and budgeting systems **meet our current business requirements.**

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The planning, forecasting and budgeting systems support the planning of a wide range of performance indicators.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The planning, forecasting and budgeting systems provide the ability to forecast multiple scenarios.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The planning, forecasting and budgeting systems strongly support multidimensional planning (e.g. by product line, region, distribution channel, etc)

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The Chief Information Officer

The next few questions relate to the most senior executive or manager responsible for Information Systems and Technology (IT) in your organisation (CIO or equivalent).

The CIO (or equivalent) has responsibility for the strategic direction of IT.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The CIO (or equivalent) has the authority to determine which IT initiatives should be pursued.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The CIO (or equivalent) is an effective strategic leader.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The CIO (or equivalent) is better described as a business focused executive as opposed to a technical expert.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

I have confidence in the performance of the CIO (or equivalent).

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Organisational Strategy and Information Technology (IT)

The next few questions relate to the level of interaction between specialist IT managers and other managerial level employees in regards to strategic decision making in your organisation.

Business managers (non-IT) consider IT to be of strategic value.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Business managers (non-IT) are aware of the organisation's IT assets.

Strongly | Disagree | Neutral | Agree | Strongly

Disagree Agree

Managers from a variety of business functions are engaged in the IT planning process.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

IT planning involves an evaluation of the future information needs of business managers.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

IT managers (IT specialists) regularly attend business strategy meetings.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

IT managers (IT specialists) participate in setting business goals and strategies.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

IT managers (IT specialists) participate in the early stages of major business projects.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Business strategies address IT-related opportunities and threats.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Management Reporting Systems

The next few questions relate to the applications and information systems used by your organisation to undertake management reporting activities. These may include specialised financial information systems, spreadsheets and any other technology based tool used for these purposes.

There is a high level of consistency between the figures reported by the various reporting systems (please mark strongly agree if you only have one management reporting system).

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The values reported in the management reporting systems accurately reflect actual activities.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The values reported by in the management reporting systems are always up to date.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The management reporting systems provide customised reporting based on different information needs.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The management reporting systems strongly support multidimensional reporting (e.g. by firm, product line, region, distribution channel, etc).

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The management reporting systems meet our current business needs.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Information Technology Support Services

The next few questions relate to the IT employees and services which support your use of information technology in the workplace (the IT Support Function). The IT Support function may comprise of multiple actual business units, and be in-house and/or outsourced.

The IT support function is responsive to technical problems.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The IT support function meets promised deadlines.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The IT support function is able to resolve problems on the first attempt.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The IT support function communicates important information to IT users.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

The IT support function understands the needs of IT users.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Market and Technology Environment

The next few questions relate to the competitive environment in which your organisation operates.

The technology in our industry is changing rapidly.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

In our kind of business, customers' preferences change quite a bit over time.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

It is very difficult to predict who might be our future competitors.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

One hears of a new competitive move almost every day.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

It is difficult to predict customer preference changes in our marketplace.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

It is very difficult to forecast where the technology in our industry will be in the next 2 to 3 years.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Relative to your competitors, how has organisation performed over the last year in the following areas:

	Much Worse			About The Same			Much Better
Sales Growth - relative to your major competitors	☐	☐	☐	☐	☐	☐	☐
Market Share - relative to your major competitors	☐	☐	☐	☐	☐	☐	☐
Profitability - relative to your major competitors	☐	☐	☐	☐	☐	☐	☐
Overall - relative to your major competitors	☐	☐	☐	☐	☐	☐	☐

IT Projects

The next few questions relate to significant IT projects undertaken in your organisation over the last 3 years. Such projects could include, but are not limited to, the implementation of new information systems or other business software and major upgrades of IT hardware.

Significant IT projects always succeed in achieving their intended scope.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Significant IT projects always stay within budget.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Significant IT projects are always completed on schedule.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Significant IT projects always produce high quality results.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Significant IT projects always succeed in meeting business requirements.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

Demographics

These few questions relating to you and your organisation are the final questions of the survey. Please note that these details will be held confidentially and will not be linked to you or your organisation.

What is your current position title?

How many years have you held this position at your current organisation?

How many years in total have you been with your current organisation?

Which of the following best describes the primary industry category of your organisation?

- [ ] Agriculture, Forestry and Fishing
- [ ] Mining
- [ ] Manufacturing
- [ ] Electricity,Gas and Water Supply
- [ ] Construction
- [ ] Wholesale Trade
- [ ] Retail Trade
- [ ] Accommodation, Cafes and Restaurants
- [ ] Transport and Storage
- [ ] Communication Services
- [ ] Finance and Insurance
- [ ] Property and Business Services
- [ ] Government Administration and Defence
- [ ] Education
- [ ] Health and Community Services
- [ ] Cultural and Recreational Services
- [ ] Other

Specify Other:

What was the gross revenue ($AUD millions) generated by your organisation last financial year (a general figure will suffice but if you never release this information please mark $0)

Please estimate the number of employees in your organisation.

Appendix 7 Indicator and Construct Descriptive Statistics

	Mean	Std. Dev	Skewness		Kurtosis		Skew /	Kurtosis /
			Stat	SE	Stat	SE	SE	SE
Future-Oriented AIS	**3.35**	**0.80**	**-0.42**	**0.18**	**-0.22**	**0.36**	**-2.33**	**-0.62**
PBF1	3.61	1.09	-0.64	0.18	-0.60	0.36	-3.58	-1.70
PBF2	3.42	1.05	-0.42	0.18	-0.88	0.36	-2.37	-2.46
PBF3	3.42	1.00	-0.38	0.18	-0.79	0.36	-2.13	-2.22
PBF4	3.31	1.05	-0.45	0.18	-0.66	0.36	-2.50	-1.86
PBF5	3.09	1.14	-0.16	0.18	-1.08	0.36	-0.89	-3.05
PBF6	3.18	1.18	-0.31	0.18	-0.98	0.36	-1.74	-2.74
CIO	**3.45**	**0.77**	**-0.40**	**0.18**	**0.33**	**0.36**	**-2.25**	**0.93**
CIO1	3.69	0.95	-0.82	0.18	0.31	0.36	-4.57	0.86
CIO2	3.34	1.01	-0.37	0.18	-0.76	0.36	-2.09	-2.14
CIO3	3.32	0.94	-0.29	0.18	-0.39	0.36	-1.61	-1.10
CIO4	3.36	1.13	-0.37	0.18	-0.90	0.36	-2.08	-2.52
CIO5	3.54	0.88	-0.80	0.18	0.74	0.36	-4.47	2.09
Bus-IT Alignment	**3.50**	**0.61**	**-0.46**	**0.18**	**0.29**	**0.36**	**-2.59**	**0.83**
CUL1	3.64	0.88	-0.69	0.18	0.14	0.36	-3.84	0.40
CUL2	3.46	0.76	-0.56	0.18	-0.44	0.36	-3.12	-1.23
CUL3	3.18	0.96	-0.33	0.18	-0.98	0.36	-1.83	-2.74
CUL4	3.69	0.84	-0.97	0.18	1.00	0.36	-5.41	2.81
IT-Bus Alignment	**3.21**	**0.76**	**0.00**	**0.18**	**-0.60**	**0.36**	**-0.02**	**-1.70**
CUL5	3.12	1.01	-0.06	0.18	-0.93	0.36	-0.34	-2.61
CUL6	2.82	1.04	0.05	0.18	-0.99	0.36	0.28	-2.79
CUL7	3.40	0.92	-0.54	0.18	-0.54	0.36	-3.04	-1.51
CUL8	3.49	0.85	-0.38	0.18	-0.63	0.36	-2.13	-1.78
Management Reporting AIS	**3.85**	**0.67**	**-0.41**	**0.18**	**-0.15**	**0.36**	**-2.30**	**-0.42**
MRS1	4.02	0.88	-1.19	0.18	1.72	0.36	-6.64	4.83
MRS2	4.24	0.65	-0.64	0.18	0.98	0.36	-3.58	2.75
MRS3	3.86	0.90	-0.76	0.18	0.19	0.36	-4.27	0.53
MRS4	3.66	1.00	-0.89	0.18	0.26	0.36	-5.01	0.72
MRS5	3.61	1.09	-0.70	0.18	-0.31	0.36	-3.92	-0.87
MRS6	3.52	0.99	-0.55	0.18	-0.28	0.36	-3.06	-0.78
IT Service	**3.53**	**0.67**	**-0.80**	**0.18**	**0.90**	**0.36**	**-4.48**	**2.52**
ITS1	3.99	0.78	-1.23	0.18	2.58	0.36	-6.89	7.26
ITS2	3.37	0.89	-0.48	0.18	0.03	0.36	-2.68	0.07
ITS3	3.16	0.84	-0.13	0.18	-0.94	0.36	-0.74	-2.65
ITS4	3.63	0.84	-1.18	0.18	1.52	0.36	-6.63	4.27
ITS5	3.51	0.83	-0.92	0.18	0.62	0.36	-5.16	1.76
Competitive Advantage	**4.51**	**1.12**	**-0.22**	**0.18**	**0.51**	**0.36**	**-1.23**	**1.43**
CAD1	4.48	1.24	-0.12	0.18	0.40	0.36	-0.67	1.13
CAD2	4.46	1.19	-0.10	0.18	0.05	0.36	-0.54	0.15
CAD3	4.51	1.29	-0.17	0.18	0.16	0.36	-0.98	0.46
CAD4	4.57	1.17	-0.24	0.18	0.30	0.36	-1.33	0.85
IT Project Capability	**2.85**	**0.76**	**0.07**	**0.18**	**0.12**	**0.36**	**0.38**	**0.33**
ITP1	3.06	0.98	-0.17	0.18	-0.86	0.36	-0.93	-2.43
ITP2	2.50	0.92	0.43	0.18	-0.45	0.36	2.43	-1.27
ITP3	2.52	0.94	0.34	0.18	-0.42	0.36	1.90	-1.18
ITP4	3.01	0.90	-0.02	0.18	-0.31	0.36	-0.12	-0.86
ITP5	3.08	0.88	-0.21	0.18	-0.48	0.36	-1.16	-1.34
ITP6	3.66	0.76	-0.71	0.18	0.21	0.36	-3.95	0.59

Appendix 8 Indicator Loadings and Cross Loadings

	Comp Adv	CIO Leader	IT Project	IT Service	Mgt. Report AIS	Future orient AIS	Bus-IT Align	IT-Bus Align
CAD1	0.951	0.12	0.228	0.045	0.153	0.321	0.212	0.194
CAD2	0.912	0.113	0.186	-0.029	0.137	0.263	0.185	0.198
CAD3	0.825	0.140	0.157	0.072	0.022	0.201	0.193	0.196
CAD4	0.954	0.121	0.262	0.095	0.103	0.293	0.208	0.203
CIO1	0.068	0.672	0.254	0.162	0.213	0.135	0.123	0.197
CIO2	-0.025	0.669	0.305	0.227	0.184	0.128	0.050	0.216
CIO3	0.181	0.887	0.443	0.392	0.359	0.321	0.375	0.484
CIO4	0.180	0.820	0.416	0.285	0.292	0.328	0.306	0.463
CIO5	0.076	0.834	0.534	0.488	0.377	0.291	0.270	0.378
ITP1	0.261	0.454	0.857	0.448	0.364	0.369	0.240	0.358
ITP2	0.177	0.346	0.781	0.289	0.299	0.297	0.255	0.403
ITP3	0.152	0.381	0.796	0.418	0.271	0.294	0.254	0.345
ITP4	0.159	0.501	0.851	0.510	0.347	0.342	0.377	0.435
ITP5	0.21	0.464	0.831	0.465	0.339	0.307	0.236	0.364
ITS1	0.140	0.219	0.358	0.742	0.269	0.293	0.305	0.133
ITS2	0.014	0.403	0.431	0.815	0.271	0.290	0.242	0.125
ITS3	0.006	0.349	0.425	0.798	0.258	0.275	0.304	0.235
ITS4	0.010	0.362	0.440	0.808	0.141	0.212	0.436	0.347
ITS5	0.035	0.376	0.432	0.836	0.193	0.252	0.443	0.340
MRS1	0.090	0.305	0.256	0.201	0.755	0.464	0.063	0.084
MRS2	0.032	0.316	0.294	0.273	0.722	0.378	0.182	0.147
MRS3	0.153	0.226	0.270	0.233	0.675	0.390	0.224	0.133
MRS4	0.163	0.273	0.334	0.119	0.714	0.472	0.086	0.270
MRS5	0.074	0.266	0.259	0.187	0.777	0.601	0.152	0.175
MRS6	0.066	0.334	0.364	0.247	0.836	0.594	0.156	0.204
PBF1	0.272	0.200	0.310	0.274	0.536	0.769	0.134	0.106
PBF2	0.176	0.282	0.313	0.341	0.531	0.794	0.182	0.165
PBF3	0.221	0.318	0.346	0.234	0.577	0.816	0.188	0.219
PBF4	0.208	0.252	0.329	0.248	0.418	0.742	0.287	0.307
PBF5	0.258	0.138	0.202	0.227	0.331	0.620	0.286	0.266
PBF6	0.233	0.248	0.228	0.127	0.487	0.694	0.186	0.258
CUL1	0.110	0.255	0.244	0.288	0.073	0.111	0.66	0.436
CUL2	0.104	0.157	0.271	0.359	0.174	0.240	0.698	0.310
CUL3	0.243	0.210	0.190	0.224	0.155	0.219	0.752	0.455
CUL4	0.150	0.262	0.249	0.375	0.139	0.214	0.725	0.466
CUL5	0.25	0.35	0.377	0.217	0.172	0.244	0.472	0.839
CUL6	0.142	0.390	0.315	0.199	0.121	0.224	0.425	0.844
CUL7	0.203	0.323	0.402	0.235	0.206	0.210	0.509	0.743
CUL8	0.082	0.425	0.378	0.313	0.225	0.238	0.477	0.747

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