

**IT GOVERNANCE EVALUATION:  
ADAPTING AND ADOPTING THE COBIT  
FRAMEWORK FOR PUBLIC SECTOR  
ORGANISATIONS**

**Loai Al Omari**  
**Master of Information Technology**

Submitted in fulfilment of the requirements for the degree of  
Doctor of Philosophy

Science and Engineering Faculty  
Queensland University of Technology  
2016



# Keywords

Australian public sector; adoption intention; case study; COBIT 5; evaluation frameworks; innovation adoption; IT governance; IT process capability; organisational maturity; perceived usefulness; public and private sector; Technology Acceptance Model.

# Abstract

Information technology (IT) has become an indispensable element for success for many organisations, including public sector organisations, as their dependency on IT to support, sustain, and drive the achievement of strategic objectives intensifies. With this increase of their reliance on IT and the associated growth of IT expenditure, the notion of IT governance has become an increasingly common and prominent ideal to ensure prudent and value-based investment in IT. With the need to establish effective IT governance, the demand for proven support methods grows. Specifically, best-practice models for the governance of IT are beginning to gain awareness and acceptance as they provide guidance to further promote and achieve effective IT governance. In particular, the Control Objectives for Information and Related Technology (COBIT) reference model is increasingly being discussed and has been widely accepted as the framework of choice for IT governance.

Although COBIT offers organisations descriptive and normative support for implementing, managing, and evaluating IT governance, it is considered a massive framework. Given the constraints of both time and resources within which the public sector is forced to operate, utilising a framework the size of COBIT in its entirety is often considered too large a task. As an alternative, it is not uncommon for organisations to randomly “cherry pick” IT processes from the framework in an effort to reduce its size. Even though the importance of COBIT as a framework for both implementing and evaluating IT governance has increased, only limited academic research has either analysed or leveraged COBIT as an instrument in executing research programs. The literature also indicates that, while there is widespread use of COBIT, little academic research has considered the effectiveness of the framework to satisfy specific needs of individual organisations, sectors, or societies. Furthermore, prior research has also identified that adoption and use of COBIT could be examined to find the motivations for organisations and individuals to use it.

This thesis addresses these gaps in literature by providing a deeper understanding of the frameworks of IT governance and their adoption, leveraging established Information System (IS) theories. A two-stage, mixed-method approach

using quantitative and qualitative studies is employed to examine the potential to develop an IT governance evaluation framework (ITGEF) based on best-practice frameworks, such as COBIT, to evaluate IT governance within a specific context. The first stage documents research that sought support for and refinement of an adapted ITGEF in an Australian state public sector context. In the second stage of the research, the technology acceptance model (TAM) and the technology, organisation, environment (TOE) framework are used to help explore the factors that influence the adoption of the adapted IT governance evaluation framework.

In order to evaluate the adapted ITGEF, three practical evaluation criteria were undertaken: the COBIT goals-cascade mechanism, case-study research within a public sector context, and the Technology Acceptance Model (TAM). The alignment of the proposed framework with the stakeholders' needs, enterprise goals, and IT-related goals for a particular context using the COBIT goals-cascade mechanism is also examined. The case-study method is used because it is considered a comprehensive evaluation method and can provide valuable insights in a real-life environment. The TAM factors of Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Intent to Adopt (I) were used to evaluate the effect of adapting ITGEF in lieu of prescriptively employing best-practice frameworks and models.

The key findings of this research are: (i) arbitrarily adapted best-practice frameworks are perceived to reduce the efficiency and effectiveness of evaluating IT governance; (ii) an adapted IT governance evaluation framework (ITGEF), which is tailored to fit the specific needs of individual organisations or sectors, could be methodologically derived from best-practice frameworks and models (e.g., COBIT); (iii) users' perception of the framework's usefulness and the ease of use are important factors to the acceptance and adoption of adapted ITGEFs ; and (iv) an adapted ITGEF is perceived to increase the ease of use, usefulness, and intent to adopt best-practice frameworks and models within a public sector context.

This research makes an important contribution to IT governance research and theory by identifying the importance of the framework's role in the evaluation of IT governance. The method for adapting best-practice frameworks to develop IT governance evaluation frameworks provides a deeper insight into IT governance evaluation for the guidance of organisations undertaking this process. The application of innovation adoption theory in this research addresses the gap in the

literature regarding the understanding of factors related to the acceptance of adapted ITGEFs in the context of well-established IS theories; thus enabling a better understanding, and hence influencing, the adoption of adapted ITGEFs. The research conducted should encourage further research into IT governance frameworks and the involvement of innovation adoption and other IS theories in the planning, implementation, and evaluation stages.

# Table of Contents

<b>Keywords</b> .....	<b>1</b>
<b>Abstract</b> .....	<b>2</b>
<b>Table of Contents</b> .....	<b>5</b>
<b>List of Figures</b> .....	<b>7</b>
<b>List of Tables</b> .....	<b>9</b>
<b>Publications from This Research</b> .....	<b>11</b>
<b>List of Abbreviations</b> .....	<b>12</b>
<b>Statement of Original Authorship</b> .....	<b>14</b>
<b>Acknowledgements</b> .....	<b>15</b>
<b>Chapter 1: Introduction</b> .....	<b>16</b>
1.1 Background to the research .....	17
1.2 The research problem.....	20
1.3 Research questions.....	22
1.4 Delimitations of scope and key assumptions.....	22
1.5 The research method .....	24
1.6 Thesis contributions .....	25
1.7 Summary and thesis outline.....	26
<b>Chapter 2: Literature Review</b> .....	<b>31</b>
2.1 IT governance.....	31
2.2 Innovation adoption .....	50
2.3 Gaps in the literature.....	60
2.4 Summary .....	61
<b>Chapter 3: Theoretical Development of an IT Governance Evaluation Framework</b> .	<b>63</b>
3.1 Adapting IT governance frameworks.....	63
3.2 IT governance evaluation framework: COBIT .....	66
3.3 Developing an initial IT governance evaluation framework .....	71
3.4 Evaluation criteria.....	80
3.5 Summary .....	80
<b>Chapter 4: Research Methodology</b> .....	<b>82</b>
4.1 Introduction .....	82
4.2 Development of the research questions.....	82
4.3 Philosophical foundation.....	84
4.4 Research approach.....	87
4.5 Research validity .....	92
4.6 Methodological limitations.....	95
4.7 Summary .....	96

<b>Chapter 5: Exploring IT Governance Evaluation Challenges .....</b>	<b>97</b>
5.1 Delphi research.....	97
5.2 Results and interpretations .....	100
5.3 Summary .....	118
<b>Chapter 6: Refinement of the Conceptual IT Governance Evaluation Framework</b>	<b>123</b>
6.1 Survey research .....	123
6.2 Results and interpretations .....	126
6.3 Summary .....	141
<b>Chapter 7: Evaluating IT Governance across the Public Sector .....</b>	<b>145</b>
7.1 Case study research .....	145
7.2 Results and interpretations .....	152
7.3 Summary .....	171
<b>Chapter 8: Exploring Factors that Influence Adoption of an Adapted IT Governance Evaluation Framework .....</b>	<b>173</b>
8.1 Survey research .....	173
8.2 Results and interpretations .....	183
8.3 Summary .....	198
<b>Chapter 9: Summary and Conclusions .....</b>	<b>201</b>
9.1 Overview of the research study .....	201
9.2 Contributions .....	205
9.3 Generalisation and wider application of research.....	207
9.4 Limitations and future research .....	208
9.5 Conclusion .....	212
<b>Bibliography.....</b>	<b>215</b>
<b>Appendices .....</b>	<b>237</b>



# List of Figures

<i>Figure 1.1.</i> Research process.....	27
<i>Figure 2.1.</i> Link between corporate governance and IT governance (Weill & Ross, 2004, p. 5).....	33
<i>Figure 2.2.</i> Private and public sector entities (Sethibe, Campbell, & McDonald, 2007).....	36
<i>Figure 2.3.</i> Focus areas of IT governance (ITGI, 2003, p. 20).....	40
<i>Figure 2.4.</i> Extended IT governance model (Grant et al., 2007, p. 8).....	42
<i>Figure 2.5.</i> Beliefs, attitudes, intentions, and behaviours (Fishbein & Ajzen, 1975, p. 15). ....	52
<i>Figure 2.6.</i> Technology Acceptance Model (Davis, 1993, p. 476). ....	54
<i>Figure 2.7.</i> Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003, p. 447).....	55
<i>Figure 2.8.</i> Extension of the Technology Acceptance Model (TAM2) by Venkatesh and Davis (2000, p. 188). ....	56
<i>Figure 2.9.</i> Technology–Organisation–Environment framework by (Tornatzky & Fleischer, 1990, p. 154). ....	57
<i>Figure 3.1.</i> Comparing a high-level IT process from COBIT 5 and COBIT 4.1. ....	69
<i>Figure 3.2.</i> Summary of the COBIT 5 Process Capability Model (ISACA, 2012a, p. 42). ....	70
<i>Figure 3.3.</i> COBIT 5 process capability levels (ISACA, 2013b). ....	71
<i>Figure 3.4.</i> Conceptual IT governance evaluation framework.....	79
<i>Figure 4.1.</i> Conceptual framework. ....	89
<i>Figure 5.1.</i> Average impact and effort to address evaluation challenges. ....	106
<i>Figure 5.2.</i> Perceived impact (PIM) of individual IT governance evaluation challenges. ....	109
<i>Figure 5.3.</i> Perceived effort to address (PEA) of individual IT governance evaluation challenges. ....	110
<i>Figure 5.4.</i> Impact, effort to address, and top-ten IT governance evaluation challenges.....	117
<i>Figure 6.1.</i> Comparison of high-level IT processes identified as being important in previous studies.....	135
<i>Figure 6.2.</i> Adapted IT Governance Evaluation Framework (ITGEF) for public sector organisations.....	140
<i>Figure 7.1.</i> Range and distribution of capability level scores for the top-ten IT processes in Queensland PSOs.....	159
<i>Figure 7.2.</i> Public sector maturity levels by size of organisation. ....	161
<i>Figure 7.3.</i> A comparison of Queensland public sector IT processes capability levels with public sector organisations from previous studies. ....	164
<i>Figure 7.4.</i> Comparison with public sector international benchmark results.....	165

<i>Figure 7.5. Mapping enterprise goals to IT-related goals.....</i>	169
<i>Figure 7.6. Mapping enterprise goals to IT-related goals and adapted ITGEF.....</i>	170
<i>Figure 8.1. Technology Acceptance Model (Davis &amp; Venkatesh, 1996, p. 20).....</i>	175
<i>Figure 8.2. Extension of TAM (TAM2) by (Venkatesh &amp; Davis, 2000, p. 188).....</i>	175
<i>Figure 8.3. Conceptual model: expanded TOE-based conceptual model for ITGEF adoption. Adapted and derived from Tornatzky and Fleischer (1990).....</i>	176
<i>Figure 8.4. Research model: TOE factors impact on TAM's perceived usefulness. Adapted and derived from Tornatzky and Fleischer (1990) and Venkatesh and Davis (2000). ....</i>	177
<i>Figure 8.5. Research model: TOE and TAM influence intention. Derived from Agarwal and Prasad (1997); Tornatzky and Fleischer (1990); and Venkatesh and Davis (2000). ....</i>	177
<i>Figure 8.6. Research model (composite model): TOE and TAM influence intention to adopt. Derived from Agarwal and Prasad (1997); Parker (2013); Tornatzky and Fleischer (1990); and Venkatesh and Davis (2000). ....</i>	180
<i>Figure 8.7. Structural model.....</i>	192
<i>Figure 8.8. Perceived ease of use, perceived usefulness, and intent to adopt the adapted IT governance evaluation framework.....</i>	198

# List of Tables

Table 2.1 <i>Dimension of the IT governance model adopted from Grant et al. (2007)</i> .....	44
Table 2.2 <i>Initial list of IT governance evaluation challenges</i> .....	49
Table 3.1 <i>Comparison of the most important control objectives from COBIT identified in previous studies</i> .....	76
Table 3.2 <i>Initial ITGEF based on COBIT 4/4.1</i> .....	77
Table 3.3 <i>Mapping of initial conceptual model from COBIT 4/4.1 to COBIT 5</i> .....	78
Table 4.1 <i>Four categories of social science research paradigms (Healy &amp; Perry, 2000, p. 119)</i> .....	85
Table 4.2 <i>Research process and relationships of the involved research activities</i> .....	90
Table 5.1 <i>Respondents' demographic details</i> .....	99
Table 5.2 <i>Validated list of IT governance evaluation challenges</i> .....	102
Table 5.3 <i>Overall IT governance evaluation challenges results</i> .....	104
Table 5.4 <i>Top 10 list of IT governance evaluation challenges</i> .....	112
Table 6.1 <i>Type of organisation in which respondents are employed</i> .....	127
Table 6.2 <i>Position level of respondents within the public sector</i> .....	127
Table 6.3 <i>Rating for COBIT 5 high-level IT processes as perceived by Queensland PSOs</i> .....	129
Table 6.4 <i>Initial IT governance evaluation framework in the Queensland public sector ranked by importance</i> .....	130
Table 6.5 <i>Comparison of high-level IT processes ratings by domain</i> .....	131
Table 6.6 <i>Top-ten high-level IT processes for public sector organisations</i> .....	143
Table 7.1 <i>Summary of key attributes of public sector cases</i> .....	149
Table 7.2 <i>Example of detailed IT governance process capability evaluation</i> .....	151
Table 7.3 <i>Summary of capability levels for the ten most important IT processes (in order of priority) for Queensland public sector organisations</i> .....	153
Table 7.4 <i>IT process capability level means for common IT processes compared with previous studies</i> .....	162
Table 7.5 <i>Rating for enterprise goals as perceived by Queensland PSOs</i> .....	166
Table 7.6 <i>Rating for IT-related goals as perceived by Queensland PSOs</i> .....	167
Table 8.1 <i>Derivation of TAM constructs</i> .....	178
Table 8.2 <i>Derivation of TOE constructs</i> .....	179
Table 8.3 <i>Research hypotheses</i> .....	180
Table 8.4 <i>Frequency distribution</i> .....	185

Table 8.5 <i>Nature of IT governance evaluation frameworks usage in Queensland PSOs</i> .....	186
Table 8.6 <i>IT governance frameworks implementation type in Queensland PSOs</i> .....	186
Table 8.7 <i>Model reliability</i> .....	188
Table 8.8 <i>Outer model loadings</i> .....	189
Table 8.9 <i>Average Variance Extracted</i> .....	190
Table 8.10 <i>Latent variable correlations</i> .....	190
Table 8.11 <i>Cross-loadings</i> .....	191
Table 8.12 <i>Total effects</i> .....	194
Table 8.13 <i>Test Statistics</i> .....	195
Table 8.14 <i>Summary of hypothesis testing results</i> .....	195
Table 8.15 <i>Perceived ease of use (PEU) of the adapted ITGEF</i> .....	196
Table 8.16 <i>Perceived usefulness (PU) of the adapted ITGEF</i> .....	197
Table 8.17 <i>Intent to adopt (I) the adapted ITGEF</i> .....	197
Table 9.1 <i>Summary of hypothesis testing results</i> .....	203

## Publications from This Research

While pursuing the research described in this thesis from early 2011 until the beginning of 2015, three refereed scholarly articles related to this research have been published in conference proceedings and a journal, with two further articles submitted for publication:

- Al Omari, L., Barnes, P., & Pitman, G. (2013). A Delphi Study into the Audit Challenges of IT Governance in the Australian Public Sector. *Electronic Journal of Computer Science and Information Technology (eJCSIT)*, 4(1), 5-13.
- Al Omari, L., Barnes, P., & Pitman, G. (2012). *Optimising COBIT 5 for IT Governance: Examples from the Public Sector*. Paper presented at the 2nd International Conference on Applied and Theoretical Information Systems Research (2nd. ATISR2012), Taipei, Taiwan.
- Al Omari, L., Barnes, P., & Pitman, G. (2012). *An Exploratory Study into Audit Challenges in IT Governance: A Delphi Approach*. Paper presented at the Symposium on IT Governance, Management & Audit (SIGMA2012), Kuala Lumpur, Malaysia.
- In addition, the paper “Adapting COBIT for IT Governance in the Public Sector: An Australian Case Study” has been submitted to the *Journal of Advances in Information Technology* in 2014.
- In addition, the paper “An Exploration of the Factors Influencing the Adoption of an Adapted IT Governance Framework” has been submitted to the *Electronic Journal of Information Systems Evaluation* in 2015.

# List of Abbreviations

APO	align, plan and organise
AVE	average variance extracted
BAI	build, acquire and implement
BSC	Balanced Scorecard
CITEC	Centre for Information Technology and Communications
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
COBIT	Control Objectives for Information and Related Technology
COSO	Committee of Sponsoring Organizations of the Treadway Commission
DOI	diffusion of innovation theory
DSS	deliver, service and support
EDA	exploratory data analysis
EDM	evaluate, direct and monitor
EUROSAI	European Organization of Supreme Audit Institutions
I	intent to adopt
IS	information systems
ISACA	Information Systems Audit and Control Association
ISO/IEC	International Standards Organization/International Electrotechnical Commission
IT	information technology
ITGEF	information technology governance evaluation framework
ITGI	Information Technology Governance Institute
ITIL	IT Infrastructure Library
KGI	key goal indicator
KPI	key performance indicator
MEA	monitor, evaluate and assess
MoG	machinery of government
NGO	non-government organisation
NPO	non-profit organisation
PCM	Process Capability Model
PEA	perceived effort to address
PEU	perceived ease of use
PIM	perceived impact
PLS	partial least squares
PRM	Process Reference Model
PSO	public sector organisation

PU	perceived usefulness
QGCIO	Queensland Government Chief Information Office
RACI	Responsible, Accountable, Consulted, and Informed
SEI	Software Engineering Institute
SEM	structural equation modelling
SHT	Stakeholder Theory
SME	small- and medium-scale enterprises
SOX	Sarbanes-Oxley Act
TAM	Technology Acceptance Model
TOE	Technology–Organisation–Environment
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
WP	work product

## Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: QUT Verified Signature

Date: August 2016



# Acknowledgements

First of all, I would like to express my deepest gratitude and appreciation to my principal supervisor, Dr Adrian McCullagh, for his tremendous support, guidance, encouragement and mateship throughout my PhD journey. Also, I would like to thank my associate supervisors, Dr Paul Barnes and Associate Professor Richi Nayak for their invaluable comments and advice both academically and personally. From the deep of my heart, thank you very much Paul and Richi.

I further thank the individual participants and organisations from the Queensland public sector who generously took part in the research activities, and for providing the invaluable insight necessary to fulfil the research objectives.

Above all, I am most grateful to my first and most influential teachers, my parents, for their love, inspiration, support, and encouragement. Their constant encouragement has been the source of the strength that enabled this momentous achievement. I could not find the words that express my deepest gratitude to my partner Solaf Al Omari for believing in me and for her endless love, support, patience and sacrifice. Without her I could not have completed this work. My thanks and love is extended to my two precious children Jude and Jenna for all the joy and love they bring into my life.

Last and certainly not least, I would like to thank professional editor Kerry Davies AE for copyediting and proofreading of this document (according to the guidelines laid out in the university-endorsed national ‘Guidelines for editing research theses’). Your assistance has made a significant improvement to my work and you have my enduring and deepest thanks.

# Chapter 1: Introduction

---

Information technology (IT) has become an indispensable element for success in the contemporary business world as the dependency on IT by many organisations today to support, sustain, and drive organisational growth increases (Posthumus, Von Solms, & King, 2010). Public sector organisations, which are defined as the part of economic and administrative life that deals with government service delivery, are among the organisations that have also embraced IT as an integral part of their daily operations to deliver efficient and cost-effective services to the public (Ali & Green, 2007). Consequently, an organisation's investment in IT-related initiatives to meet the needs of their employees, other stakeholders, and their business objectives continues to grow (Preittigun, Chantatub, & Vatanasakdakul, 2012). With the increase in the reliance on IT and the associated growth of IT expenditure, the notion of IT governance has become an increasingly common and prominent ideal within most organisations to ensure prudent and value-based investment in the technology (De Haes & Van Grembergen, 2009; Rubino & Vitolla, 2014).

IT governance consists of structures, processes, and operational mechanisms that work together in harmony to ensure that IT investments and business objectives are aligned (De Haes & Van Grembergen, 2005). The cornerstone of IT governance is to provide decision-makers an acceptable level of assurance that an organisation's strategic objectives are not jeopardised by IT failures (Spremic, 2011). A conventional or, rather, inevitable approach for attaining a level of assurance includes the evaluation of the IT governance system in place. Evaluation was born of the need to assess the degree of conformation with standard practice through the utilisation of methodologies and frameworks (Cornwell, 1995; Spremic, 2009). This in particular means that, by engaging in IT governance evaluation, organisations can periodically measure IT governance performance using well-proved worldwide frameworks or methods such as Control Objectives for Information and Related Technology (COBIT), IT Infrastructure Library ITIL, or the International Standards Organization's ISO 38500, to name a few.

A range of research exists that examines IT governance structures and mechanisms (De Haes & Van Grembergen, 2005; N. Ismail, 2008; Van Grembergen,

De Haes, & Guldentops, 2004), factors inflecting adoption and implementation of IT governance systems (F. Lin, Guan, & Fang, 2010; Stoel, Havelka, & Merhout, 2012; Y. Jo, J. Lee, & J. Kim, 2010), and the use of codified frameworks and their impact on IT governance (Fröhlich, Johannsen, & Wilop, 2010; Radovanovic, Radojevic, Lucic, & Sarac, 2010; Tugas, 2010). The literature also indicates that, while there is widespread use of governance frameworks, there is a need for more research to investigate how these frameworks could be modified to fit a specific circumstance or context (Singh, 2010). By the same token, aspects that involve the user behaviour in IT governance, although they have long been acknowledged (Terry & Standing, 2004), have received far less attention from academics (Smits & van Hillegersberg, 2015).

The value that may arise through improving the governance of information technology by considering the influence of IT governance frameworks may go unrealised. As the mantra of doing more with less in public sector organisations intensifies (Janssen & Esteve, 2013), every potential avenue that may contribute to improving IT governance needs to be considered. This research gathers insight into how IT governance frameworks could be adapted to suit the public sector context and in the process contribute to linking IT governance and innovation adoption theories by considering the user's role in IT governance.

The remaining sections of this chapter present the background to the research (Section 1.1), the research problem (Section 1.2), an overview of the delimitation of the scope and key assumptions of the research (Section 1.4), an overview of the research methodology (Section 1.5), and the contribution of the thesis (Section 1.6), and will finish with a summary of the chapter and thesis outline (Section 1.7).

## **1.1 BACKGROUND TO THE RESEARCH**

IT governance is considered a complex system as it includes several critical aspects, namely, “leadership, organization and decision rights, scalable processes and enabling technologies” (Selig, 2008, p. 11). Early conceptualisations of IT governance, often considered as a subset of corporate governance (Debreceeny & Gray, 2013; Posthumus et al., 2010), recognised the role of IT governance in ensuring a valuable contribution from the organisation's IT to its overall business strategy (Otto, 2010). More specifically, the role of IT governance is to “ensure that

the organisation's IT sustains and extends the organisation's strategies and objectives" (ITGI, 2003). A number of highly respected organisations and authors have attempted to define IT governance (Simonsson & Johnson, 2006), but as at the date of this thesis there is not a commonly accepted universal definition of IT governance. IT governance can be defined as "the process of controlling an organisation's IT resources" (Hunton, Bryant, & Bagranoff, 2004, p. 2). The International Standard for Corporate Governance of ICT extends this definition to identify that IT governance is "the system by which the current and future use of ICT is directed and controlled. It involves evaluating and directing the plans for the use of ICT to support the organisation and monitoring this use to achieve plans. It includes the strategy and policies for using ICT within an organisation" (ISO, 2008). As a result, IT governance has become a common component of most organisations' governance, oversight, and control landscapes (Schubert, 2004; Simonsson, Johnson, & Ekstedt, 2010; Trites, 2004).

As with most social phenomenon, the increasing importance of IT governance has given rise to several industry frameworks, tools, best practices, and maturity models, each offering a prescriptive and deterministic approach to establishing effective IT governance. Nonetheless, the significant role of frameworks has been established as an effective approach to IT governance (Guldentops, Van Grembergen, & De Haes, 2002; Hussain & Siddiqui, 2005; Kim, 2003; Oliver & Lainhart, 2012; Ridley, Young, & Carroll, 2004) by way of providing guidance to organisations and offering an advantage as "compliance with these standards allows the enterprise to demonstrate they are following best practices and complying with regulatory rules" (Moeller, 2011, p. 1). For example, prominent meta-frameworks such as ISO 38500 and ITIL provide a comprehensive suite of best practices for standardising, monitoring, and controlling IT activities (Wallhoff, 2004). However, "guidance on IT governance can perhaps be better found through the Information Systems Audit and Control Association (ISACA) and its related professional organization, the IT Governance Institute (ITGI)" (Moeller, 2011, p. 340). COBIT is a set of best practices developed by ITGI and is widely accepted as the main IT governance framework for establishing control over the IT environment, facilitating performance measurement of IT processes and allowing executives to bridge the gap

between control requirements, technical issues, and business risks (Ahuja, 2009; Rouyet-Ruiz, 2008).

Given the varied and significant organisational pressures to ensure proper oversight and control of IT, it is interesting to note that, despite the considerable academic and practitioner focus on COBIT as a de facto framework for IT governance over the last two decades (A. Brown & Grant, 2005; Gerke & Ridley, 2006, 2009; Ridley et al., 2004; Ridley, Young, & Carroll, 2008), many organisations continue to struggle with fundamental governance practices, such as appropriately selecting, implementing, managing, and evaluating IT governance processes (Jordan & Musson, 2006; P. Marshall & McKay, 2004). From an anecdotal perspective, COBIT's size, and multifaceted and complex structure make implementing a framework of this magnitude in its entirety too large a task (Debreceeny & Gray, 2013; Gerke & Ridley, 2009; Ridley et al., 2004, 2008). This is also echoed by statements that view the COBIT framework as "being too extensive to be completely applied" and proposed to move to "a less complex approach to defining and establishing [selective] controls" (Leih, 2009, p. 189). As an alternative to full implementation, it is not uncommon for organisations in the public sector to "cherry pick" controls from the framework in an effort to reduce its size. These mutant customisations are "often developed ad hoc, without following a well-documented design and development method, and often do not provide a pathway to further extend and update the model to foster systematic enhancements and extensions" (Proenca et al., 2013, p. 1).

Prominent researchers in the domain, Peterson (2004), De Haes and Van Grembergen (2005), Weill and Ross (2005), and Ridley et al. (2008) all put forth converging definitions of IT governance that recognise the importance of all three structural, process, and relational mechanisms. Although the value of user involvement in various aspects of IT governance has long been recognised (Gillies & Broadbent, 2005; R. Huang, R. Zmud, & R. Price, 2010a; Van Grembergen et al., 2004), human behaviour aspects of IT governance has received far less attention from academics (Smits & van Hillegersberg, 2015). Several studies also highlight that the user's role in IT governance requires further investigation (Devos & Van De Ginste, 2014; Teo, Manaf, & Choong, 2013).

The importance of IT governance and the relevance of frameworks provide the context for this study, which also focuses on the factors underlying the adoption of IT governance frameworks. In particular, the intentions and opinions of the adopters are explored to shed light on the factors influencing adoption intent.

## **1.2 THE RESEARCH PROBLEM**

The primary problem that is investigated in this research is that “frameworks, best practices and standards are useful only if they are adopted and adapted effectively” (Neto, de Luca Ribeiro, & Santos, 2014) as organisations face significant challenges with respect to their IT governance obligations. Despite potentially costly consequences resulting from failure of IT and business alignment, there is little direct guidance for organisations to determine how to provide, demonstrate, and maintain adequate governance of IT. A key aspect of this problem is twofold. First, the paucity of research on how organisations could use frameworks efficiently and effectively to conduct evaluation of their IT governance systems. Second, the lack of academic insight available on examining the adoption and adaptation of IT governance frameworks.

While the topic of IT governance has grown in popularity, little academic research exists on the subject (Marrone, Hoffmann, & Kolbe, 2010). In contrast, IT governance concerns are prominent in practitioner journals, which advocate the need to deploy frameworks and standards in an effort to address governance-related challenges. Thus, several different models and standards have been developed for IT governance, of which COBIT is most often used. Research shows that the effort put into these model and standards can assist in enabling value creation, increasing compliance, reducing cost and time, and increasing resources optimisation and productivity (Bartholomew, 2007).

The review of literature indicates that utilising frameworks is an important aspect of successful IT governance. However, despite the documented benefits, research also suggests that these frameworks are too complex and generic for all organisation types (i.e., “one size fits all”) (Khalfan & Gough, 2002; Ribbers, Peterson, & Parker, 2002). Furthermore, it takes significant time to fully implement a framework the size of COBIT in its entirety (Al Omari, Barnes, & Pitman, 2012b). Such timeframes mean that the COBIT framework is often considered an expensive

approach for many organisations, as significant resources need to be allocated over an extensive period. The substantial investment required leads to many organisations being reluctant to embark on a long path of IT governance implementation.

Despite the importance of IT governance frameworks, little empirical research has been carried out on developing ways in which to effectively implement, maintain, and evaluate IT governance programs (Mangalaraj, Singh, & Taneja, 2014). Much attention has been given to developing standards and models for IT governance. This suggests that the current challenges of IT governance are not a lack of standards or models, but rather a lack of an effective strategy to successfully evaluate IT governance. In particular, “There is limited academic research that either analyses COBIT or leverages COBIT as an instrument in executing research programs.” (Bartens, De Haes, Lamoen, Schulte, & Voss, 2015, p. 4558)

To facilitate effective IT governance implementation, the maturity of organisations should be measured by using IT governance evaluation methods. These evaluation methods are often based on a more or less comprehensive set of criteria and provide a way of scoring the capability of IT governance processes. However, organisations typically adopt ad hoc methods instead of standard, systematic, and rigorous methods in order to evaluate IT governance. Consequently, IT governance evaluation methods need adjustment for applicability in a specific domain, such as public sector organisations (Krey, 2010). Therefore, we argue that “there is the need though to contextualize the use of COBIT” (Lapao, 2011, p. 40) before it can be applied properly to evaluate IT governance in the public sector domain. This has the potential to reduce IT governance evaluation time and cost, and bring about more contextualised methods.

As stated by Sorgenfrei, Ebner, Smolnik, and Jennex (2014), “the adoption of IT on an individual level has become one of the most studied phenomena in the field of IS” (p. 1). However, one of the challenges of IT governance is the lack of practical methods for contextualising or adapting evaluation frameworks, particularly considering specific contexts and situations; the other is the lack of understanding of framework adoption, particularly the factors influencing such adoption. As a result, this research will fill a gap in the IT governance literature by providing greater insight into this important aspect of IT governance frameworks. This research will

also bridge the gap between IT governance research and innovation adoption research.

### 1.3 RESEARCH QUESTIONS

Despite its prevalence in practice, little academic literature has been published that investigates the adapting and adoption of best-practice frameworks and models for evaluating IT governance. There is a need to understand if Information Systems (IS) theoretical constructs can be of benefit in understanding IT governance framework adoption and how these factors can provide guidance to developers and proponents of contextualised frameworks. More formally, the overarching research question for this research is:

**How can best-practice frameworks be adapted and adopted to evaluate IT governance in public sector organisations?**

The secondary research questions are as follow:

- RQ1.* Are existing best-practice frameworks perceived as challenging when evaluating IT governance within the public sector?
- RQ2.* How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?
- RQ3.* How can public sector organisations evaluate IT governance using adapted best-practice frameworks?
- RQ4.* What factors influence the adoption of adapted IT governance evaluation frameworks (ITGEFs) within a public sector context?

The main research question was formulated to explore the statement by Neto et al. (2014), stating that “frameworks, best practices and standards are useful only if they are adopted and adapted effectively”.

### 1.4 DELIMITATIONS OF SCOPE AND KEY ASSUMPTIONS

Defining the scope of the research being undertaken is crucial to an effective research program (Perry, Alizadeh, & Riege, 1997). This research centres on IT governance frameworks, in particular COBIT, in public sector organisations, but also considers the application of innovation adoption theories to explore the framework’s adoption factors.



Despite IT governance being an important concern for many different types of organisations, this research is limited to the Australian public sector. Public sector organisations (PSOs) in Australia are defined as “enterprises which the Commonwealth Government, State/Territory and local governments, separately or jointly have control over. It includes local government authorities and all government departments, agencies and authorities created by, or reporting to, the Commonwealth Parliament and State parliaments” (The Australian Bureau of Statistics, 1998). They are considered complex and have “many objectives, minister(s) as ‘shareholder’(s), ministerial appointment processes, different types of accountability (for example, to Parliament), a more complex legal framework [and serve] whole of government” (Edwards & Clough, 2005, p. 15). More specifically, the Queensland public sector was chosen as our research participant because its organisational structure and public sector objectives are representative of other jurisdictions within Australia. Further, it is likely that its public sector objectives will substantially correspond to other public sector jurisdictions globally, other than that different cultural aspects may have an influence.

Other IS theories may be concerned with influences on the IT governance adoption process. However, this research employs innovation adoption theories, specifically the Technology Adoption Model (TAM). Several other IS theories may help to explain the area being studied. The selection of a particular theory gives the research more clarity and focus.

The research data collection was limited to a small portion of respondents in each of the participating organisations. Although efforts were made to select respondents who are representative of the broader public sector population and a survey was employed to include as many respondents as practical, the number of respondents involved remained relatively small throughout the research stages. Those respondents are knowledgeable of the areas being studied and represent a diversity of perspectives. The number of respondents in the research is the maximum that could be accommodated with the resources available. Nevertheless, the choice of respondents was designed to increase the replication rigour of the research and assist in ensuring comparisons across cases were valid (Yin, 2013).

The core of the study consists of questions about attitudes and opinions. Biffignandi and Bethlehem (2012) describe an attitude as a general concept,

reflecting views about a wider, often complex issue. As these measure the subjective state of the respondent, there is no true value and they cannot be observed by another means. This is because “the attitude only exists in the mind of the respondent” (Biffignandi & Bethlehem, 2012, p. 104) and therefore the research “cannot directly measure abstract concepts but indicators or manifestations, which serve as proxy variables” (Hair, Hult, Ringle, & Sarstedt, 2013, p. 6).

## **1.5 THE RESEARCH METHOD**

A two-stage, mixed-method approach was adopted as this design clearly linked to the research paradigm of “realism” chosen for this research. As critical realism, the research methods were selected based on the nature of the research problem (McEvoy & Richards, 2006). Therefore, a mixed-method approach, which combines quantitative and qualitative methods or techniques, is considered the most effective strategy for this research (Perry et al., 1997). By applying both approaches at different stages of the research program, the researcher was able to collect data on the same issues from different sources, which could be triangulated together. This approach also reduces the weaknesses associated with using any one single method (Teddlie & Tashakkori, 2009). Also, a mixed-method approach is considered to best suit the exploration of the research question “How can best-practice frameworks be adapted and adopted to evaluate IT governance in public sector organisations?” as the implementation of multiple methods over a number of research stages or activities assists in answering this type of broad question (Morse & Niehaus, 2009).

From a theoretical perspective, a mixed-method approach gave this research the best chance of discovering the theoretical mechanisms that underlie the contextualisation and then adoption of IT governance frameworks (Teddlie & Tashakkori, 2009). A combination of quantitative and qualitative methods was designed to lead to thicker and deeper understanding of the research issue (Creswell, 2013). The mixed-method design developed as the research progressed, so that the results from the first stage, including three research activities or studies, assisted the development of a more insightful study of innovation adoption factors and IT governance frameworks in the second stage (Teddlie & Tashakkori, 2009). In addition, the mixed-method approach enabled this research to develop from the IT governance and innovation adoption theories literature, and thus this research is

considered from a unified position (Leech, Dellinger, Brannagan, & Tanaka, 2010). As a result, this research is able to combine the strengths of quantitative research with those of qualitative research to develop deeper insights into a complex phenomenon (Kaplan & Duchon, 1988).

## **1.6 THESIS CONTRIBUTIONS**

Despite the growth in IT governance research, there has been little research into factors that affect and influence the adoption of IT governance frameworks. The research that does exist is largely descriptive in nature and concentrates on user participation in the ongoing operations of IT governance (Terry & Standing, 2004). These studies have not led to any explanation of how innovation adoption theories can influence the acceptance of IT governance frameworks or the benefits that may be associated with the consideration of such influence in contextualising an IT governance framework.

This research addressed this gap in the literature by performing an empirical investigation of the potential to develop a contextualised IT governance framework and subsequently has explored the factors that influence its acceptance. Included in the exploration of these factors is a developed research model based on the IT governance literature and confirmed through the cases studied. This research addressed an identified gap between IT governance in academia and its applications in industry by providing insights into practical aspects of the IT discipline (De Haes & Van Grembergen, 2015). In so doing, this research links IT governance and innovation adoption researching.

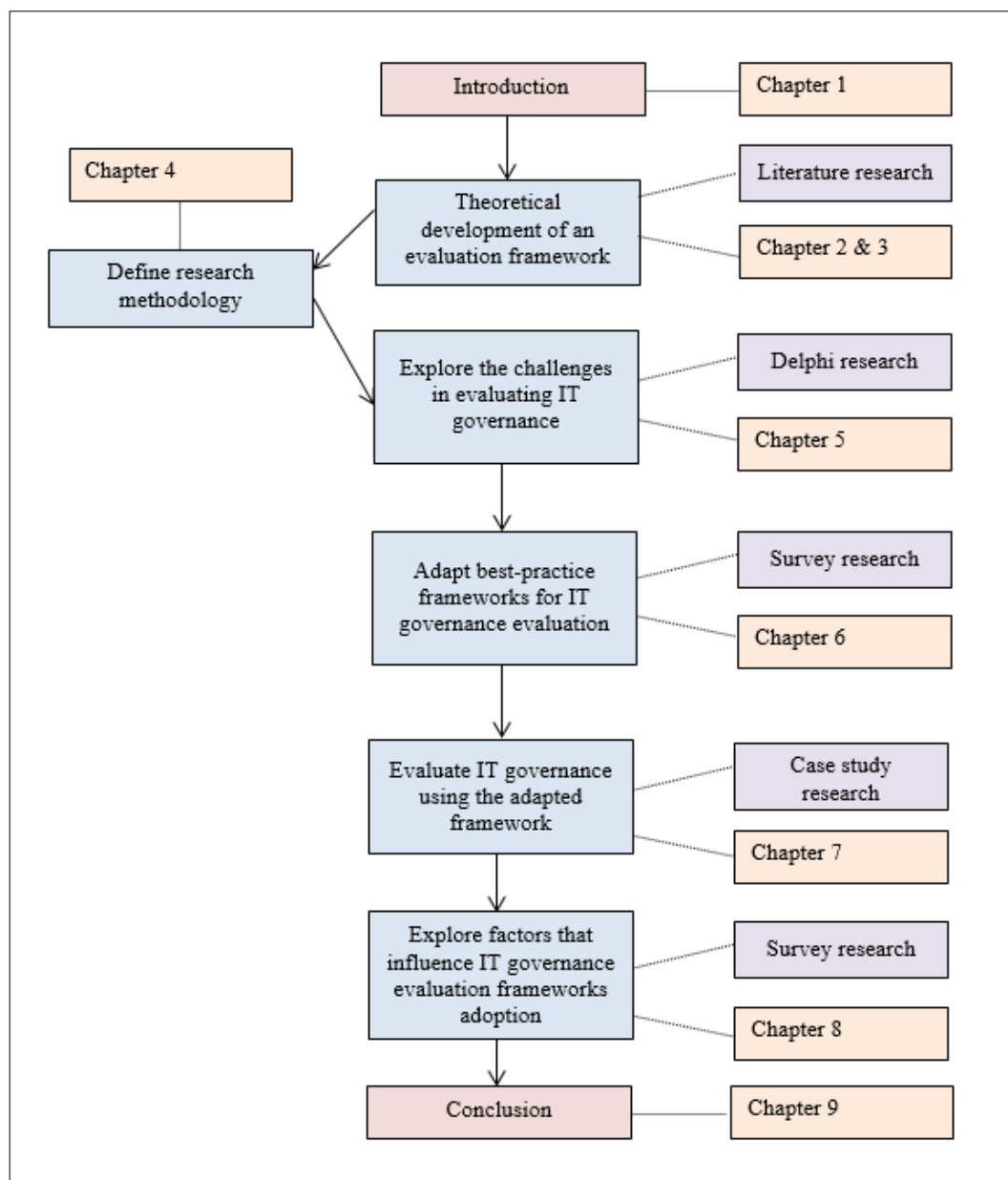
This research contributes to a better understanding of the contextualisation methods of IT governance frameworks and the influence that innovation adopting factors may have on IT governance and how this relates to the acceptance and adoption of IT governance frameworks. As such, the research contributes to the body of knowledge on IT governance and thus is of significant importance to the professions involved in information systems and their management, and other professions concerned with the governance of strategic IT resources. The identification of factors that influence adoption of frameworks will assist professionals, managers, and executives in the contextualisation and acceptance of IT governance frameworks. The findings of this research will also assist Australian

public sector organisations to gain greater insight into their governance of IT and the impact of frameworks on the organisation's IT governance system. In this case, practitioners are advised that the perceived usefulness of IT governance frameworks is a significant influence on the intention to adopt such practices.

## **1.7 SUMMARY AND THESIS OUTLINE**

In this chapter the overarching theme of this research is established, which is to explore the question, "How can best-practice frameworks be adapted and adopted to evaluate IT governance in public sector organisations?" The research problem was identified as a clear gap in the limited research currently existing on innovation adoption theories and IT governance frameworks. It supports the call by many researchers (Debreceeny & Gray, 2013; Gerke & Ridley, 2009; Leih, 2009; Singh, 2010) for increased research on IT governance frameworks, in particular, contextualisation and customisation, and also supports the perceived need for research that links IT governance and innovation adoption theories (Bhattacharjya & Chang, 2006; Jones, McCarthy, Halawi, & Mujtaba, 2010; Othman, Chan, Foo, Nelson, & Timbrell, 2011; Parker, 2013; Y. Jo et al., 2010).

The different research steps, or research activities, are indicated in Figure 1.1 and briefly explained afterwards. The detailed methodology, approach and results of each of these activities are reported on in the following chapters, including information on how the constructs were operationalised.



*Figure 1.1.* Research process.

Chapters 2 provides a summary of the literature pertaining to the areas related to the thesis topic. The literature in regard to the thesis topic and related research is discussed under three main topics: (i) IT governance, with particular attention to the Australian public sector; (ii) the COBIT framework as a main IT governance framework, with particular attention to the role of evaluating IT governance systems; and (iii) innovation adoption theories. The research applies innovation adoption theories to explore factors that affect and influence the adoption of IT governance frameworks. Chapter 3 aims to develop an a priori model for IT governance evaluation based on the COBIT framework and a conceptual model to be refined and

validated in later chapters. The literature review also provides the background information used to develop the research methodology in Chapter 4.

Chapter 4 identifies the research questions that will address the gaps in the literature by focusing on a relatively neglected aspect of ITGEFs from the perspective of innovation adoption theories. Chapter 4 also identifies the research paradigm and design that best suit the research questions and to identify clear contributions that will assist both practitioners and academics. Exploratory research often builds on secondary research, “such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies” (Saunders, Lewis, & Thornhill, 2007). This research indeed triangulates between multiple types of these approaches: literature research, Delphi method research, survey research, and analytic case research. This triangulation enables the obtaining of a richer insight in reality as “different research methods focus on different aspects of reality and therefore a richer understanding of a research topic will be gained by combining several methods together in a single piece of research or research program” (Mingers, 2001, p. 241). The different research methods are applied in parallel or sequentially, as described below, with the results from one feeding into the next.

Chapter 5 explores the challenges organisations face when conducting IT governance evaluations, specifically in a government setting. The input of this research step focuses on the initial list of issues and challenges that were derived from literature in Chapter 2. For this research activity, a Delphi research methodology was leveraged to build up a consensus among a group of 24 experts regarding a validated list of challenges when evaluating IT governance in the Queensland public sector. The expert group was also asked to rate the perceived impact (PIM) and perceived effort to address (PEA), and to provide a ranking of challenges that each organisation in the public sector might encounter. The analysis of challenges and issues indicated that the “lack of developed methodologies and tools” in reference to IT governance frameworks is perceived as a challenge for evaluating IT governance systems within the Queensland public sector.

Chapter 6, following the Delphi research findings in the previous chapter, explores the potential to adapt IT governance frameworks to suit a particular organisational need. An empirical investigation of the existence of an adapted ITGEF based on the COBIT framework is then undertaken. The principal source of data in this chapter is the responses to the survey of the public sector to elicit their perceptions on the most important high-level IT processes for conducting IT governance evaluation. The findings indicate that best-practice frameworks, including COBIT, can be adapted to conduct IT governance evaluations within a public sector context based on the most important high-level IT processes identified to be both enduring and relevant.

Chapter 7 explores the potential to use the adapted ITGEF in Chapter 6 by conducting an evaluation of IT governance in a specific organisational context. To achieve this goal, this research activity evaluates IT governance in Queensland public sector organisations in terms of the capability levels of IT processes, which is then compared with public sector organisations in other Australian and international jurisdictions.

Chapter 8 explores the factors that affect and influence the adoption of adapted IT governance frameworks. This chapter derives a model combining the theoretical foundations of the TAM and the Technology–Organisation–Environment (TOE) framework to explore the relevance of the antecedents of innovation adoption in the context of public sector organisations.

Chapter 9 concludes this thesis by presenting the implications of the research and recommendations for future research. Contributions and limitations of the research are also described.

The next chapter will discuss the literature related to the research and in particular consider related studies. From the discussion the gaps in the literature are identified and used to develop the research questions.





# Chapter 2: Literature Review

---

Conducting a literature review is essential to any program of research as it provides an assimilation of extant literature, assists in positioning and scoping the research, and builds knowledge (Leedy & Ormrod, 2009). Although the literature often appears as a single phase with an aim of positioning the study, the need to revisit and extend the literature review becomes crucial as new findings emerge. In addition, there is a good chance that new publications, which could be pertinent to the case at hand, become available as many studies occur over an extended time.

In this chapter, a discussion of the literature relevant to the study is presented, including the areas of IT governance, best-practice frameworks, and innovation adoption theories. Section 1 provides background information on IT governance, and the role and importance of evaluating IT governance for public sector organisations in Australia, and discusses the relevant literature on the IT governance mechanisms and frameworks, in particular the role of COBIT as an IT governance framework. Section 2.2 discusses the relevant literature on innovation adoption in Information Systems (IS), provides an overview on the relevant theories, and discusses the limitation of innovation adoption theories. Gaps identified in the literature are discussed in Section 2.3. The chapter concludes with a summary in Section 2.4.

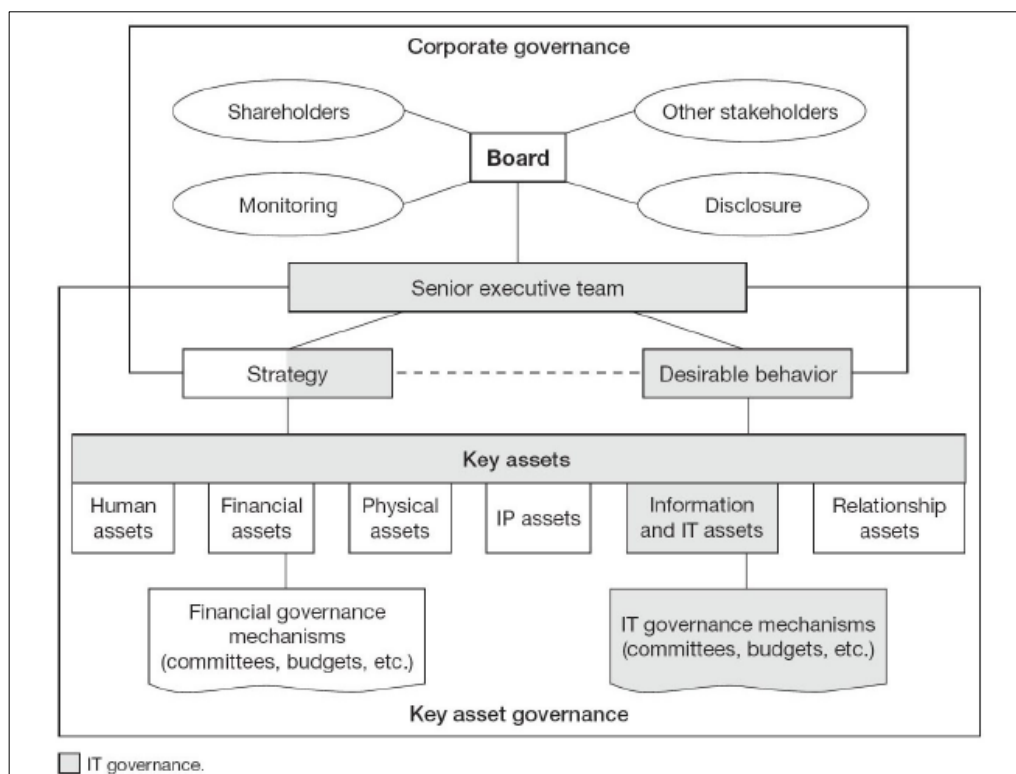
## 2.1 IT GOVERNANCE

### 2.1.1 Defining IT governance

Information technology (IT) has become an integral part of organisational functions and underpins many essential day-to-day business processes and transactions. This role is rapidly transforming into a critical function within corporate environments as financial systems are increasingly relying on IT. As more IT services are being consumed across the enterprise, new potential risks are introduced to the business, which in turn require adjustment to existing organisational structures (N. Fox, Ward, & O'Rourke, 2006) and updates to IT requirements (Saint-Germain, 2005) to mitigate these risks. As Hadden (2002) explains, “[i]ncreased reliance on information has exposed companies within the U.S. and abroad to a host of new risks” (p. 1). Consequently, the interest in research relating to IT and corporate

governance has risen considerably in recent years in response to the growing demand for greater accountability and responsibility from the board and executives of corporations.

Corporate governance is positioned at the highest levels of an organisational structure and requires leadership, direction, and control (Webb, Pollard, & Ridley, 2006). Literature on corporate governance does not agree on an optimal structure; however, a well-regarded framework by Weill and Ross (2004) illustrates the relationship between corporate governance and six key assets through which organisations build strategies to generate maximum business value (see Figure 2.1). These key assets are: human, financial, physical, intellectual property (IP), information and IT, and relationship assets. The proper governance of these key assets requires a number of unique organisational mechanisms to be established, such as processes, procedures, and committees. While it is common for some of these assets to share certain mechanisms, the complexity of governing information and IT assets warrants specific mechanisms to be implemented. The governance of information and IT (or IT governance) focuses on the IT component of corporate governance, and that requires proper execution to ensure meeting organisational goals and utilising IT resources efficiently (Wessels & Loggerenberg, 2006).



*Figure 2.1.* Link between corporate governance and IT governance (Weill & Ross, 2004, p. 5).

In essence, IT governance is a subset of corporate governance aimed at overcoming the challenge of ensuring that organisations maximise the value delivered from IT investments and improve technology's contribution towards enabling organisational goals (De Haes & Van Grembergen, 2004; ITGI, 2005a; Padilla, 2005). It is often influenced by compliance requirements, such as Sarbanes-Oxley (SOX) in the USA, Basel II in Europe, and CLERP 9 in Australia (Dahlberg & Kivijarvi, 2006). According to the IT Governance Institute (ITGI, 2003), the overall objective of IT governance is to elevate the strategic importance of IT in order to enable the enterprise to sustain its operations and extend activities into the future while mitigating associated risks.

In an attempt to characterise IT governance, overlapping and varying definitions have been established (Prasad, Heales, & Green, 2009). Although there is no consensus on a single definition (Willson & Pollard, 2009), this research will adopt the ITGI's (2007b) definition: "IT governance is the responsibility of executives and the board of directors, and consists of the leadership, organizational structures and processes that ensure that the enterprise's IT sustains and extends the organization's strategies and objectives" (p. 5). IT governance consists of

“management, planning and performance review policies, practices and processes; with associated decision rights, which establish authority, controls and performance metrics over investments, plans, budgets, commitments, services, major changes, security, privacy, business continuity and compliance with laws and organizational policies” (Selig, 2008, p. 9). Vannoy and Palvia (2010) have taken a more business-oriented approach and stated that the goal of IT governance is not only to increase internal efficiency but also to support the role of IT as a business enabler. Others, such as Ula, Ismail, and Sidek (2011), have proposed narrower definitions in which IT governance is concerned with the policies and procedures that define how an organisation directs and controls the use of its technology and protects its information. Raup-Kounovsky, Canestraro, Pardo, and Hrdinová (2010) indicate that IT governance establishes the decisions, rights, and accountability framework to encourage desirable behaviour in the use of IT. In a broader context, IT governance “formalizes and clarifies oversight, accountability and decision rights for a wide array of IT strategy, resource and control activities” (Selig, 2008, p. 9).

Lack of adequate IT governance has been found to act as an inhibiting factor for organisations as failures of IT governance can lead to operational inefficiencies and superfluous costs (Raghupathi, 2007). The ITGI indicates that inability to obtain a positive return from IT investments; failure of IT initiatives to realise promised innovation and benefits; ineffective technology adoption, as well as overrun IT budgets, are considered potential effects of inadequate IT governance (ITGI, 2003). Failures of IT governance can also have an external impact resulting in “[b]usiness losses, reputational damage and a weakened competitive position” (ITGI, 2003, p. 8), as well as regulatory censure. Raghupathi (2007) indicates that “in light of increased awareness of disclosure and transparency among companies we can expect more governance practices supported by models and tools based on legal, ethical, and public policies and principles” (p. 99). Furthermore, Short and Gerrard (2009) highlight that there may be systemic impacts: “A collapse of trust in corporate governance and management over the past 10 years has led to increased regulation in the U.S. ... and new regulatory initiatives in Europe and other developed countries, making good corporate governance mandatory” (p. 2).

Prior scholars have recognised the opportunity for research into IT governance and have undertaken studies in specific domains. For instance, Keil, Tiwana, and

Bush (2002) conducted an industry and geographic specific research into IT governance practices in the Belgian financial services sector. In the same way, Grüttner, Pinheiro, and Itaborahy (2010); and Kurilo, Miloslavskaya, and Tolstaya (2009) conducted research that focused on banking organisations in Brazil and Russia respectively, taking into account both the IT governance frameworks and local regulatory requirements. In the medical industry, Brady (2010) conducted research associated with the regulatory requirements that had a security specific focus, whereas Krey (2010) focused on IT governance, risk, and compliance within the broader health care sector. Other model-focused studies support the importance of IT governance, including those of Dunkerley (2011), who conducted empirical tests of an IS security success model and Clarke (2011), who explored security behaviours.

Academics and industrial analysts have advocated the need for improving the governance of IT due to “the ongoing financial markets debacle and the global economic context” (Feltus, Petit, & Dubois, 2009, p. 23). The Australian Standard on Corporate Governance of Information and Communication Technology (AS 8015-2005) and the International Standard for Corporate Governance of Information Technology (ISO/IEC 38500:2008) have also emphasised the importance of establishing effective IT governance (ISO, 2008; Standards Australia, 2005). Equally, Willson and Pollard (2009) state that “IT governance is an important concern for businesses” (p. 98); however, they highlight that effective IT governance is considered more of an ambition than reality for many organisations. Similarly, Neto et al. (2014) indicate that IT governance is considered a challenging task and highlight that in pursuit of effective IT governance an organisation “will apply its own specific plan or road map, depending, of course, on factors such as its industry and business environment and its culture and objectives” (p. 2).

While a deal of literature exists that has examined ITG in the private sector (Ali & Green, 2006; Weill & Ross, 2004), little research has been undertaken in this domain within public sector organisations (Ali & Green, 2007; Gerke & Ridley, 2006) despite the recognition of the value of effective IT governance to the success of these organisations (Vinten, 2002). Research by Sohal and Fitzpatrick (2002) was identified to be the earliest IT governance research to focus on Australian organisations. Their conclusion coincides with research by Ferguson, Green,

Vaswani, and Wu (2012), which links positive level of IT governance effectiveness to the increased success of an organisation.

### 2.1.2 IT governance in the public sector

Establishing a clear definition of what *public* and *private* sectors are has never been an easy task, as drawing a line between where one begins and the other ends continues to be difficult. The growing similarity of role, context, and function of the sectors, and ongoing public sector reforms and privatisation initiatives are among the factors leading to the vague distinction (Campbell, McDonald, & Sethibe, 2009).

Generally speaking, public and private sectors can be defined by the level of government or market influence on ownership and control, as displayed in Figure 2.2. Public sector entities have a specific obligation to provide services to all citizens through the utilisation of taxpayers' money while maintaining the highest levels of integrity and ethical values (Fleming & McNamee, 2005, p. 139). The public sector encompasses entities dependent on government budgetary allocations for their funding, such as general government (federal, state, and local government) – often referred to as *public service* or just *government* – as well as self-funded agencies with a revenue flow independent of government budgetary allocations – referred to as *semi or quasi government*. In contrast, private sector entities and enterprises exist without the need of public funding, are not controlled by the government, and could be for-profit or non-profit – often referred to as non-governmental organisations (NGOs), or non-profit organisations (NPOs), or the third sector. In this paper, the term *private sector* will be used to refer solely to for-profit organisations. In Australia, several research studies have been undertaken to focus on key differences between public and private sector entities (Campbell et al., 2009).

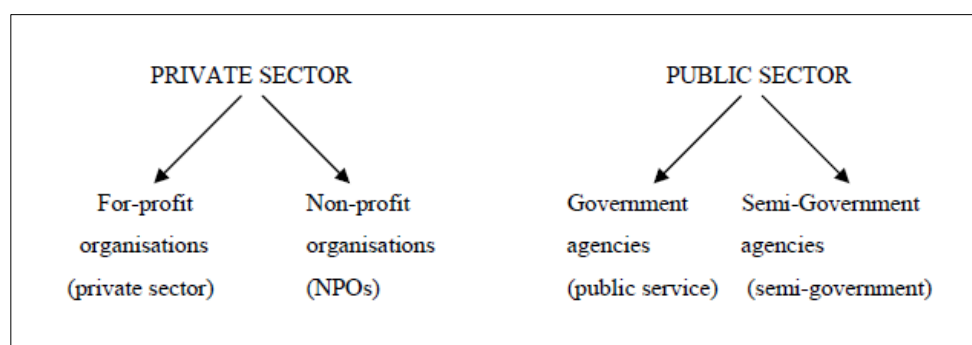


Figure 2.2. Private and public sector entities (Sethibe, Campbell, & McDonald, 2007).

In Australia, the public sector “has many objectives, minister(s) as ‘shareholder’(s), ministerial appointment processes, different types of accountability (for example, to Parliament), a more complex legal framework [and] Serving whole of government” (Edwards & Clough, 2005, p. 15). Public sector organisations (PSOs) in Australia are defined as “enterprises which the Commonwealth Government, State/Territory and local governments, separately or jointly have control over. It includes local government authorities and all government departments, agencies and authorities created by, or reporting to, the Commonwealth Parliament and State parliaments” (The Australian Bureau of Statistics, 1998). PSOs represent the administrative effort that deals with service delivery for the current government at national, regional, or local level (Lane, 2000). In the public sector, a wide range of concerns exists due to some of the following distinguishing characteristics:

- The public sector has a high level of bureaucracy and red tape – that is, less flexible formal procedures for decision-making (Shaikh, Marri, Shaikh, Shaikh, & Khumbhati, 2007) and excessive amounts of counterproductive rules driven by processes instead of results (Lane, 2000).
- Compared with the private sector, the public sector has wider accountability and lower managerial autonomy. For example, managers have less freedom to act on issues like performance incentives and staffing (Lawry, Waddell, & Singh, 2007; Nicoll, 2005).
- The sector has frequently changing requirements because of, for example, changes in government and varying ministerial expectations (Liu & Ridley, 2005; Shaikh et al., 2007).

The widespread recognition that IT has the potential to transform a state government’s efficiency and productivity in the areas of service functions and internal operations keeps driving the investment in IT to prompt good governance (Danziger & Andersen, 2002). Considering that Australian government expenditure on ICT will reach \$6.2 billion by 2018, according to a report by International Data Corporation (IDC, 2015), increasing pressure is placed on public sector entities to exhibit transparency and accountability in using taxpayers’ money to deliver outcomes, at the same time as operating under greater budgetary constraints and

higher complex regulatory requirements, and struggling to attract staff when compared with the private sector (Crawford & Helm, 2009). As a result, effective governance of IT becomes crucial to PSOs in attempting to achieve the full optimisation of IT investments (Ali & Green, 2007).

Liu and Ridley (2005) argue that IT governance in the public sector is more complex than that in the private sector. They attribute this to differences in environmental factors, organisation–environment transactions, and internal structures and processes. Consequently, it is considered more important to establish control over IT in the public sector than in the private sector (Beaumaster, 2002). Be it in the Australian public or private sector, raising decision-makers' awareness about the value of aligning IT initiatives and business objectives has been a common challenge (Al Omari, Barnes, & Pitman, 2012a; Hansen, 2002). However, a “one size fits all” approach for IT governance is not practical due to profound differences between the two sectors. It would certainly be a mistake for future research to fail to address these differences (Khalfan & Gough, 2002). With the need to establish effective IT governance in the public sector, the demand for proven support methods grows. Specifically, best-practice models for the evaluation of IT governance are becoming essential to organisations because they provide guidance to further promote and achieve effective IT governance.

### **2.1.3 The evaluation of IT governance**

The evaluation process is considered fundamental to establishing effective IT governance because it ensures the achievement of strategic IT objectives and provides for a review of IT performance and the contribution of IT to the business (Ajegunma, Abdirahman, & Raza, 2012). As stated by Hardy (2006), “a key aspect of achieving effective IT governance and increased value is for the board to benchmark a company's maturity and assess its current status against international standard guidelines, industry's best practices and the enterprise's strategy.” (p. 57) Moreover, conducting regular evaluations helps organisations in maintaining a transparent view of their IT capabilities and provides an early-warning system for risks and pitfalls that might otherwise be overlooked. IT governance evaluations provide transparency of IT-related costs, which increasingly account for a very significant proportion of most organisations' operating expenses (2005). In particular, internal evaluation of IT processes is required to ensure that the processes



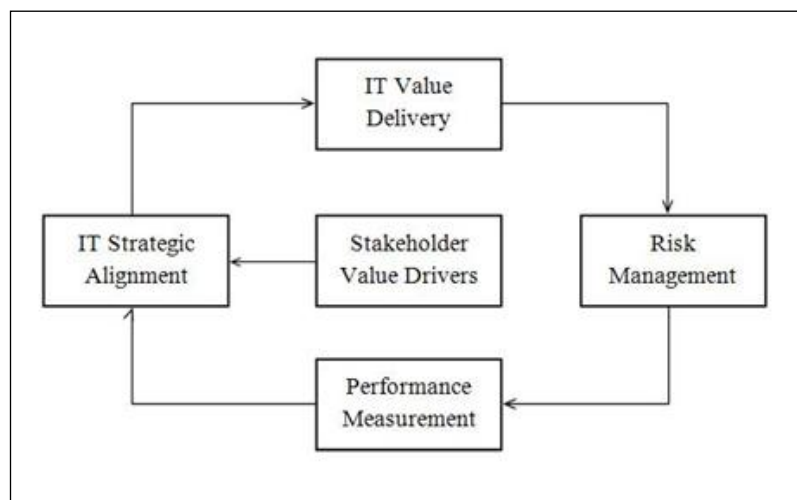
are capable of delivering the intended outcomes effectively. IT governance evaluations quantify how well an IT process or the outputs of a process achieve a specific goal (i.e., IT process capability) and thus enable management and other stakeholders to know whether or not IT is meeting its objectives (National Computing Centre, 2005). Only with IT governance evaluations can organisations work towards implementing a strategy to achieve their IT goals and improving the value delivered from IT.

Measurement of IT capability (also referred to as performance measurement or IT governance evaluation) is considered a fundamental element within IT governance because it provides executives with a level of assurance and a set of measurable objectives for critical IT processes (Debreceeny & Gray, 2013). In a study by PricewaterhouseCoopers (PwC), the “inadequate view of how well IT is performing” was considered one of the top ten issues cited by a sample of 7000 respondents, of which more than 80% were of the opinion that some sort of IT governance evaluation mechanism was required to solve this challenge (Nicho & Cusack, 2007).

IT governance evaluation’s main objective is to provide a better information base to assist decision-making and help set priorities for improving IT governance. It is different from but considered part of a performance audit (often referred to as a value-for-money audit). According to the Australian National Audit Office, evaluation is the “systematic assessment of the appropriateness, effectiveness and/or efficiency” of IT governance processes, whereas performance audit is defined as “independent, objective and systematic examination of the management of an organisation, program or function”. (p. 3) Differences between evaluation and audit include the fact that audit is an independent process, while evaluation is not necessarily so. In addition, in the public arena, audit reports are presented direct to Parliament, whereas evaluation is often reported to the head of an agency and is often not made public (Barrett, 2001).

The ITGI (2003) identifies a continuous cycle of five main focus areas of IT governance. As illustrated in Figure 2.3, three focus areas (performance measurement, resource management or IT value delivery, and IT strategic alignment) are considered as drivers for two main outcomes (risk management and stakeholder value delivery). The cycle starts by aligning the IT strategy with the business

objectives, then implementing the strategy to ensure that expected value is delivered from IT while any associated risks are mitigated. Performance measurement (or IT governance evaluation) is considered a critical focus area and the main driver for effective IT governance; thus the implemented strategy is monitored to ensure that correction actions are taken when needed. Finally, the IT strategy is re-evaluated and realigned if corrective actions are necessary (ITGI, 2005b). Within this cycle, the five IT governance focus areas need to be addressed by executive management regularly to successfully govern IT within organisations.



*Figure 2.3.* Focus areas of IT governance (ITGI, 2003, p. 20).

As discussed, IT governance is considered complex in nature (Patel, 2004; Peterson, 2004) because it is comprised of dense interconnected subsystems (or mechanisms), namely structures, processes, and relational mechanisms, working together as one entity (De Haes & Van Grembergen, 2005; Sambamurthy & Zmud, 1999; Weill & Ross, 2005). Structures involve councils and committees; processes include planning process and service level agreements; and relational mechanisms involve stakeholder participation and communication between IT and business (De Haes & Van Grembergen, 2008). Weill and Ross (2004) argue that organisations need to employ well-designed, well-understood, and transparent mechanisms to achieve effective IT governance, which, in turn, will bring about better results and capabilities from IT investments (P. Marshall & McKay, 2004). Thus, the evaluation of IT governance mechanisms becomes a prerequisite for an overall successful IT governance (Gillies & Broadbent, 2005; Kallenbach & Scanlon, 2007; Nfuka & Rusu, 2011) as it provides a “set of processes, procedures and policies that enable an

organization to measure, monitor, and evaluate their situation in relation to predefined factors, criteria or benchmarks” (Webb et al., 2006, p. 3).

Stewart-Rattray (2012) pointed out that the main challenge for organisations is not just establishing but also maintaining a robust IT governance posture due to the lack of ability to predict and anticipate failures. Three factors motivate organisations to undertake an evaluation of IT governance. First, evaluation is a form of control with a measurement perspective and is intended to result in better value delivery to organisations (Majdalawieh & Zaghoul, 2009). Second, well-developed frameworks and guidelines exist in this field so evaluation is not considered a costly process. Third, due to mounting pressure for organisations to demonstrate compliance and meet accountability requirements, the need for evaluation to ensure due diligence intensifies. The various definitions of IT governance acknowledge that continual evaluation of IT governance is considered a cornerstone for its success and promotes the use of frameworks to enable the execution of continuous cycles of monitoring, review, and application of corrective action or adjustment when necessary (Hunton, Bryant, et al., 2004; ITGI, 2003; Standards Australia, 2005). For many years, the use of evaluation mechanisms to help steer the IT function has been a challenge that only few organisations appear to have successfully addressed. As a result, practical and effective methods for evaluating IT performance are considered essential to establishing effective IT governance.

Furthermore, accounting offices of several countries, such as the United Kingdom (NAO, 2005), the United States (GAO, 2004a, 2004b, 2009) and Australia (ANAO, 2004, 2009), have developed performance measurement methods and guidance standards that public organisations can use for evaluating IT governance processes. For example, in India the Office of the Comptroller and Auditor General uses a questionnaire-based approach to evaluate the effectiveness of IT processes (OCAGI, 2002). Likewise, the ISACA manual states that auditors should review and assess the achievement of the IT function (effectiveness and efficiency) as well as the effectiveness of IT resources and performance management processes (ISACA, 2009). However, these guidelines do not specify a succinct method or methodology to be used for assessing IT effectiveness.

### 2.1.4 IT governance mechanisms and frameworks

Having uncovered some of the IT governance concepts and challenges, including the lack of a mutually agreed definition of IT governance, it is now useful to discuss the mechanisms that lead to realising the anticipated benefits of IT governance. In general, IT governance can be deployed using a mixture of structures, processes, and relational mechanisms (Ali & Green, 2007; Weill & Ross, 2004). By integrating the work of Weill and Ross (2005), Van Grembergen et al. (2004) and Peterson (2004), Grant, Brown, Uruthirapathy, and McKnight (2007) developed a conceptual model that describes a comprehensive view of the core elements of IT governance as depicted in Figure 2.4. The model is considered well matured as it covers the contingency, multidimensionality, and dynamic nature of IT governance in addition to incorporating the major elements (structure and processes) and the four objectives (IT value delivery and strategic alignment, and performance and risk management) that drive IT governance (Nabiollahi & bin Sahibuddin, 2008).

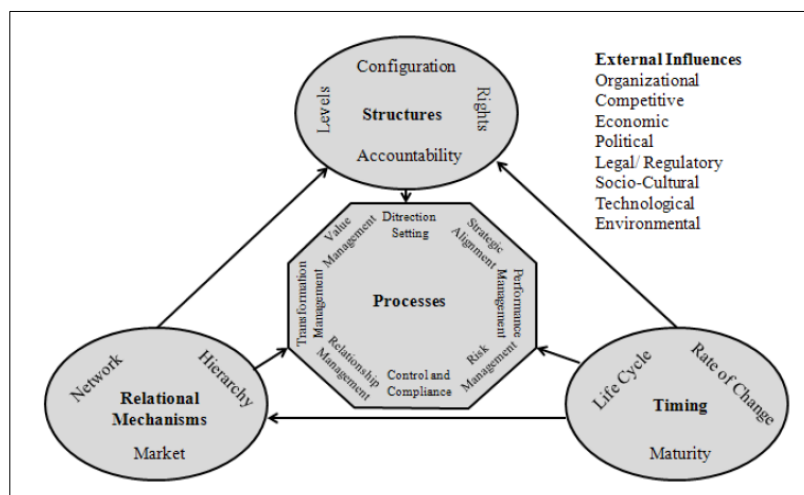


Figure 2.4. Extended IT governance model (Grant et al., 2007, p. 8).

Similarly, each dimension of the model (structures, processes, and relational mechanisms) consist of the necessary mechanisms for the implementation of IT governance as presented in Table 2.1 (De Haes & Van Grembergen, 2008). Even though several mechanisms exist within this model, the decision on what to implement is influenced by the context and contingencies within the organisation and the interacting environment (Nfuka & Rusu, 2013).

In recent years, many organisations have undertaken a process of implementing IT governance mechanisms based on a single IT governance framework or a

combination of frameworks. In general, frameworks can be categorised into groups, namely: business-oriented frameworks, such as the Committee of Sponsoring Organizations of the Treadway Commission (COSO), technology-focused frameworks (e.g., ITIL), and frameworks that aim at aligning business and technology goals (e.g., COBIT) (Liu & Ridley, 2005). Predominantly, IT governance frameworks enable executives and practitioners alike to make decisions, direct as well as evaluate, and monitor governance-related activities using a common and unified approach. Adopting relevant IT governance frameworks assists executives in better understanding the critical role they play in governing IT (F. Lin, Chou, & Wang, 2011). For instance, executives' commitment, strategic objectives, and resources allocation influence the adoption and selection of a particular framework/s (Renken, 2004; Selig, 2008). From an evaluation perspective, many organisations use frameworks or integrate multiple governance frameworks to improve their compliance level with certain regulatory requirements (i.e., SOX), while also enhancing the internal controls environments (H. Lin, Cefaratti, & Wallace, 2012).

Table 2.1

*Dimension of the IT governance model adopted from Grant et al. (2007)*

<b>Dimension</b>	<b>Definition</b>
Structures	This dimension is concerned with the planning and organisational elements outlined in the high-level governance strategy of organisations. Four main governance structures are included, namely: rights, accountability, configuration, and levels.
Processes	Processes refers to the tools used for the control and evaluation of IT governance. There are eight core elements in the processes dimension, as displayed in Figure 2.4, that organisations should enact for effective IT governance. Processes are fundamental elements of IT governance frameworks.
Relational mechanisms	Relational mechanisms refer to the internal and external relationship management required to ensure the successful implementation of IT governance. Three relational mechanisms are identified, namely: network, hierarchy, and market.
Timing	The timing dimension addresses the temporal aspects associated with IT governance implementation, namely: maturity, life cycle, and rate of change.
External influences	Different external influences shape the mix of mechanisms used by organisations and should be taken into consideration when implementing IT governance. The external influences include organisational, competitive, economic, political, legal or regulatory, socio-cultural, technological, and environmental factors.

Some of the widespread frameworks within the IT governance sphere include COSO, ITIL, ISO 38500, and COBIT (W. Brown & Nasuti, 2005). The ISO standard addresses the corporate governance of IT and is concerned with governing management processes and decision-making. On the other hand, ITIL is a framework that focuses mainly on IT service management, which enables IT departments to apply strong systematic execution of operations with stringent controls (Kanapathy & Khan, 2012). COBIT is generally accepted as a standard and as a common framework for IT governance that, in comparison with COSO, provides more guidance regarding control over IT (Dahlberg & Kivijarvi, 2006; Larsen, Pedersen, & Viborg Andersen, 2006).

Despite their established usefulness, Otto (2010) suggests that IT governance frameworks cannot be simply considered as off-the-shelf solutions and they cannot be implemented without any customisation due to factors such as organisational structure, business objectives, and company size. Raghupathi (2007) and Gawaly

(2009) highlight an urgent need for IT governance models and frameworks that can be expanded and transformed from generic frameworks into something more relevant and applicable to businesses and organisations. In reference to the COBIT framework, Neto, et al. (2014) states that “[f]rameworks, best practices and standards are useful only if they are adopted and adapted effectively” (p. 1). Accordingly, Simonsson and Johnson (2008) and Willson and Pollard (2009) draw attention to the very little academic research that provides guidance on how to turn theories on IT governance frameworks and structures into practice.

### **2.1.5 COBIT: A framework for IT governance**

COBIT was founded by the Information Systems Audit and Control Association (ISACA) and the ITGI in 1992. The first edition of COBIT was published in 1996, and the fifth and latest edition was published in April 2012. The framework has grown to be, and still is, one of the most significant global frameworks for IT governance (Al Omari et al., 2012a; Weill & Ross, 2004). COBIT was originally built as an IT audit guideline (Devos & Van De Ginste, 2014) because the framework contained a comprehensive set of guidelines to improve audit and compliance, provided a detailed guidance on governance practices, and offered auditors several customised checklists for various aspects of controls assessment (Anthes, 2004). These aspects make COBIT a perfect framework for establishing control over IT and facilitating performance measurement of IT processes, as well as allowing executives to bridge the gap between control requirements, technical issues, and business risks (Rouyet-Ruiz, 2008). In addition, COBIT has important business value in terms of increased compliance, corporate risk reduction, and good accountability, and is proven to be a useful tool to establish a baseline for process maturity (De Haes & Van Grembergen, 2005). Moreover, the framework is growing to be universally applicable (Ahuja, 2009) due to its wide implementation as an IT governance framework (Robinson, 2005).

From an IT governance perspective, the main objective of COBIT is to enable value creation through ensuring benefits are realised, risk reduced, and resources optimised. It is also proclaimed to provide business stakeholders with an IT governance model that improves the management of risks associated with IT (Oliver, 2003) and leverages a top-down structure to ensure systematic management of the descriptive processes to achieve proper IT governance (Solms, 2005a, p. 100). The

COBIT framework is considered to be a generic, comprehensive, independent, and large body of knowledge designed to measure the maturity of IT processes within organisations of all sizes, whether commercial, not-for-profit, or in the public sector (Mallette & Jain, 2005; E. Ramos, Santoro, & Baiao, 2013).

The COBIT framework has been steadily achieving worldwide recognition as the most effective and reliable tool for the implementation and audit of IT governance, as well as for assessing IT capability (Gerke & Ridley, 2009). It is regarded as the main standard to adopt for organisations striving to comply with regulations such as Sarbanes-Oxley (SOX) in the United States (W. Brown & Nasuti, 2005; S. Chan, 2004; M. Ramos, 2006). It is also considered a trusted standard that has been adopted globally, as it provides extensive sets of predefined processes that can be continually revised and customised to be more effective in supporting different organisational objectives, whether for private or public industries, governments, or accounting and auditing firms (Guldentops et al., 2002; Hussain & Siddiqui, 2005; Kim, 2003; Oliver & Lainhart, 2012; Ridley et al., 2004). COBIT is viewed as an exhaustive framework that encompasses a complete lifecycle of IT investment (Debreceeny & Gray, 2013) and supplies IT metrics to measure the achievement of goals (Hardy, 2006).

It is also defined as the best framework to balance organisational IT goals, business objectives, and risks (Ridley et al., 2004). This is achieved by making use of Norton and Kaplan's (1996) Balanced Scorecard (BSC) dimensions – Financial, Customer, Internal; and Learning and Growth – to introduce a goals cascade mechanism that translates and links stakeholders' needs to specific enterprise goals, IT-related goals, and enabler goals (COBIT processes). A set of 17 enterprise goals have been developed that are mapped to 17 IT-related goals and sequentially to the COBIT processes (ISACA, 2012a). In addition to providing a set of IT governance processes, COBIT also facilitates the appropriate implementation and effective management of these processes through establishing clear roles and responsibilities by means of a detailed Responsible, Accountable, Consulted, and Informed (RACI) matrix (Simonsson, Johnson, & Wijkstrm, 2007). COBIT provides extensive sets of predefined processes which can be continuously revised and customised to be more effective in supporting different organisational objectives (Kim, 2003).



The current fifth version of COBIT is built on five basic principles: Meeting Stakeholder Needs; Covering the Enterprise End-to-End; Applying a Single, Integrated Framework; Enabling a Holistic Approach; and Separating Governance from Management. Further, the COBIT 5 Process Reference Model (PRM) divides IT into five domains: (i) Evaluate, Direct and Monitor (EDM); (ii) Align, Plan and Organise (APO); (iii) Build, Acquire and Implement (BAI); (iv) Deliver, Service and Support (DSS); and (v) Monitor, Evaluate and Assess (MEA), which are broken into 37 high-level IT processes and over 300 detailed IT controls covering aspects of IT management and governance (ISACA, 2012a). Another distinctive feature within COBIT lies in its ability to identify seven categories of enablers (or factors) – (a) Principles, policies and frameworks; (b) Processes; (c) Organisational structures; (d) Culture, ethics and behaviour; (e) Information; (f) Services, infrastructure and applications; and (g) Availability – of which three are also enterprise resources: Information; Services, infrastructure and applications; and People, skills and competencies, to support IT processes in achieving the set business objective (N. Ismail, 2008). Thus, it is considered the most appropriate framework to facilitate the alignment between business and IT goals (Ridley, Young, & Carroll, 2004).

COBIT 5 transformed into a more business-oriented framework through establishing one integrated framework that consisted of different models (e.g. Val IT, Risk IT). This amalgamation was largely due to the recognised need to provide a comprehensive basis for options, not only for users and auditors but also for senior managers and business process owners in order to cover all aspects of business and functional IT responsibilities leading to effective IT governance and management outcomes (Oliver & Lainhart, 2012; Rouyet-Ruiz, 2008). Moreover, COBIT 5 has been aligned with the ISO/IEC 15504 Process Capability Model (PCM) (ISACA, 2012a). From an IT governance evaluation perspective, the shift from the Capability Maturity Model (CMM), or the more recent Capability Maturity Model Integration (CMMI), developed by the Software Engineering Institute (SEI) to the new PCM has revolutionised COBIT, giving it a cutting edge in assessing capability at the process level instead of assessing maturity at the enterprise level (ITGI, 2007a). This new approach is not only more consistent and repeatable, but is also verifiable and can demonstrate traceability against objective evidence gathered during the evaluation process (Walker, McBride, Basson, & Oakley, 2012). The PCM has been used

extensively by financial institutions in Europe to conduct internal controls audits with the aim of assessing the need for improvement. This adds to the advantages organisations should expect from implementing COBIT, as the partnership between the framework and the PCM delivers a measurement scale to quantitatively evaluate the existence, adequacy, effectiveness, and compatibility of IT governance processes (Y. Wang & King, 2000).

### **2.1.6 Challenges of IT governance evaluation**

From the literature research, different drivers for adopting IT governance were identified. An important one was certainly the need to comply with statutory requirements and regulations, which impacts heavily on the control environment in IT. Other important drivers for IT governance in the public sector include the pressure to achieve economies of scale after change in the political environment and resources scarcity, resulting in smaller IT budgets yet higher expectations. The challenge of course is then to optimally allocate the remaining budget to initiatives that deliver the highest value to the business. IT governance becomes an important aspect in demonstrating that IT is giving maximum value to organisations. Identifying the issues and challenges from the literature results in the initial list of IT governance evaluation challenges given in Table 2.2. The table cross-references the literature from which the challenges are derived and was constructed from literature research and prior survey studies.

The need to group the challenges into logical categories emerged as an important aspect of the research to establish context prior to progressing with the research activities. Consequently, three categories were created, internal, external, and organisational. Each category contains challenges that are associated with the category's label. For instance, challenges in the internal category represent those generating from or impacting the organisation internally; challenges in the external category represent those generating from or impacting the organisation externally; and organisational challenges are those caused by or perceived by the management or the business. These challenges are discussed further in Chapter 5.

Table 2.2

*Initial list of IT governance evaluation challenges*

Category	IT governance evaluation challenge	Authors
Internal	Lack of necessary skills and competencies to undertake effective IT governance evaluations	(Guthrie, 1992; Lee & Ali, 2008; Sharifi et al., 2015)
	Audit team's inadequate evaluation and testing of the effectiveness of IT governance controls	(Ebner, 2014; Lee & Ali, 2008; Stoel et al., 2012)
	Lack of developed methodologies and tools to keep pace with changes occurring in the audit field	(Merhout & Havelka, 2008; Sharifi et al., 2015; Stoel et al., 2012)
	Lack of or inconsistent rules to determine what aspects of audit best fit the relevant organisation	(Al Hosban, 2014; Guthrie, 1992; Stoel et al., 2012)
	Poor training arrangements for public sector auditors	(Kurti, Barrolli, & Sevrani, 2014; Raaum & Campbell, 2006)
	Failure of an audit team to appropriately apply required substantive auditing procedures and planning processes	(Ebner, 2014; Lee & Ali, 2008; Stoel et al., 2012)
External	Inconsistent execution of audit methodology across public sector organisations	(Ebner, 2014; Merhout & Havelka, 2008)
	Limited knowledge within the audit team of emerging risk exposures related specifically to the audited organisation	(Koutoupis & Tsamis, 2009; Stoel et al., 2012)
	Audited public sector organisation lack of necessary skills or some reticence to cooperate	(Kurti et al., 2014; Merhout & Havelka, 2008)
	Pressure to prematurely sign off on evaluation reports while not following specific legislative requirements	(Merhout & Havelka, 2008; Stoel et al., 2012)
	Weak auditee–auditor relationship in the public sector	(D'Onza, Lamboglia, & Verona, 2015; Filipek, 2007; Merhout & Havelka, 2008)
	Expectation gap between public sector perceptions of evaluation and actual evaluation practices	(Guthrie, 1992; Lee & Ali, 2008; Stoel et al., 2012)
Organisational	Difficulty in recruiting and retaining experienced IT governance auditors in the public sector	(Kurti et al., 2014; Raaum & Campbell, 2006)
	Tendency to focus on mere compliance with legislation rather than quality	(D'Onza et al., 2015; Le Grand. Charles H, 2012)
	Lack of executive support for extensive IT governance evaluation programs	(Ebner, 2014; Merhout & Havelka, 2008)
	Reduced influence of audit committees and ill-established internal audit units	(Al Hosban, 2014; Pitt, 2014)
	Loss of continuity (evaluation cycle) due to mandatory audit rotation	(D'Onza et al., 2015; Koutoupis & Tsamis, 2009)

COBIT recognises culture, ethics and behaviour as strong enablers<sup>1</sup> for governance of IT by means of supporting the necessary IT process and refers to them as “the set of individual and collective behaviours within an enterprise” (ISACA, 2012a, p. 79), yet very little guidance is offered in this space. More to the point, Devos and Van De Ginste (2014) describe COBIT as being constructed mechanically due to overlooking the user’s role in the IT governance process. Thus, several studies have given more attention to users and other relational aspects (e.g., culture, values, joint beliefs) when investigating adoption and implementation challenges associated with COBIT through examining IS theories, such as Stakeholder Theory (SHT), Diffusion of Innovation theory (DOI), Technology–Organisation–Environment framework (TOE), and Technology Acceptance Model (TAM), to name a few.

An important but often neglected aspect of IT governance in general and COBIT in particular is the human element (De Haes & Van Grembergen, 2008; Hancock & Parakala, 2008). Raising awareness, formalising internal communications, and ensuring a holistic approach to frameworks implementation across the organisation minimises users’ confusion created by conflicting expectations and priorities, and their adoption of and participation in IT governance frameworks (e.g., COBIT) is predicted to increase (De Haes & Van Grembergen, 2009; Nfuka & Rusu, 2011; Weill & Ross, 2004). Although the concept of user participation and innovation adoption is a feature of several of the frameworks of IT governance, factors that influence adoption of these frameworks are largely unexplored in the literature. Thus, the next section will focus on research relating to factors that influence adoption of COBIT (or a customisation) as an IT governance framework from an IS theory perspective.

## 2.2 INNOVATION ADOPTION

Innovation is described as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (E. Rogers, 2010, p. 11). Mainly, innovation goes through a lifecycle that starts with an introduction stage and passes through stages of growth, maturity, and decline. In reference to the relation between

---

<sup>1</sup> Enablers are defined as “factors that, individually and collectively, influence whether something will work in this case, governance and management over enterprise IT” (De Haes & Van Grembergen, 2012, p. 61).

innovation and IT – or just technology – Schubert (2004) reveals that “the history of information technology tracks the ways that people have applied scientific innovations” (p. 1). Essentially, innovation is introduced to satisfy the specific needs of individuals, enterprises, or societies. More often than not, the adoption of IT innovation in PSOs is motivated by increasing organisational capability and employee productivity; enhancing organisational performance; and attaining higher cost savings (Chircu & Lee, 2003). Adoption of IT innovations is defined as “the first use or acceptance of a new technology or new product” (Khasawneh, 2008), whereas diffusion is defined as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (E. Rogers, 2010, p. 5). The difference between adoption diffusion of innovation is that a decision on the adoption of an innovation precedes any diffusion decisions (Quaddus & Xu, 2005). In basic terms, adoption may be expressed as the decision to accept or reject the use of an innovation, while diffusion is the process by which an innovation grows to become widespread (i.e., implemented and confirmed to be used).

The process of innovation adoption and diffusion occurs over five distinct phases – knowledge, persuasion, decision, implementation, and confirmation. A successful innovation process is achieved when innovation is accepted and integrated into the organisation and at the same time individual adopters show commitment by continuing to use the technology over a period of time (Bhattacharjee, 1998). Correspondingly, Ajzen (1991) stated that “[a]s a general rule, the stronger the intention<sup>2</sup> to engage in a behavior, the more likely should be its performance” (p. 181). Hence, Agarwal and Prasad (1997) claim that the study of intentions is useful because they are considered to be good predictors of actual future use. Theoretical models that have taken into consideration intentions as an innovation adoption have been recognised to be “more effective for situations prior to adoption, serving as a tool to help predict whether a technology may or may not be adopted by users” (Hester, 2010, p. 2). Another significant factor found in innovation adoption

---

<sup>2</sup> Intention or intent is defined as “the immediate antecedent of corresponding overt behaviors” (Fishbein & Ajzen, 1975, p. 382); and also as “the degree to which a person has formulated conscious plans to perform some specified future behavior” (Warshaw & Davis, 1985, p. 214).

literature is the subjective norms, which refers to “the perceived social pressure to perform or not to perform the behaviour” (Ajzen, 1998, p. 736). As illustrated in Figure 2.5, intentions are affected by attitudes towards the behaviour, as well as by subjective norms.

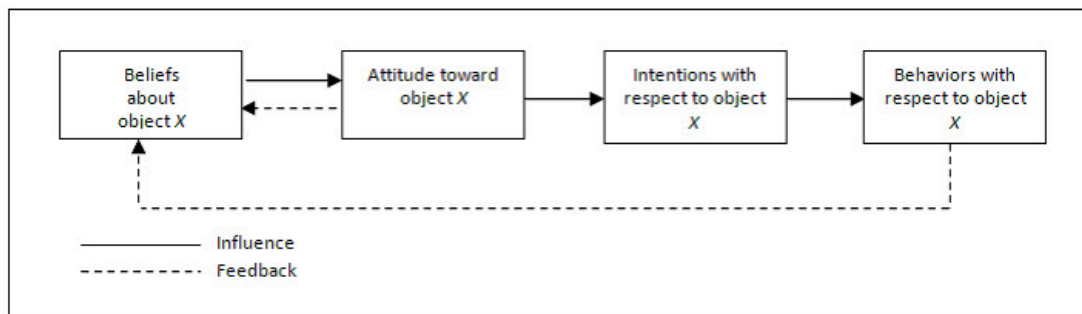


Figure 2.5. Beliefs, attitudes, intentions, and behaviours (Fishbein & Ajzen, 1975, p. 15).

Although significant prior research exists on the subject of innovation adoption, predicting and explaining the role of adopter behaviour remain of particular interest to IS researchers (Vannoy & Palvia, 2010). As a result, research on IT innovation adoption has been focusing on a core set of theoretical models that seek to explain target adopter attitudes and their innovation-related behaviour (Gallivan, 2001).

### 2.2.1 Innovation adoption theories

A number of different theories can be found in the literature pertaining to innovation adoption. These can be categorised into three different types – the collection of technologies being used that constitute an innovation (technology focused), the organisation using it (organisation focused), or the individual using it (individual focused) (Barnes & Hinton, 2012). These will be discussed next.

#### *Technology-focused theories*

Indeed, the DOI theory by E. Rogers (1983)<sup>3</sup> is considered the best known technology-focused theory in the innovation adoption-diffusion literature. This theory considers the adoption of innovation as a social process that begins after

<sup>3</sup> Also known as Rogers’ model. this has been widely used to study the adoption of innovation. Mainly cited from the book *Diffusion of Innovations* by E. M. Rogers published in 1983, three more editions of the same book in 1995, 2003, and 2010 exist. This study will use Rogers (1983) to refer to this theory as an indication to its applicability at different points in time.

gaining knowledge of the innovation and displaying variable degrees of willingness to adopt based on the characteristics that determine the individual tendency to do so (Barnes & Hinton, 2012). E. Rogers (1983) categorises technology adopters as innovators, early adopters, early majority, and late majority (or laggards). Subsequent research by Bradford and Florin (2003) established that “ease of use, perceived need, and technical compatibility” are important antecedents to the adoption of innovations.

#### *Organisation-focused theories*

Two organisation-focused theories have been identified as relevant by means of an example for this category, namely, institutional theory and the TOE framework. The focus of the institutional theory is on social structures and processes that govern behaviour in organisations, such as rules, norms, routines, and values (Scott, 2014). This theory views organisations as independent variables influenced by direct consequences of individuals’ attributes, stakeholders’ motives, external pressures, and cognitive and cultural explanations. On the other hand, the TOE framework brings the technology and the organisation focus together and infers that technology adoption is influenced by three sets of factors, namely, the technological context, the organisational context, and the environmental context (Tornatzky & Fleischer, 1990). The technological context consists of internal and external technologies; organisational context includes size, complexity, and degree of centralisation; and environmental context encompasses industry structure, competitors, and regulatory environment.

#### *Individual-focused theories*

The most influential theories in this category include: TAM, Theory of Reasoned Action (TRA), and Unified Theory of Acceptance and Use of Technology (UTAUT). Essentially, these theories study behavioural elements influencing an individual’s intention to and actual use of a technological innovation (Venkatesh, Morris, Davis, & Davis, 2003). Social norms, along with user attitude towards the technology and other situational factors lead to increased utilisation and performance of system usage (Venkatesh & Davis, 2000).

The following sections discuss relevant theories of technology innovation for studying IT governance frameworks adoption within the context of the individual’s attitude and perceived expectations in the public sector.

### 2.2.2 The Technology Acceptance Model

Originally developed by Davis (1989), TAM is considered the most influential and commonly employed theory in IS research as it provides an explanation for the factors of technology acceptance by individuals (Benbasat & Barki, 2007). This model is considered very successful because the author largely simplified the TRA by Fishbein and Ajzen (1975) and made it more efficient to conduct technology adoption research as well as facilitating the aggregation of results across settings. According to Venkatesh and Davis (2000), the determinants discussed by TAM are *perceived usefulness*, which is defined as “the extent to which a person believes that using the system will enhance his or her job performance” (p. 187), and *perceived ease of use*, defined as “the extent to which a person believes that using the system [was] free of effort” (p. 187). As illustrated in Figure 2.6, the model focuses on the direct influence of the perceived usefulness (PU) and perceived ease of use (PEU). Ease of use can enhance usefulness, which in turn improves attitude towards usability, leading to efficient and effective usage (Montgomery, 2011).

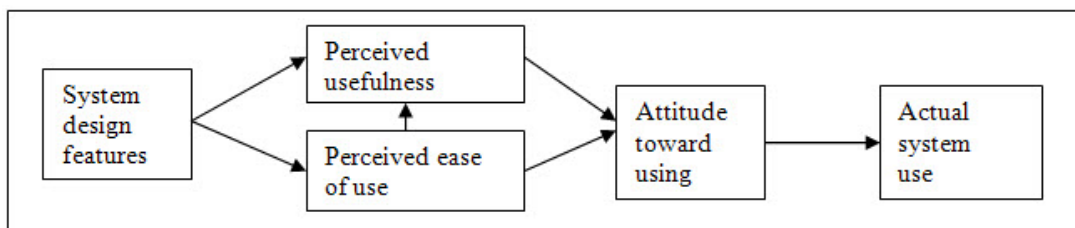


Figure 2.6. Technology Acceptance Model (Davis, 1993, p. 476).

TAM has been widely applied in understanding the motivational issues pertaining to the acceptance of technology, as it has proven to be robust in predicting user acceptance of IT (H. Chan & Teo, 2007). According to Chan and Teo, TAM is a well-established, robust, and powerful model for predicting user acceptance and has been the subject of further development since the original work of Davis (1989). The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) represents the most significant modification to the model in recent years. The authors examined eight well-known theories or models to validate the most significant elements and eliminate duplications among variables. As depicted in Figure 2.7, the resulting UTAUT model extends TAM by including four core determinants of user intentions leading to use (performance expectancy, effort



expectancy, social influence, and facilitating conditions) and four moderators of relationships between them (gender, age, experience, and voluntariness of use).

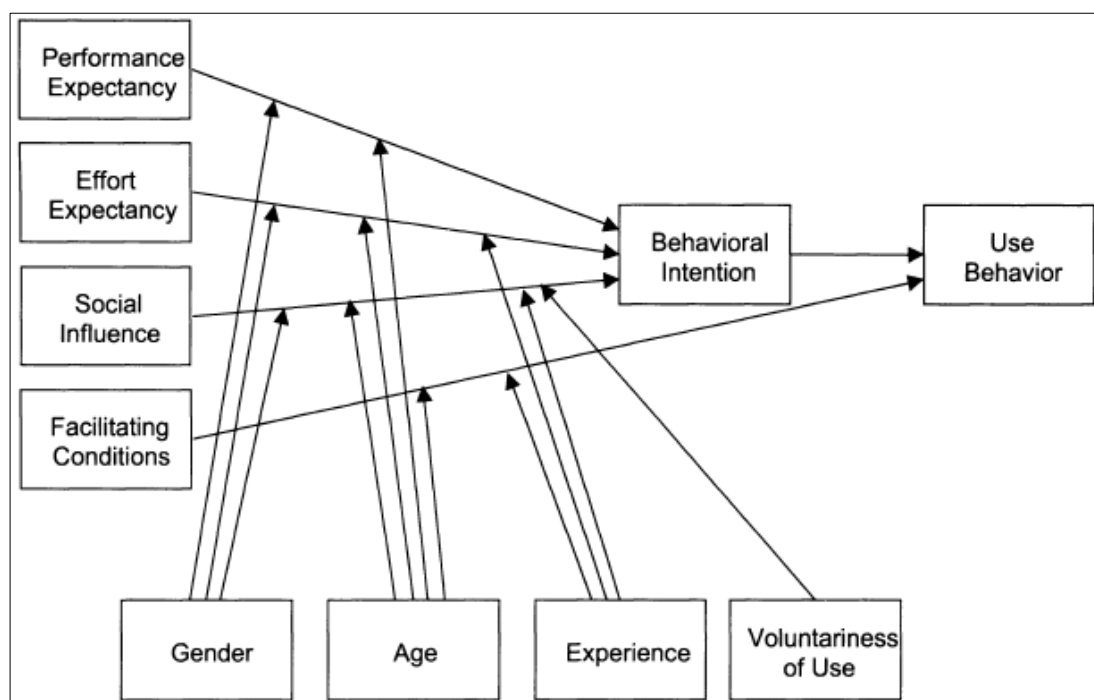


Figure 2.7. Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003, p. 447).

By the same token, there has been a plethora of studies that utilise TAM in relation to software acceptance and other facets of technology innovations by means of extending the applicability of the model in various contexts. For instance, TAM was expanded by Chenoweth, Minch, and Tabor (2007) to focus on security controls adoption, as they identified that most existing research in technology acceptance ignores important aspects of the IT artefact. Likewise, Jones et al. (2010) extended TAM and applied the amended model to the adoption of information systems security measures. Furthermore, Venkatesh and Davis (2000) explored the impact of subjective norms on innovation adoption through developing the original TAM. As illustrated in Figure 2.8, they derived a model that incorporates social influence and cognitive instrumental processes as determinants of perceived usefulness and usage intentions. The authors characterised these factors (job relevance, output quality, result demonstrability, and image) as affecting perceived usefulness.

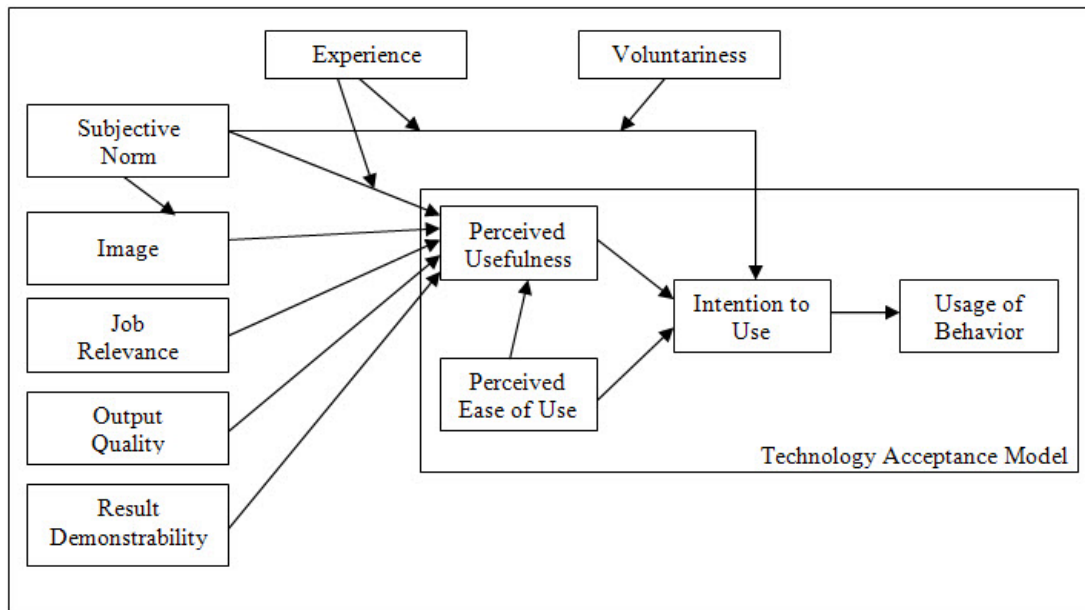


Figure 2.8. Extension of the Technology Acceptance Model (TAM2) by Venkatesh and Davis (2000, p. 188).

Other relevant and related studies have expanded TAM by merging it with other frameworks or models to address the adoption of innovation in the public sector. For example, Givens (2011) examined organisational factors in response to change resistance towards adopting a virtual work environment. He concluded that participants' technical expertise and their willingness to accept change are factors that influence the level of adopting new technology innovations. In the same way, Chanasuc, Praneetpolgrang, Suvachittanont, Jirapongsuwan, and Boonchai-Apisit (2012) studied the factors that affect the success of IT adoption in Thai public organisations, including the effective application of IT. Their research expanded TAM to include organisational culture factors, such as expectations for knowledge, values, and norms. Similarly, Awa, Ukoha, Emecheta, and Nzogwu (2012) reviewed factors affecting electronic commerce adoption in small- and medium-scale enterprises (SMEs) through integrating TAM and TOE frameworks and expanding their characteristic constructs.

### 2.2.3 Technology–Organisation–Environment framework

Originally developed by Tornatzky and Fleischer (1990), the TOE framework focuses on the organisational aspects of innovation adoption. The framework takes into account technological, organisational and environmental variables, which makes it advantageous over other adoption models in investigating technology innovation

adoption, use, and value creation (Oliveira & Martins, 2010). Primarily, TOE is free from industry and firm-size restrictions (Wen & Chen, 2010) and is considered as having “a solid theoretical basis, consistent empirical support, and promise of applying to other IS innovation domains” (Zhu, Kraemer, & Xu, 2002, p. 338). In addition, Vannoy and Palvia (2010) point out the relationship between technology adoption and social influence and reveal that organisational and environmental factors affect organisations’ tendency to adopt innovations. For this reason, TOE is considered as a framework that foresees challenges associated with user adoption of technology among firms (Gangwar, Date, & Raoot, 2014). The three contexts of TOE (see Figure 2.9) present “both threats and opportunities for technological innovation” (Tornatzky & Fleischer, 1990, p. 154) and therefore influence the way an organisation adopts new technology. These components are explained as follows.

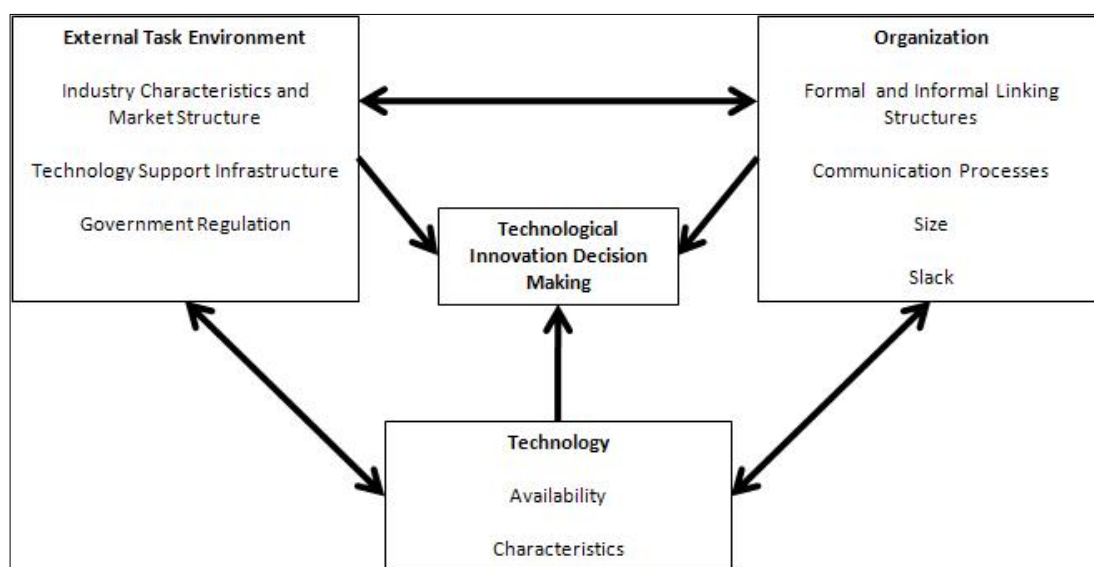


Figure 2.9. Technology–Organisation–Environment framework by (Tornatzky & Fleischer, 1990, p. 154).

### ***Technological context***

In the TOE framework, technology is broadly defined by Tornatzky and Fleischer (1990) as “systematic knowledge transformed into, or made manifest by, tools” (p. 9). Technological context is comprised of internal and external technologies and intangible resources of the organisation (e.g., IT expertise) that influence an individual, an organisation, and an industry’s adoption of innovations (Zhu et al., 2002). Similarly, Ghezzi, Rangone, Balocco, and Renga (2010) consider

that the technological context includes the internal and external technologies relevant to the organisation and may include processes.

### ***Organisational context***

In TOE, the organisation is described in several measures, such as “firm size; the centralization, formalization, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally” (Tornatzky & Fleischer, 1990, p. 153). The organisational context incorporates descriptive measures such as firm scope, firm size, value, the complexity of its structure, managerial beliefs, and formal and informal intra-organisational mechanisms for communication and control (Zhu et al., 2002). In line with this research, IT expertise, company size, and industry classification, as well as experience with the COBIT framework were found to be positively related to audit committees’ perceived oversight of IT risks (Hadden, 2002). In a similar study on IT governance and COBIT, De Haes and Van Grembergen (2008) took into account that organisations differ in culture and size, operate in different sectors, and have different market positions and business strategies.

### ***Environment context***

This third aspect in TOE is the environment, both economic and political, in which an organisation operates, with the priority given to external factors such as government incentives and regulations (Intan Salwani, Marthandan, Daud Norzaidi, & Choy Chong, 2009). Tornatzky and Fleischer (1990) indicate that environment is an important determinant of behaviour because “often the effects of those larger environmental variables are highly dependent upon the idiosyncrasies of specific industries or technical areas” (p. 43). For example, the political environment in which public sector organisations operate presents environmental-specific complex factors as indicated by the statement that “compliance and governance are becoming a global phenomenon” (Braganza & Franken, 2007, p. 102).

Other environmental factors that influence the adoption of new practices have been the subject of prior researchers, such as Al-Gahtani, Hubona, and Wang (2007) who focus on identifying the role of four key moderator variables: gender, age, experience, and voluntariness of use; and Chuttur (2009) who identified that “external factors such as system experience, level of education, and age may have a direct influence on system usage” (p. 16).

#### 2.2.4 Limitations of innovation theories

In spite of the wide adoption of TAM, the model has been found to have certain limitations. For instance, studies based on TAM have limited ability to be generalised; as L. Chen and Tan (2004) explain, the model has produced conflicting findings, which in turn led to confusion over moderating and external variables. Further, several researchers (E.g., Autry, Grawe, Daugherty, & Richey, 2010; Schillewaert, Ahearne, Frambach, & Moenaert, 2005; Wu, 2011) have highlighted the importance of investigating the role of other variables such as technological influences, the innovativeness of the firm, the firm's level of technology readiness, size, security, and culture. Likewise, Legris, Ingham, and Collerette (2003) highlight the need for significant factors to be identified and included in TAM as the empirical studies based on the model do not produce totally consistent or clear results.

In addition, Autry et al. (2010); and Hong, Thong, and Tam (2006) explain that the repeated empirical testing of TAM shows that its variables consistently explain 40% of the variance in individuals' intention to use and subsequent implementation, which makes it a parsimonious model as stated by the authors. Due to using TAM for most IT adoption studies, the IS innovation field is becoming weakened as it gradually moves towards homogeneity (M. Williams, Dwivedi, Lal, & Schwarz, 2009).

At the same time, the TOE framework has several limitations. For example, Dedrick and West (2003) mentioned that the TOE framework lacks an integrated conceptual framework, and a well-developed theory, and is just a taxonomy for categorising variables. They argue that a more robust framework for studying organisational adoption is required. Furthermore, TOE is described as having no major constructs (Low, Chen, & Wu, 2011) and that the framework is limited in its explanatory power of technology adoption (Musawa & Wahab, 2012).

Additionally, Y. Wang and Yang (2010) indicate that variables of the TOE framework may vary according to the context of the study and thus may have unclear major constructs in each of its contexts. Therefore, several researchers (Oliveira & Martins, 2010; Y. Wang & Yang, 2010; Wen & Chen, 2010; Zhu et al., 2002) indicate, other variables should be included to enrich the TOE framework, such as cognitive and sociological variables; technology readiness; experience, education, and skills; managerial and decision-making capabilities; technology infrastructure

and culture; and government factors salient to the country context (e.g., government policies and regulations).

This clearly indicates the need to integrate TAM and the TOE framework with other IT adoption models and theories as is seen fit.

### **2.3 GAPS IN THE LITERATURE**

This section considers gaps in the literature that are used to help justify this research and to develop the research questions in Section 4.2.

Although the importance of effective IT governance to the success of PSOs has long been recognised (Pang, 2014; Vinten, 2002), the majority of research has only examined its mechanisms and practices in private sector organisations (Ali & Green, 2006; Denford, Dawson, & Desouza, 2015; Weill & Ross, 2004). In particular, there is very little empirical evidence and no known research within the public sector that recommends holistic evaluation methods of IT governance in spite of the extensive literature available on each of the IT governance focus areas, including performance measurement (Buckby, Best, & Stewart, 2008; Denford et al., 2015). In response, well-defined standards and frameworks for IT governance evaluation have been developed; however, research has revealed that a large number of organisations have not adopted any of them (Othman et al., 2011). The review of literature indicates that consideration of evaluation frameworks is an important aspect of IT governance, but does not consider in any depth the lack of suitable frameworks as a barrier to performing IT governance evaluation in the public sector. This emphasises the importance of developing contextualised practical methods specifically for PSOs to use in evaluation of IT governance. Given the importance and unexplored state of IT governance evaluation methods and frameworks (Majdalawieh & Zaghloul, 2009), this research examines the challenges of IT governance evaluation within Australian PSOs.

The COBIT framework is considered to be generic, comprehensive, and independent; it comprises a large body of knowledge designed to implement and evaluate IT governance within organisations of all sizes, whether commercial, not-for-profit, or in the public sector (Kerr & Murthy, 2013; E. Ramos et al., 2013). Although the framework is well received in a broad range of IS communities, only a small number of firm theoretical claims can be sustained because it is created by and

for practitioners (De Haes, Debreceeny, & Van Grembergen, 2013). As a result, criticism has arisen from the academic community (Devos & Van De Ginste, 2014; Ridley et al., 2008). In particular, “There is limited academic research that either analyses COBIT or leverages COBIT as an instrument in executing research programs” (Bartens et al., 2015, p. 4558). This research endeavours to address this gap by conducting research based on COBIT as an artefact in a public sector context.

The value of user involvement in various aspects of IT governance has long been recognised (Terry & Standing, 2004), with many of the mechanisms and frameworks available in literature designed to foster and support user participation in IT governance (Gillies & Broadbent, 2005; R. Huang et al., 2010a; Van Grembergen et al., 2004). However, the literature on IT governance is mostly focused on structures, processes, mechanisms, and frameworks, while social aspects of IT governance, like human behaviour and organisational factors, receive far less attention from academics (Smits & van Hillegersberg, 2015). Recent research has also suggested that behaviour issues in IT governance deserve more attention (Teo et al., 2013). Several studies also highlight that the user’s role in IT governance requires further investigation (Davies, 2006; ITGI, 2011; P. Rogers, 2009). More to the point, the most widely accepted IT governance framework, COBIT, is substantially criticised as being constructed mechanically and thus found to ignore the user as a reflective human actor (Devos & Van De Ginste, 2014). Despite the recognition of the importance of more user involvement in IT governance, there is a lack of studies that look at the influence of the user on the adoption and acceptance of IT governance frameworks. The consideration of this issue in IT governance within the public sector represents another gap in the literature. This research explores the underlying factors that influence the adoption of IT governance frameworks in relation to innovation adoption theories.

## **2.4 SUMMARY**

In this chapter, a discussion of the literature that is relevant to the study has been presented. The chapter began with a discussion of the importance of IT governance in ensuring that IT goals achieve and support business objectives in the public sector. Then it examined literature regarding the use of the frameworks for IT governance evaluation in the public sector and the requirements that might facilitate

the use of these frameworks in terms of customisation and being “fit for purpose”. Finally, it articulated the theoretical foundation of adopting tailored governance frameworks in a specific organisational context.

This review of the literature demonstrates the lack of IS research undertaken to address the adoption of frameworks for IT governance. Additionally, there is little understanding of the underlying factors that influence the adoption of a governance framework, despite the importance of IT governance and notwithstanding the proven value of frameworks in many other aspects of the IS discipline. Issues including management support, perceived ease of use, perceived usefulness, user experience, and other environmental factors should be further explored from an IT governance perspective. This phenomenon brings into question whether barriers exist that inhibit adoption of IT governance frameworks in the public sector. Thus, the research seeks to understand the adaption and adoption of IT governance frameworks through the application of well-established IS theories: TAM and the TOE framework. Hence, the factors that influence the acceptance and adoption of IT governance frameworks are explored in Chapter 8.

Finally, this literature review in relation to the topic and the studied environment contributes to ascertaining the identified gaps, research questions and objectives of this research.



## Chapter 3: Theoretical Development of an IT Governance Evaluation Framework

---

This chapter follows the review of literature that explores IT governance concepts and evaluation mechanisms within public sector organisations (PSOs). The review found variations in implementing and adapting IT governance frameworks. A number of studies in the IT governance domain use the concept of evaluation; however, there is not a clear mechanism of adapting frameworks to be used in the evaluation process. This has led the current research to undertake a deeper review of IT governance evaluation frameworks (ITGEFs).

This chapter aims to develop an a priori model for IT governance evaluation based on the COBIT framework. Further, this chapter aims to address the second sub-research question (Section 4.2): “How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?”

The remainder of the chapter is structured as follows. Section 3.1 highlights the need to adapt best-practice frameworks; Section 3.2 provides an overview of COBIT as best suited to IT governance evaluations; Section 3.3 develops a conceptual model for an ITGEF; while Section 3.4 provides a review and summary of the chapter.

### 3.1 ADAPTING IT GOVERNANCE FRAMEWORKS

As discussed in the previous chapter, evaluating IT governance is one of the main concerns of IT executives in both public and private sectors (Kerr & Murthy, 2013). Influenced by regulatory and compliance requirements, such as SOX in the United States, Basel II in Europe, and CLERP 9 in Australia, the search for and rapid adoption of frameworks to enhance the overall level of control of IT processes, especially those related to financial and accounting information, intensified (Dahlberg & Kivijarvi, 2006). Although there is no mandate to use a specific method, frameworks used to evaluate IT processes varies across organisations. As a result, several studies (Al Omari et al., 2012a; De Haes & Van Grembergen, 2008; Debreceeny & Gray, 2009; Liu & Ridley, 2005) examine the adoption of frameworks, such as COBIT (versions 4, 4.1 and 5), IT Infrastructure Library (ITIL), and the

Balanced Scorecard (BSC), as mechanisms for evaluating (or measuring the performance of) IT governance.

In spite of the comprehensive and detailed guidance available on IT governance frameworks, adapting and implementing frameworks and best practices have been recognised as challenging by many organisations (Bartens et al., 2015; De Haes & Van Grembergen, 2015). A survey by the IT Governance Institute (ITGI) (2008) found that IT governance frameworks were used as a reference source by only half of the organisations that adopted them. Likewise, the results from a study by Debreceny and Gray (2009) showed that only 16% of the surveyed organisations utilised the COBIT framework intensively, while the remainder opted to select a subset of processes that provided most of the desired IT governance benefits.

Although COBIT was developed to provide a methodical basis for structuring and performing these evaluations (Fröhlich et al., 2010), it is considered large, multifaceted, and complex (Debreceny & Gray, 2013). Given the constraints of both time and resources within which the Australian public sector is forced to operate, implementing an evaluation framework the size of COBIT in its entirety is often considered too large a task (Al Omari et al., 2012b). This is also echoed by statements that view the COBIT framework as “being too extensive to be completely applied” and propose to move to “a less complex approach to defining and establishing [selective] controls” (Leih, 2009, p. 189). In addition, Singh (2010) states that “not all COBIT objectives are ‘born equal’, and some are more important than others. The reasons for this behaviour may be satisficing, learning, or a cost-benefit analysis and it is difficult to argue either way without actual data from IT managers.” (p. 9) Therefore “there is the need though to contextualize the use of COBIT” (Lapao, 2011, p. 40).

However, as an alternative to full implementation, it is not uncommon for organisations in the public sector to “cherry pick” controls from the framework in an effort to reduce its size (Bartens et al., 2015; Leih, 2009; Proenca et al., 2013). These inconsistent customisations are “often developed ad hoc, without following a well-documented design and development method, and often do not provide a pathway to further extend and update the model to foster systematic enhancements and extensions” (Proenca et al., 2013, p. 1). Consequently, this leads to the creation of dissimilar sets of tools to be used in conducting IT governance evaluation programs,

thus producing inconsistent findings across the public sector (Krey, 2010; Lapao, 2011; Singh, 2010).

The literature also points to the need for more studies to investigate how COBIT should be modified to fit the specific circumstances of each organisation (Singh, 2010). This research fulfils this need by performing an empirical investigation of the potential to adapt the latest version of the COBIT framework (COBIT 5) for IT governance evaluation in Australian PSOs.

While many studies have looked into adapting COBIT for a specific context (Gerke & Ridley, 2006; Guldentops et al., 2002; Huissoud, 2005; Lubbad, 2014), less research has been accorded to assess the suitability of these customisations, much less in the public sector. Moreover, these shortcomings are compounded by calls to (i) assess the design of COBIT-based instruments (Debreceeny & Gray, 2013); (ii) trial IT evaluation frameworks based on COBIT in PSOs (Gerke & Ridley, 2006); (iii) empirically validate whether a tailored version based on COBIT is fit for purpose (De Haes, Van Grembergen, & Debreceeny, 2013); and (iv) conduct academic research to assess the effectiveness of an IT evaluation instrument that was designed to meet the needs of individual organisations (Gerke & Ridley, 2009).

Despite the fact that several studies have found that IT governance has been successfully implemented through COBIT processes, variations in approach, methods, and versions of COBIT were found. Indeed, thorough planning and careful execution need to be leveraged when picking out a subset of COBIT's processes to ensure that the devised set of IT controls and processes match business objectives and thus are not perceived to be business prohibitive by stakeholders (Al-Khazrajy, 2011). As every organisation has a unique set of objectives, COBIT can be contextualised to suit a specific organisational or domain context through translating enterprise goals into IT-related goals and mapping these to individual IT processes and practices (ISACA, 2012a). This suggests that a need for a unified approach to tailoring COBIT is emergent, to maximise the value added to specific organisational contexts (e.g., higher education or public sector) rather than implementing the full COBIT framework.

### 3.2 IT GOVERNANCE EVALUATION FRAMEWORK: COBIT

The COBIT framework recognises the importance of effectively assessing IT governance to organisations by articulating that “[a] basic need for every enterprise is to understand the status of its own IT systems and to decide what level of management and control the enterprise should provide” (ITGI, 2007a, p. 17). It also notes that “[t]he assessment of process capability based on the COBIT maturity models is a key part of IT governance implementation” (ITGI, 2007b). Although obtaining an objective view of an organisation’s own IT performance level through maturity models has been described as a challenging undertaking (ITGI, 2007a), COBIT enables measurement of IT capability as a portfolio through assessing the maturity of individual IT processes (R. Chen, Sun, Helms, & Jih, 2008).

Evaluating IT governance can be based on the Process Capability Model (PCM) or the generic maturity model (in previous versions of COBIT), with selected or all 37 IT processes (ITGI, 2007a). For example, Debreceeny and Gray (2013) undertook a large field study to evaluate the maturity of IT processes. The authors used all 34 processes in COBIT 4 as a foundation to evaluate process capability by interacting with process owners at 52 organisations in several countries. The authors applied an extensive survey instrument, which found that the mean level of process maturity is rather low, with higher process maturity being observed in more operational processes. However, the authors concluded that utilising the COBIT framework in its entirety was too generic and as a result may not have directly correlated to the capabilities of any particular organisation. On the other hand, Weber (2014) developed an evaluation framework based on a selection of processes to be used in South African organisations. The author concluded that the use of a selection of processes from COBIT 5 produced an acceptable and fit-for-purpose framework to use in evaluating ITG.

As mentioned in the previous chapter, the PCM utilised in COBIT provides a structured approach for IT capability assessment through evaluating processes capability against a consistent and well-established scale (Oliver & Lainhart, 2012). The evaluation is performed through metrics that assess a unique set of key goal indicators (KGIs) and key performance indicators (KPIs) for each IT process. KGIs are lead indicators that aim to identify and measure the application of processes. On the other hand, KPIs are lag indicators that assess the achievement of process goals.

KPIs and KGIs are often associated with Balanced Scorecards (BSC) and are important in measuring the relationship between IT processes and business goals which is critical to the success of ITG (Gray, 2004). For all 37 IT processes a set of IT-related goals (i.e., to define what IT objectives are achieved by the process), process goals (i.e., to define what IT must deliver to support objectives), and activities (i.e., to assess actual performance) is provided. Figure 3.1 illustrates this with an example from COBIT.



		IT	Process	Activities/Key Practices	
APO12 Manage Risk	Goals	2 IT compliance and support for business compliance with external laws and regulations. 4 Managed IT-related business risk. 6 Transparency of IT costs, benefits and risk. 10 Security of information, processing infrastructure and applications. 13 Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards.	1. IT-related risk is identified, analysed, managed and reported. 2. A current and complete risk profile exists. 3. All significant risk management actions are managed and under control. 4. Risk management actions are implemented effectively.	APO12.01 Collect data. APO12.02 Analyse risk. APO12.03 Maintain a risk profile. APO12.04 Articulate risk. APO12.05 Define a risk management action portfolio. APO12.06 Respond to risk.	COBIT 5
	Metrics	19 Items	9 Items	33 Items	
PO9 Assess and Manage IT Risks	Goals	<ul style="list-style-type: none"> <li>• Protect the achievement of IT objectives.</li> <li>• Establish clarity on the business impact of risks to IT objectives and resources.</li> <li>• Account for and protect all IT assets.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish and reduce the likelihood and impact of IT risks.</li> <li>• Establish cost-effective action plans for critical IT risks.</li> </ul>	PO9.1 IT Risk Management Framework PO9.2 Establishment of Risk Context PO9.3 Event Identification PO9.4 Risk Assessment PO9.5 Risk Response PO9.6 Maintenance and Monitoring of a Risk Action Plan	COBIT 4.1
	Metrics	<ul style="list-style-type: none"> <li>• Percent of critical IT objectives covered by risk assessment</li> <li>• Percent of IT risk assessments integrated in the IT risk assessment approach</li> </ul>	<ul style="list-style-type: none"> <li>• Percent of identified critical IT events that have been assessed.</li> <li>• Number of newly identified IT risks (compared to previous exercise).</li> <li>• Number of significant incidents caused by risks that were not identified by the risk assessment process.</li> <li>• Percent of identified critical IT risks with an action plan developed.</li> </ul>	<ul style="list-style-type: none"> <li>• Percent of IT budget spent on risk management (assessment and mitigation) activities.</li> <li>• Frequency of review of the IT risk management process.</li> <li>• Percent of approved risk assessments.</li> <li>• Number of actioned risk monitoring reports within the agreed-upon frequency.</li> <li>• Percent of identified IT events used in risk assessments.</li> <li>• Percent of risk management action plans approved for</li> </ul>	
		KPI	KGI		

Figure 3.1. Comparing a high-level IT process from COBIT 5 and COBIT 4.1.

According to ISACA (2012a), there are six levels of capability that a process can achieve in COBIT (see Figure 3.2):

- Incomplete (level 0): The process is not implemented or fails to achieve its objective. This level has no process attributes.
- Performed (level 1): The process is implemented and achieves its objective. This level has only one process attribute: process performance.
- Managed (level 2): The previously described performed process is now implemented using a managed approach and its outcomes are appropriately established. This level has two process attributes: performance management and work product management.
- Established (level 3): The previously described managed process is now implemented using a defined process that is capable of achieving its process outcomes. This level has two process attributes: process definition and process deployment.
- Predictable (level 4): The previously described established process now operates within a defined boundary that allows the achievement of the processes outcomes. This level has two process attributes: process management and process control.
- Optimising (level 5): The process is continuously improved in a way that enables it to achieve relevant, current, and projected goals. This level has two process attributes: process innovation and process optimisation.

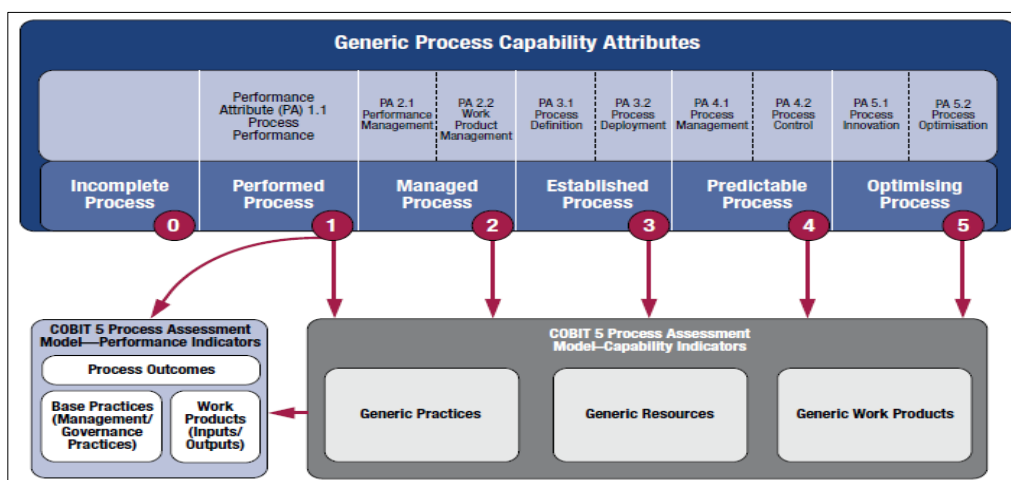


Figure 3.2. Summary of the COBIT 5 Process Capability Model (ISACA, 2012a, p. 42).



Furthermore, each capability level can be achieved only when the level below has been fully achieved (see Figure 3.3). For example, a process capability level 4 (predictable process) requires the process management and process control attributes to be largely achieved, on top of full achievement of the attributes for a process capability level 3 (established process).

		Process exists?	Process Attribute								
			PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2
Process Capability Level	Level 5 (Optimising)	Yes	L or F	L or F	L or F	L or F	L or F	L or F	L or F	L or F	L or F
	Level 4 (Predictable)	Yes	L or F	L or F	L or F	L or F	L or F	L or F	L or F		
	Level 3 (Established)	Yes	L or F	L or F	L or F	L or F	L or F				
	Level 2 (Managed)	Yes	L or F	L or F	L or F						
	Level 1 (Performed)	Yes	L or F								
	Level 0 (Incomplete)	No									
Rating scale:		N: Not Achieved (0-15%)	P: Partially Achieved (15%-50%)			L: Largely Achieved (50%-85%)		F: Fully Achieved (85%-100%)			

Figure 3.3. COBIT 5 process capability levels (ISACA, 2013b).

The COBIT framework was selected for use in this research as it was derived specifically to guide the practice of IT governance and is used extensively throughout the public and private sectors for this purpose. It is important to note that in many previous studies the decision to utilise all or a collection of IT processes from COBIT was based on the opinion of the researchers. As a result, no consistency for the selection of specific IT processes was provided for a given context, which also makes it difficult to compare results. Consequently, the next section explores previous studies that have attempted to adapt the COBIT framework for conducting evaluation of IT governance.

### 3.3 DEVELOPING AN INITIAL IT GOVERNANCE EVALUATION FRAMEWORK

From a theoretical perspective, Singh's (2010) study offers alternative explanations as to why the COBIT framework is not adopted exhaustively by many organisations. The author states that "[n]ot all COBIT objectives are born equal, and some are more important than others" (p. 9) and further explains that IT managers tend to rank the control objectives so that their efforts can be prioritised. In addition, he argues that the reasons for this behaviour may be driven by cost reduction. By the

same token, Y. Jo et al. (2010) conducted a study on 100 Korean corporations to examine the effects of multiple factors on organisational intent to adopt COBIT as a framework for IT governance evaluation. Their results reveal that COBIT has not been successfully adopted in Korea, in comparison with many other countries, possibly because of the scarcity of experts who can “customise it” to meet the needs of Korean organisations.

Several studies have endeavoured to tailor and adapt the COBIT framework for a specific organisational context. For example, a study by Nugroho (2014) examined COBIT 5 as an IT governance tool in higher education institutions in Indonesia. The author concluded that each organisation must take into account its specific situation to define its own set of governance processes as it sees fit, as long as all necessary governance and management objectives are covered. Similarly, Hiererra (2012) conducted a focused evaluation using eight high-level control objectives from COBIT to determine the IT governance maturity of the information systems (IS) department within a single university in Indonesia. Along the same line, a study by Wood (2010) adopted a case study design based on nine of the COBIT high-level control objectives as a modified framework to evaluate the IT governance maturity of the city of San Marcos in the United States. Similarly, the implementation of COBIT as an IT governance framework was examined in an educational institution in Portugal by Gomes and Ribeiro (2009b) and also in two Australian institutions of higher education by Bhattacharjya and Chang (2006).

In a similar effort to derive an abbreviated list of IT processes for creating an integrated IT governance framework in the Malaysian Ministry of Education, S. Ismail, Alinda, Ibrahim, and Rahman (2009) noted that the focus on IT governance domains differs between different parts of the organisation. For example, the Plan and Organize domain was the main focus at the ministerial level, whereas the Monitor and Evaluate domain was given the highest emphasis at the schools level. Their study concluded with determining 20 high-level control objectives that were considered to be most important in one organisation.

Similarly, Braga (2015) recommended adopting COBIT for private sector organisations in Argentina. The author utilised the framework’s goals cascade mechanism to pick a specific set of primary and secondary processes that relate to two IT-related goals: compliance with external regulations and laws; and security of

information, processing infrastructure, and applications. In a similar study by Malakooti, Hashemi, and Tavakoli (2014) on private and public banks in Iran, the authors affirmed that internal and external auditors rely on a selection of COBIT processes to perform evaluations and compliance audits due to its strong control focus. In the same vein, Al-Khazrajy (2011) indicated that COBIT helps in conducting IT governance evaluations at low cost with better value, as it can be tailored to fit certain organisational needs. However, none of these studies provided empirical evidence of the validity of their selection or practical methods for utilising COBIT by auditors.

As a result, it is proposed that tailoring the COBIT framework to conduct IT governance evaluation that is relevant to a specific organisational context is possible. The development of an ITGEF to allow for national or international standardisation would also be well received by practitioners and auditors, as it is considered best practice to rely on frameworks to be able to substantiate evaluation scores. (Ridley et al., 2004)

An international practitioner study by Guldentops et al. (2002) is considered the earliest study that attempted to contextualise the COBIT framework. The authors interviewed a group of 20 senior experts to examine the high-level control objectives perceived by the panel as being most important. The study introduced a self-assessment tool and a reference benchmark based on a selection of 15 out of 34 processes from COBIT. The authors employed the tool to evaluate organisations' IT performance against these selected control objectives by using a generic six-point maturity scale. Afterward, Liu and Ridley (2005) conducted a study to establish a reference benchmark of maturity levels of control over IT processes in the Australian public sector by adopting a self-assessment tool based on the study's selection of 15 controls from COBIT by Guldentops et al. (2002) to illicit the level of control over IT processes. The authors then compared the Australian benchmark with the international benchmark established by Guldentops et al. (2002) and concluded that the Australian public sector had a better performance for IT control over the 15 most important IT processes. Subsequently, a study by Nfuka and Rusu (2010) also used the previously selected 15 processes from the COBIT framework to evaluate IT governance maturity in five Tanzanian PSOs and compared the results with those of previous studies of Guldentops et al. (2002), and Liu and Ridley (2005). They

concluded that when the maturity levels in the studied environment were compared with those in the public sector in Australia and internationally in a range of nations, the maturity pattern appeared to be relatively lower in Tanzania as a developing country.

As observed in the previous studies, the authors agreed on three points. First of all, only a limited number of empirical research studies exist that focus on the evaluation of IT governance using COBIT in the public sector environments worldwide. Second, the authors noted the similarity between the rankings of the leading IT processes, which suggests that the priority placed on these specific IT processes is largely consistent. This also indicates a consistency in the nature of the IT governance practices and maturity within the public sector worldwide. Third, none of the studies provided a justification or a mechanism for the selection of the leading (or most important) 15 IT processes from the COBIT framework.

Another project was undertaken by the IT working group at the European Organization of Supreme Audit Institutions (EUROSAI) to design a self-assessment tool for evaluating IT governance based on the COBIT framework. Similar to the previous studies, a list of 16 key control objectives was identified as the most important to Supreme Audit Institutions (Huissoud, 2005). In the same way, a study was undertaken by Gerke & Ridley (2006) in Australia to identify and assess a set of control objectives to be used as an IT evaluation instrument by the Tasmanian Audit Office within PSOs. The authors produced an abbreviated list of 17 high-level control objectives from the COBIT framework that were considered to be important to Tasmanian PSOs. However, the latter studies (i.e., Gerke & Ridley, 2006; Huissoud, 2005) are different from the former (i.e., Guldentops et al., 2002; Liu & Ridley, 2005; Nfuka & Rusu, 2010), by means of engaging participants to identify the most important COBIT controls before evaluating IT governance, instead of self-nominating important controls. For instance, the IT working group at EUROSAI facilitated a workshop environment for participants to examine the IT aspects of their own organisation to determine the key control objectives from the COBIT framework. Equally, Gerke & Ridley (2006) developed and administered a survey instrument to 30 participants from PSOs, requesting them to rate the 34 high-level control objectives from the COBIT framework according to their importance to their organisation on a Likert-type scale. Gerke & Ridley (2006) identified eight control

objectives to be common when compared with the lists from previous studies by Huissoud (2005) and Guldentops et al. (2002) as illustrated in Table 3.1.

Based on the comparison between these studies, 24 out of the 34 control objectives (70%) were perceived as important. Five categories or tiers emerged from this comparison as presented in Table 3.1. The first category presented a list of control objectives that were common across at least five previous studies. Four control objectives (17%) have been previously identified in this tier as significant in their context. The second and third category consisted of control objectives that were common across four and three previous studies respectively. Three control objectives (12.5%) have been previously identified in each of these tiers. The fourth tier contained five control objectives (21%) that were common across two previous studies, while the fifth category consisted of nine (37.5) control objectives that were perceived as important by only one previous study.

Table 3.1

*Comparison of the most important control objectives from COBIT identified in previous studies*

Tier	COBIT 4/4.1 Control Objectives	Hiererra (2012)	Wood (2010)	Ismail et al (2009)	Gerke & Ridley (2006)	Huissoud (2005)	Guldentops et al. (2002)
1	<i>PO1 Define a Strategic IT Plan</i>	X	X	X	X	X	X
	<i>DS5 Ensure Systems Security</i>	X		X	X	X	X
	<i>AI6 Manage Changes</i>	X	X		X	X	X
	<i>DS11 Manage Data</i>	X		X	X	X	X
2	<i>AI2 Acquire and Maintain Application Software</i>			X	X	X	X
	<i>DS4 Ensure Continuous Service</i>			X	X	X	X
	<i>DS10 Manage Problems</i>			X	X	X	X
3	<i>PO9 Assess Risks</i>				X	X	X
	<i>ME1 Monitor and Evaluate IT Performance</i>	X	X	X			
	<i>ME4 Provide IT Governance</i>	X	X	X			
4	<i>PO10 Manage Projects</i>	X	X				
	<i>AI4 Enable Operation and Use</i>		X	X			
	<i>DS1 Define and Manage Service Levels</i>	X	X				
	<i>DS7 Educate and Train Users</i>		X	X			
5	<i>DS13 Manage Operations</i>		X	X			
	<i>PO2 Define the Information Architecture</i>			X			
	<i>PO3 Determine Technological Direction</i>			X			
	<i>PO4 Define the IT Processes, Organisation and Relationships</i>			X			
	<i>PO6 Communicate Management Aims and Direction</i>			X			
	<i>PO7 Manage IT Human Resources</i>			X			
	<i>PO8 Manage Quality</i>			X			
	<i>AI5 Procure IT Resources</i>			X			
	<i>DS12 Manage the Physical Environment</i>			X			
	<i>ME3 Ensure Compliance with External Requirements</i>			X			

In line with the number of control objectives identified by previous studies, it was proposed that the ITGEF would be created using the first three tiers to give ten control objectives, as displayed in Table 3.2. Also, a list of this size is in line with the recommendation by Gerke and Ridley (2006).

Table 3.2

*Initial ITGEF based on COBIT 4/4.1*

<b>Most important Control Objectives</b>
<i>PO1 Define a Strategic IT Plan</i>
<i>DS5 Ensure Systems Security</i>
<i>AI6 Manage Changes</i>
<i>DS11 Manage Data</i>
<i>AI2 Acquire and Maintain Application Software</i>
<i>DS4 Ensure Continuous Service</i>
<i>DS10 Manage Problems</i>
<i>PO9 Assess Risks</i>
<i>ME1 Monitor and Evaluate IT Performance</i>
<i>ME4 Provide IT Governance</i>

Using the COBIT 4.1 to COBIT 5 mapping by ISACA (2012b), control objectives from the previous version of the framework are mapped to the new high-level IT processes of the latest edition of COBIT, as displayed in Table 3.3. As discussed, COBIT 5 clearly differentiates governance and management activities through the introduction of the new domain EDM. The new framework also distinguishes operations from management in some areas, such a security and risk. For example, the COBIT 4 control objective *DS5 Ensure Systems Security* has not been renamed to *DSS05 Manage Security Services* but another high-level IT process, *APO13 Manage Security*, has been introduced to cover the management aspect of security. Therefore, the comparison with previous studies will see the merging of a couple of IT processes to match one of the previous ones.

Table 3.3

*Mapping of initial conceptual model from COBIT 4/4.1 to COBIT 5*

<b>COBIT 4/4.1 Control Objectives</b>	<b>COBIT 5 High-Level IT Processes</b>
<i>PO1 Define a Strategic IT Plan</i>	<i>EDM02 Ensure Benefits Delivery APO02 Manage Strategy</i>
<i>DS5 Ensure Systems Security</i>	<i>APO13 Manage Security DSS05 Manage Security Services</i>
<i>AI6 Manage Changes</i>	<i>BAI06 Manage Changes</i>
<i>DS11 Manage Data</i>	<i>DSS01 Manage Operations</i>
<i>AI2 Acquire and Maintain Application Software</i>	<i>BAI03 Manage Solutions Identification and Build</i>
<i>DS4 Ensure Continuous Service</i>	<i>DSS04 Manage Continuity</i>
<i>DS10 Manage Problems</i>	<i>DSS03 Manage Problems</i>
<i>PO9 Assess Risks</i>	<i>EDM03 Ensure Risk Optimisation APO12 Manage Risk</i>
<i>ME1 Monitor and Evaluate IT Performance</i>	<i>MEA01 Monitor, Evaluate and Assess Performance and Conformance</i>
<i>ME4 Provide IT Governance</i>	<i>EDM01 Ensure Governance Framework Setting and Maintenance</i>

As a result, it is proposed that the conceptual ITGEF comprises all 13 high-level IT processes (equivalent to ten COBIT 4/4.1 control objectives) as these processes and sub-processes were perceived as most important in spite of the context of the study (international, national or state), as displayed in Figure 3.4. Conceptual IT governance evaluation framework.





### 3.4 EVALUATION CRITERIA

In order to evaluate the proposed model (ITGEF) the following criteria have been determined. These evaluation criteria are sufficient because they can be used to judge the effectiveness and quality of the proposed model and can help to highlight areas with any deficiency:

- The COBIT goals-cascade

The COBIT goals cascade mechanism is used to evaluate the alignment of the adapted ITGEF with the stakeholders' needs, enterprise goals, and IT-related goals for a particular context (PSOs). The analysis and linkage of these goals and the adapted ITGEF is undertaken in Chapter 6.

- Case study

The case study method is used because it is considered a comprehensive evaluation method and can provide sufficient information in a real-life environment (Yin, 2013). In addition, case studies can also provide valuable insights for problem solving, evaluation, and strategy (Cooper & Schindler, 2003). As the evaluation of IT governance is more applicable in a real environment, the case study research method is considered an appropriate evaluation criterion. Chapter 7 includes detailed analyses of case study research conducted within a public sector context.

- The Technology Acceptance Model (TAM)

The objective is to analyse the level of TAM factors of perceived usefulness (PU), perceived ease of use (PEU), and intent to adopt (I) to evaluate the effect of adapting best-practice frameworks and models in lieu of prescriptive deployment. This is discussed further in Chapter 8.

### 3.5 SUMMARY

To conclude, COBIT is a framework that aims to govern and manage IT and supports executives in defining and achieving business and related IT goals (ISACA, 2012a). The framework is considered the most important IT governance guideline to

ever be issued (Bodnar, 2006); however, there is still plenty of room for improvement within such a heavily used framework (Mingay, 2005). Further, according to Williams (2006), there is not a comprehensive, free-of-charge and complete framework to cover IT governance except for COBIT. Nevertheless, organisations adopting the rather sizeable framework often fail to appreciate that COBIT is a reference guide that is based on best practices and should not be applied “as is” because it is not developed to be prescriptive nor to offer a “fix-all” solution. Organisations still have to perform in-depth analysis of their requirements and make a balanced decision as to which set of processes would best fit the context within which they operate (Al Omari et al., 2012b; Bartens et al., 2015; Gerke & Ridley, 2009; Gomes & Ribeiro, 2009a).

Indeed, effective methods for adapting and adopting the COBIT framework should take into consideration the specific context requirements for each organisation (Neto et al., 2014). Consequently, several research efforts have attempted to arrive at an evaluation framework derived from COBIT for use within the IT governance field. Accordingly, a handful of ITGEFs have been successfully developed based on relevant control objectives across geographical or organisational contexts, suggesting that it could be possible to derive an ITGEF based on COBIT that is adequate for a specific organisational context.

Based on the previous studies (see Figure 3.1), it is apparent that organisations are indeed applying a selective mix of IT processes (also called control objectives in previous versions) in an effort to adapt the COBIT framework to best suit the needs of individual organisations or specific contexts. This has emphasised the need for further research to not only establish a systematic approach to adapt COBIT for IT governance evaluation, but also to validate and refine a conceptual model for an ITGEF in a specific organisational context. Therefore, a conceptual ITGEF has been developed based on the literature review and previous studies (see Figure 3.4), which consisted of 13 high-level IT processes. In addition, Chapter 6 aims to refine and examine the validity of the model to perform IT governance evaluation in PSOs.

# Chapter 4: Research Methodology

---

## 4.1 INTRODUCTION

This chapter discusses the development of the research questions in light of the review of literature and presents the philosophical foundation that will justify the methodological approach and research design for the thesis. This chapter aims to outline the overall research approach, instead of providing a detailed review of the methods or techniques involved in each of the two stages applied by the research, as these will be discussed in Chapters 5 to 8 respectively.

The remainder of the chapter is structured as follows. Section 4.2 presents the research questions; Section 4.3 provides an overview of the philosophical approach that underpinned the methodology chosen for this study within the philosophy of science; Section 4.4 discusses the research approach of the thesis; Section 4.5 highlights methodological limitations; while Section 4.6 provides a review and summary of the overall methodology.

## 4.2 DEVELOPMENT OF THE RESEARCH QUESTIONS

A number of clear gaps are apparent in previous research (see Section 2.3) with respect to exploring IT governance evaluation challenges, in particular, suitable governance frameworks, or rather the lack thereof, in public sector organisations (PSOs). There is also a gap relating to investigating the methodological customisation of the COBIT framework to fit specific needs of individual organisations or sectors. Further, the lack of studies that look at the factors that influence the adoption of IT governance frameworks was highlighted. Hence, this research seeks to address the gaps identified in the field of IT governance by answering the research question: **“How can best-practice frameworks be adapted and adopted to evaluate IT governance in public sector organisations?”**

The goal of this thesis is to be accomplished through answering the main research question that is aligned with the defined research problem (see Section 1.2). Four subordinate research questions (RQ1 to RQ4) are used to support the contemplation of the primary research question and correspond to the undertaking of research activities 1 to 4, as discussed later in this chapter.

The secondary research questions are as follow:

*RQ1.* Are existing best-practice frameworks perceived as challenging when evaluating IT governance within the public sector?

This research question was addressed by conducting the first research activity, which aimed to explore the challenges organisations face when performing IT governance evaluations, specifically in a government setting.

*RQ2.* How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?

This question builds on the previous by putting forward a proposition to address one of the main challenges in conducting IT governance evaluation identified in RQ1. Although there could be several ways to do so, as an intervention in this research, IT governance frameworks, in particular COBIT, were considered because of the highlighted need in the literature to concentrate on contextualisation (or adapting) as an important research area in order to optimally use the scarce resources in PSOs effectively and efficiently.

*RQ3.* How can public sector organisations evaluate IT governance using adapted best-practice frameworks?

This question is answered by research activity 3, in which a method with guidelines in the form of an evaluation framework for IT governance in PSOs was tested. The research activity evaluated IT governance in Queensland PSOs in terms of the capability levels of their IT processes, which were then compared with PSOs in other Australian and international jurisdictions.

*RQ4.* What factors influence the adoption of adapted IT governance evaluation frameworks (ITGEFs) within a public sector context?

Following the creation and testing of an adapted version of COBIT for evaluating IT governance in PSOs in RQ1 to RQ3, factors that influence the acceptance and adoption of the adapted framework are explored in RQ4 through conducting research activity 4.

### 4.3 PHILOSOPHICAL FOUNDATION

Establishing the philosophical basis is important for any research effort as it defines the “assumptions about human knowledge and assumptions about realities encountered in our human world” (Crotty, 2003, p. 17). Further, the philosophical basis outlines the “basic belief system or worldview that guides the investigator” (Guba & Lincoln, 1994, p. 105) and provides “an overall conceptual framework within which a researcher may work” (Sobh & Perry, 2006, p. 1194). This is also referred to as research paradigm. Weaver and Olson (2006) define paradigms as “patterns of beliefs and practices that regulate inquiry within a discipline by providing lenses, frames and processes through which investigation is accomplished” (p. 460). In simple terms, a research paradigm stands for the researcher’s beliefs about what is possible to know and the nature of the knowledge being studied. Paradigms are widely used to describe the framework within which research is conducted and influence what researchers try to discover and how they attempt to discover it (Burrell & Morgan, 1979).

A research paradigm is chosen based on philosophical assumptions about the nature of reality and the phenomenon being studied, which in turn guides the selection of tools, instruments, participants, and methods used for any given study (Denzin & Lincoln, 2000). Researchers’ philosophical assumptions are built around the major questions of ontology, epistemology, and methodology<sup>4</sup> to assist in defining a research paradigm (Pickard, 2012).

In the social science discipline, four research paradigms have been identified by Healy and Perry (2000), namely, Positivism, Realism (Post-positivism), Constructivism (Interpretivism), and Critical Theory. As illustrated in Table 4.1, each of these paradigms takes a distinctive approach with regards to the ontology, epistemology, and methodology used.

---

<sup>4</sup> Ontology is defined as the “reality that a researcher is seeking to investigate”; epistemology is characterised as “the relationship between that reality and the researcher”, while methodology is described as the “technique used by the researcher to investigate that reality” (Perry et al., 1997, p. 547).

Table 4.1

*Four categories of social science research paradigms (Healy & Perry, 2000, p. 119)*

Paradigm	Positivism	Realism (post-positivism)	Constructivism (interpretivism)	Critical Theory
<b>Ontology</b>	<b>Naïve Realism:</b> Reality is the empirical world with a focus on identifying cause and effect relationships.	<b>Critical Realism:</b> Reality is imperfectly apprehensible, hence a focus on exploring tendencies.	<b>Realitivism:</b> Reality exists independent of our cognition, where knowledge is relative to a particular context and time.	<b>Historical Realism:</b> Reality is a socially constructed construct and focuses on relationships.
<b>Epistemology</b>	<b>Objective:</b> The correspondence between statements and reality through inductive verification or via deductive falsification.	<b>Objectivist:</b> It is only possible to approximate reality, which is dependent on practical consequences.	<b>Subjectivist:</b> There is no predetermined methodology or criteria to justify the authenticity of our knowledge.	<b>Subjective:</b> No set approach due to the range of discourses.
<b>Common Methodology</b>	<b>Quantitative:</b> Experiments Surveys	<b>Mixed Method:</b> Case Study Surveys Structural Equation Modelling	<b>Qualitative:</b> Hermeneutical/ Dialectical Grounded Theory Case Study	<b>Qualitative:</b> Dialogic/ Dialectical

In general, positivism is the most frequently used research paradigm in traditional sciences as it presumes that science quantitatively measures independent facts about a single apprehensible reality, which means that because data are being observed it is value-free and does not change (Guba & Lincoln, 1994; Tsoukas, 1989). However, a positivism paradigm is inappropriate when approaching a social science phenomenon such as evaluating IT governance processes, which involve humans and their real-life experiences, because it treats respondents as independent, non-reflective objects which leads to “ignor[ing] their ability to reflect on problem situations, and act on these” (Robson, 1993, p. 60).

The critical theory paradigm places emphasis on social realities and incorporates historically situated structures that aim to critique and transform social, cultural, economic, political, ethnic, and gender values through long-term ethnographic and historical studies (Healy & Perry, 2000). Under this paradigm, social reality is seen as the product of people and takes on the view that people are

able to change their social situation within various organisational constraints (Myers & Klein, 2011). In other words, it seeks human emancipation through explaining and transforming the circumstances that restrain them (Gephart, 1999). In addition, as stated by Cecez-Kecmanovic (2007), critical theory brings to light the contradictions and conflicts of contemporary society attempting to socially critique issues. This paradigm is also not appropriate for much IT governance research as it considers knowledge to be grounded in social and historical routines and is thus value dependent and not value-free (Guba & Lincoln, 1994).

Like critical theory, the constructivism paradigm assumes that reality consists of “multiple realities” that people perceive and enquires about the values and ideologies that underpin a finding (Guba & Lincoln, 1994, p. 112). In addition, researching these constructed realities is dependent on interactions between an interviewer, as a “passionate participant”, and respondents. Constructivism places high emphasis on the meaning of actions and language to explain the phenomenon under investigation (Myers & Klein, 2011). Traditionally, constructivists, also referred to as interpretivists, endeavour to explore and understand the world from the research participants’ perspective (Gephart, 1999). This research paradigm may be suitable for some social science research but it is almost inappropriate for IT governance research because the approach excludes concerns about the important and clearly real economic and technological aspects (Hunt, 1991).

Finally, realism (also known as post-positivism) believes that a real world exists independent of the mind, paradigms, and our adoption of theories or conceptual frameworks and, although it is only imperfectly apprehensible, it is “out there to be discovered objectively and value free” (Neuman, 2005, p. 64). The realism world “consists of abstract things that are born of people’s minds but exist independently of any one person” (Healy & Perry, 2000, p. 120). This paradigm is suitable for this research as the participants’ perceptions are being studied not for their own sake but rather to provide a window to a reality beyond those perceptions. The realism paradigm is deemed suitable because this research aims at attaining a better “understanding of the common reality of an economic system in which many people operate inter-dependently” (Sobh & Perry, 2006, pp. 1199-1200), thus supporting this research’s position that the IT governance framework’s role in the evaluation of IT governance systems encompasses a real and unique set of activities



and relationships that exist independently of the consciousness and experience of all researchers. Moreover, as this paradigm's objective is to develop a deeper level of explanation and understanding of a particular phenomenon (McEvoy & Richards, 2006), it supports this research's aim of developing a greater level of understanding of the generative mechanisms that underpin how IT governance frameworks are contextualised and accepted. The realism paradigm assists in unveiling causal mechanisms and technological and social contexts by providing a direction for combining different methods, theories, and tools that achieve the pursued outcomes (S. Fox, 2009). Therefore, it fits well with the mixed-methods approach chosen to answer the research questions.

This research utilises the realism research paradigm, which in turn leads to adopting the position of critical realism ontology, an objectivist epistemology, and a mixed-methods approach.

#### **4.4 RESEARCH APPROACH**

Embarking on a research project requires the investigator to have a clear picture of the research process and associated activities. The research methodology and approach must be carefully planned and formulated to provide the information required to successfully answer the research questions and solve the research problem (Mligo, 2013). To explore whether the COBIT framework can be adapted and adopted to conduct evaluation of IT governance in the Australian public sector, the research employed a two-stage mixed-methods approach that evolved over time.

This approach is illustrated in

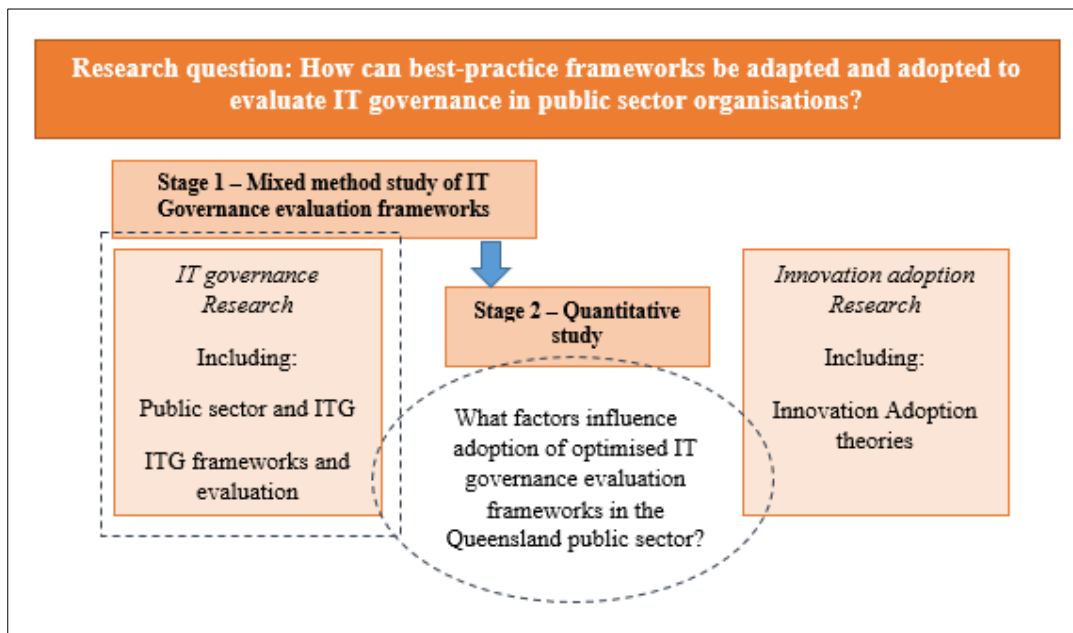
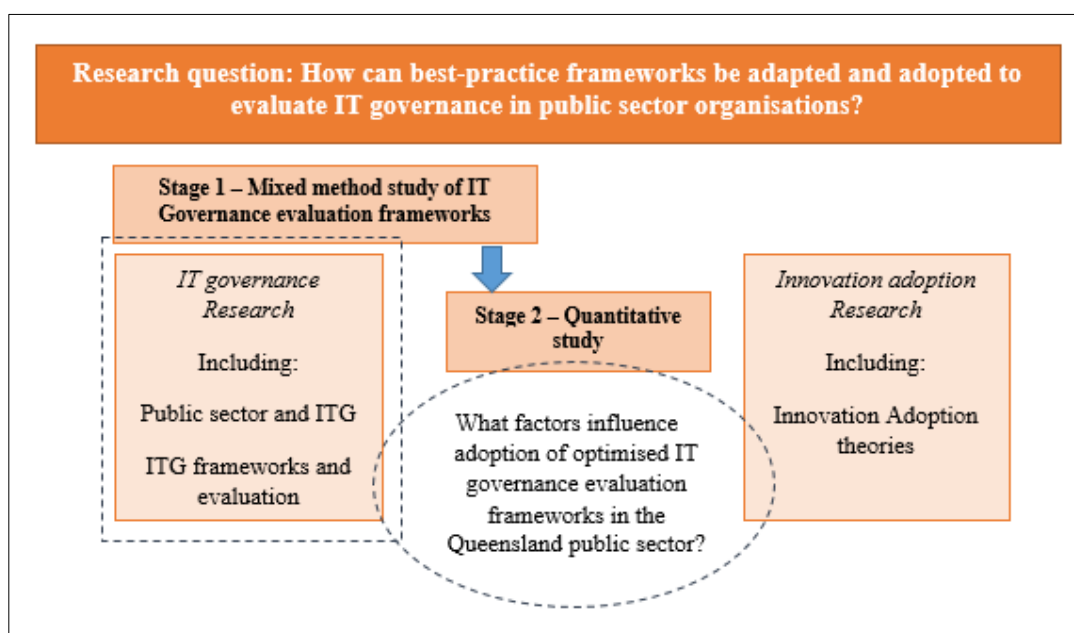


Figure 4.1. Initially, the thesis was designed as a single stage to address the main focus of the research. However, since the findings from the first stage fall short in exploring the user's role in IT governance evaluation, in particular innovation adoption factors, the thesis employed a second stage. Introducing a second stage to the thesis enabled broadening of the research's theoretical perspectives and incorporated innovation adoption theories into the research problem. The overall research questions for the two stages are related but evolved as the research program unfolded.



*Figure 4.1. Conceptual framework.*

Generally, two research approaches are often employed by social science research studies including information systems (IS), namely, quantitative and qualitative. Typically, researchers choose one or both of these two approaches (also known as mixed methods) depending on the problem definition (Punch, 2013). Although research studies can be generally classified as having a more qualitative or quantitative focus in nature, the distinction between the two methods has become less clear and can usually be more accurately described as representing different ends on a continuum (Creswell, 2013). This study adopted a mixed-methods approach because it is a suitable fit within the realism paradigm and provides the depth dictated by the nature of the research problem. This approach assisted in attaining a better understanding of the research problem and leveraged the most appropriate tools for the research questions. In addition, using a mixed-methods approach provided an opportunity to minimise flaws associated with using qualitative methods (e.g., lack of generalisability) and quantitative methods (e.g., lack of context understanding) individually, as embracing a blend of qualitative and quantitative approaches will draw from the strengths and mitigate the weaknesses of both (Johnson & Onwuegbuzie, 2004). Similarly, Teddlie and Tashakkori (2009) suggest that linkages between qualitative and quantitative methods will reduce bias in the results and mutually strengthen the findings from both approaches.

The mixed-methods approach was essential in understanding the evaluation of IT governance processes, customised IT governance frameworks, and the factors impacting adoption of information systems related innovation in the public sector environment. Published mixed-methods studies (De Haes, 2007; Gerke & Ridley, 2009; Hiererra, 2012; Lubbad, 2014) suggest that social researchers use mixed-methods approaches for one or more of the following purposes: providing a more complete picture; improving accuracy; compensating for strengths and weaknesses; and, more importantly, developing robust analysis (Denscombe, 2014). The two-stage research design and associated activities used are demonstrated in Table 4.2.

Table 4.2

*Research process and relationships of the involved research activities*

Research Stage	Stage 1			Stage 2
Research activity	<i>Research activity 1</i>	<i>Research activity 2</i>	<i>Research activity 3</i>	<i>Research activity 4</i>
Research question	1. Are existing best-practice frameworks perceived as challenging when evaluating IT governance within the public sector?	2. How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?	3. How can public sector organisations evaluate IT governance using adapted best-practice frameworks?	4. What factors influence the adoption of adapted IT governance evaluation frameworks within a public sector context?
Result	Explore the challenges in evaluating IT governance in the public sector.	Adapt best-practice frameworks to conduct IT governance evaluations within a public sector context.	Evaluate IT governance across the public sector using an adapted framework.	Explore factors that influence IT governance evaluation frameworks adoption in the public sector
Corresponding chapter	Chapter 4	Chapter 5	Chapter 6	Chapter 7
Approach	Qualitative	Quantitative	Qualitative	Quantitative
Method	Delphi research	Survey research	Case study research	Survey research
Data collection technique	Questionnaire			
Data analysis approach	Exploratory data analysis (EDA)			Structural equation modelling (SEM)

In the first stage, three research activities were undertaken. Research activity 1 consisted of a Delphi research that aimed at exploring the challenges associated with IT governance evaluation in the public sector. A three-round questionnaire was developed based on literature and previous research to obtain respondents' perceptions of a predefined list of challenges. This research activity identified the lack of suitable frameworks as a barrier to performing evaluation of IT governance in PSOs (see Chapter 3). The second research activity utilised a quantitative survey that aimed at developing an evaluation framework for IT governance in the public sector (see Chapter 4). An online questionnaire was developed to gather respondents'

perceptions of the importance of each of the 37 high-level IT processes from the COBIT framework.

Given the findings from the previous research activities, the third research activity was designed to evaluate IT governance processes using the adapted framework across the public sector by applying case study research (see Chapter 5). Case studies were selected for a number of reasons. (i) According to Yin (2013), case study research emphasises studies in natural settings and allows for greater understanding of the context in which a phenomenon exists through the collection of rich data from which to draw conclusions. IT governance is a phenomenon that occurs within the context of the organisation and is the unit of analysis. (ii) Case studies not only allow the exploration of the individual participant's viewpoint but also various groupings of participants (Tellis, 1997). The use of multiple sources of data from the perspective of various stakeholders was required to ensure an accurate evaluation of IT governance processes. (iii) Case study research is suitable for dynamic organisations investigating emergent and rapidly evolving phenomenon (Noor, 2008). The examined PSOs are considered dynamic organisations, with IT governance being an emergent and rapidly evolving phenomenon. (iv) Case studies can investigate and describe the processes and underlying meaning of current events through collecting and integrating quantitative survey data, which facilitates reaching a holistic understanding of the phenomenon being studied (Baxter & Jack, 2008).

The second stage takes this research further by providing an alternative theoretical understanding of IT governance. More specifically, two innovation adoption theories within the IS discipline, namely, the Technology Acceptance Model (TAM) and the Technology–Organisation–Environment (TOE) framework, were employed to explore the users' role in evaluating IT governance. The fourth research activity utilised a quantitative survey to explore potential factors that might influence the adoption of IT governance frameworks in PSOs (see Chapter 7).

Based on applied research methods, this research could have utilised a number of data collection techniques, including interviews, survey questionnaires, and documents review (Collis et al., 2003). Although the choice of using one or a combination of these techniques depends on the goal of the research activity, initial discussions with potential participants from the public sector revealed that they opposed participating in interviews and would prefer to respond to anonymous

questionnaires instead. As a result, the four research activities utilised questionnaires as a main data collection technique. Consequently, two data analysis techniques were taken on board to answer the research questions, namely, exploratory data analysis (EDA) and structural equation modelling (SEM).

Exploratory data analysis is the process of using statistical tools to analyse data sets in order to understand and summarise their main characteristics (Fowler, 2013). Primarily, EDA maximises the insights from the structure of a data set to see what can be discovered beyond formal modelling or hypothesis testing (Hoaglin, Mosteller, & Tukey, 2000). In this research, it was applied to research activities 1, 2, and 3 to analyse data that were obtained from the questionnaires. This mainly involved measures related to relative location, such as rankings, and those related to the centre, such as means. Structural equation modelling is better known as a data analysis tool for testing and estimating causal relationships in quantitative research studies (Pearl, 2003). This research applied SEM because of its capability to develop and test hypotheses with falsifiable implications (Hair, Black, & Babin, 2009) in order to test the effect of the TAM and TOE factors on the adoption of IT governance frameworks in research activity 4.

Full details of the methods, including the sample, pilot studies, instruments, and analysis used within research activities 1, 2, 3, and 4 are provided in Chapters 4, 5, 6, and 7 respectively.

#### **4.5 RESEARCH VALIDITY**

In any research, two of the most important aspects of developing an appropriate methodology are validity and reliability tests (Yin, 2013). Likewise, the design of this research, as described in research activities 1 to 4, took into account validity and reliability. Validity was considered so that the best available approximation to the truth or falsity of the propositions and conclusions is achieved (Winter, 2000). Reliability is concerned with repeatability of results and was taken into account to ensure that the data collection instruments measured the same ways each time and that they were used under the same conditions with the same subjects (Veal & Ticehurst, 2005). According to Yin (2013), the widely applied aspects to meet research quality are construct validity, internal validity, external validity, and

reliability. Accordingly, adhering to these aspects ensured the quality of this research.

Construct validity aims at establishing the correct operational measures for the studied concepts (Guba & Lincoln, 1994). This is how the concepts in the study are operationalised for a credible conceptual interpretation of the data drawn from the field. According to Yin (2013), the use of multiple sources of evidence and a review of the case study report by key participants are some of the tactics available to increase construct validity. Multiple sources of evidence were applied through questionnaires and documents. The use of such multiple sources of evidence minimised the bias and allowed for the development of convergent lines of enquiry that also led to triangulation (Silverman, 2006). A review of the case study report by each respondent at the participating organisation was yet another tactic applied. This was achieved by sending a draft case report back to each studied PSO for review, which in turn contributed to quality results.

Convergent and discriminant validity were also applied as part of statistical construct validity, which contributed to the use of correct operational measures in the fourth research activity (Hair et al., 2009). This was due to the nature of that research activity to explore factors that influence the adoption of ITGEFs. Discriminant validity showed that the measures that should not be related to each other were not, whereas convergent validity showed that the measures that were theoretically supposed to be highly interrelated were, in fact, found to be highly interrelated (Hair et al., 2009).

*Internal validity* refers to the internal design of research and establishes the rigour with which this research was conducted (Yin, 2013). Given the exploratory nature of this research, strategies were designed for collecting and analysing the appropriate data that successfully led to the conclusion. Throughout the research activities, as indicated in the respective chapters, all evidence from the capability level of IT processes relevant to factors that influence adoption of ITGEFs were investigated and used to infer the conclusions. Moreover, well-established IT governance frameworks (e.g., COBIT) and theoretical categories and subcategories from the literature as indicated in each research activity were used.

Several threats to the internal validity exist, including history, maturation, testing, instrumentation, selection, and experimental mortality (Veal & Ticehurst,

2005). In this case, history, maturation, and mortality were not a threat as the duration of each research activity was on average less than six months. In addition, to address the issue of participants dropping out due to lack of interest and to eliminate the potential of selection issues, the data collection instruments in research activities 2 and 4 were sent out to the entire user group rather than a selected sample, whereas in research activities 1 and 3 the data collection instruments were sent only to a selected sample as a more targeted respondent group was required. Additionally, the use of a single researcher in all research activities prevented instrumentation threats, which can occur due to inconsistency or unreliability in the measuring instruments or observation procedures.

*External validity* is concerned with the ability to generalise the research (Creswell, 2013). It is the extent to which the internally valid results of the research can be held to be true across other domains to which the findings can be generalised (Yin, 2013). In this research, validity was determined in two ways. One was based on the case study research in research activity 3, which provided analytical generalisations, suggesting that the results can be replicated (Yin, 2013). This replication was also strengthened by the use of well-defined case studies of 11 PSOs, which meant that the majority of Queensland PSOs were represented. This also applies to a considerable number of respondents, comprising mainly audit and IT professionals at various management levels. The other was based on survey research in research activities 1, 2 and 4, which provided the possibility for statistical generalisation in which a particular set of results are generalised to a population (Trochim & Donnelly, 2007), in this case, the top ten challenges in evaluating IT governance (the most important IT process) and factors that influence adoption of ITGEFs in Queensland PSOs.

*Reliability*, as discussed earlier, is concerned with the consistency of the measurement, which aims at minimising errors or bias in the research through the documentation of research procedures and estimation of statistical reliability (Trochim & Donnelly, 2007). In research activity 3, applying case study research, although no case study protocol was necessary, a set of documented procedures that were replicated for each case were used (Yin, 2013). For example, an overview of the case studies, data collection instruments, required evidence list, and a template for the report were prepared in advance, as well as a case study database that



collected and linked case study notes and documents. In addition, data collection instruments were customised and applied in the manner that allowed the same format so that each respondent would understand them in the same way (Silverman, 2006). In research activities 1, 2 and 4, which applied Delphi and survey research, apart from verifying the questionnaire correctness in the pilot study, its reliability was estimated in two stages: the pilot and the actual study (Neuman, 2005). In both cases, internal consistency was estimated and found to be acceptable. For example, this was verified by using the average variance extracted (AVE), Cronbach's alpha, and composite reliability measures, as discussed in each relevant chapter.

#### **4.6 METHODOLOGICAL LIMITATIONS**

The sensitive nature of the information needed for the research (using frameworks to evaluate IT governance within PSOs) makes accessibility to necessary data difficult. Apart from the fact that IT, audit, and business professionals consider the IT governance frameworks they use as critical tools to evaluate IT governance processes, some of the targeted participants also believe divulging such critical information may put them at a disadvantage relative to their organisations or cause embarrassment within the wider Queensland government arena. Nonetheless, efforts were made to secure access through professional colleagues of the researcher who are in vantage positions at some of these organisations. As a result, this research utilised anonymous questionnaires as the main source for data, instead of inviting participants to partake in any face-to-face interviews. Furthermore, in order to give the targeted participants and organisations necessary assurance regarding the ethics, confidentiality, and anonymity of participants involved, as well as judicious use and control of the data given out, the approval of the QUT Ethics Committee was sought, obtained, and communicated at all stages of the research.

Through examining related studies from prior literature, it seems possible that this research could have also benefited from other methods, such as action, ethnography, and experiment research. For example, a grounded theory approach would have proved invaluable in building relevant theory if the researcher had found the existing theories inadequate for investigating the use of IT governance frameworks by PSOs in evaluating IT governance processes. At the same time, ethnography and action research could have also provided the research with the

opportunity for direct observation and ecological validity. However, this was deemed not feasible considering the limited resources and time available to the researcher. Equally, experimental investigation could have been difficult as it involves “empirical investigation under controlled conditions designed to examine the properties of, and relationship between, specific factors” (Denscombe, 2014, p. 66). Thus, due to the nature of the research subject, both experiment and action research were not considered practical alternatives. A longitudinal research approach involves gathering data repeatedly from the same or similar sources at regular intervals over a fairly long period (Saunders et al., 2007). Although data collected using this approach provides a good basis for generalisation of research findings, it is not considered appropriate for this research due to the dynamic nature of IT governance frameworks and the obvious limitations imposed by limited resources.

#### **4.7 SUMMARY**

This chapter discussed the development of the research questions and established the methodological foundation for the research program. It provided a detailed explanation of the philosophical underpinnings of the research and justification for the key decisions made in the research design, including the use of a mixed-methods approach and development of two stages of research. Refer to the next four chapters for details of each specific method, as provided in Table 4.2.

## Chapter 5: Exploring IT Governance Evaluation Challenges

---

This chapter further explores the challenges organisations face when conducting IT governance evaluations, specifically in a government setting. The input of this research step consists of an initial list of issues and challenges that were derived from the literature (see Chapter 2). For this research activity within the first stage, a Delphi research methodology was leveraged to build up a consensus among a group of 24 experts regarding a validated list of challenges when evaluating IT governance in the Queensland public sector. The expert group was also asked to rate the perceived impact (PIM) and the perceived effort to address (PEA), and to provide a ranking of challenges that each organisation in the public sector might encounter. This research activity will explore the need for a systematic approach to contextualise or adapt best-practice frameworks, such as COBIT, for IT governance evaluation to prevent the random selection of evaluation criteria from the framework in a “hit and miss” style.

### 5.1 DELPHI RESEARCH

The Delphi method provides a flexible and simple mechanism to manage the contribution and communication among experts from dispersed geographical locations in order to resolve a complex problem (Landeta, 2006) without the need for direct interaction, due to lack of funds or time (Linstone & Turoff, 1975b). Dalkey (1969) indicates that the Delphi method aims to achieve several objectives, such as the exploration of underlying assumptions or information leading to different judgements, the correlation of informed judgements on a certain topic, the development of a range of possible program alternatives or solutions, and the education of the panel as to the diverse and interrelated aspects of the topic at hand.

The Delphi method is particularly suited as a research methodology for this stage of the thesis as this technique lends itself especially well to exploratory theory building on complex, interdisciplinary issues, often involving a number of new or future trends (Meredith, Raturi, Amoako-Gyampah, & Kaplan, 1989). This method was applied to obtain perceptions to help identify evaluation challenges through

clarifying positions and delineating differences among a group of experts (Dalkey & Helmer, 1963; Delbecq, Van de Ven, & Gustafson, 1975). The Delphi method seems suitable to avoid in-person confrontation of participants, eliminating the pressure to conform to group opinion and reduce dominance of the group by certain personalities. In addition, this method ensures anonymity, which was a request by most participants. The opportunity to draw on the current knowledge of experts obtained by the Delphi method could be deemed more useful than a literature search, especially for exchanging scientific or technical information. The Queensland public sector was chosen as the research participant because its organisational structure and public sector objectives are not substantially different from other state government within Australia. Further, it is likely that its public sector objects will substantially correspond to other public sector jurisdictions globally, other than different cultural aspects that may have an influence.

Taylor-Powell (2002) stresses the importance of selecting the expert panel because “[c]areful selection of participants is important since the quality and accuracy of responses to a Delphi are only as good as the expert quality of the participants who are involved in the process” (p. 1). It is also anticipated that 10 to 15 participants may be adequate for a focused Delphi where participants do not vary a great deal (Linstone & Turoff, 1975b). Further, three rounds have proved sufficient to attain reasonable convergence, as excessive repetition is generally unacceptable to participants (Linstone & Turoff, 1975a, 1975b). Based on these considerations, an expert panel was composed of 28 audit and IT professionals who are all knowledgeable about organisations operating in the Queensland public sector. From the initial group, 16 experts were involved in the full Delphi research effort (total 42.8% drop off rate). The distribution of the 16 profiles involved in the research is shown in Table 5.1.

Table 5.1

*Respondents' demographic details*

<b>Background</b>	<b>Number of Respondents</b>		
	<i>Senior</i>	<i>Junior</i>	<i>Total</i>
<i>Audit</i>	6	5	11
<i>IT</i>	4	1	5
<i>Total</i>	10	6	16

Given the objective of identifying the major challenges in evaluating IT governance, panel members were required to complete an email survey consisting of a three-round questionnaire instrument. These survey rounds were organised in the period September 2011–April 2012. Similar to the Delphi research work of De Haes and Van Grembergen (2008); and Keil et al. (2002), the Delphi research started with an initial list of IT governance evaluation challenges. Potential participants were emailed a personal invitation letter (see Appendix A item 1) and were also provided with the participant's information sheet (see Appendix A item 2).

In the first Delphi round, the panel members were asked to only validate the predefined list of evaluation challenges for its suitability to the public sector, giving them the opportunity to add, change, and delete some of the challenges (cf. the questionnaire of round 1 in Appendix A item 3). Further, space was provided at the end of the questionnaire to capture any additional comments or feedback. The focus of this first round was to validate the predefined list of practices specifically for the Queensland public sector, and no other input or feedback was requested at this stage. In the second round, the panel members were asked to rate on a five-point scale, each of the revised challenges, the PIM (0 = no impact, 5 = high impact) and the PEA (0 = no effort, 5 = high effort). Then they were asked to take the previous attributes of impact, effort to address, and personal experience into account in order to provide their perception of the top-ten IT governance evaluation challenges (the most important challenge score 1, the second most important score 2, ... the tenth most important score 10) (cf. the questionnaire of round 2 in Appendix A item 4). In the third and final round, the panellists were asked to re-evaluate their own scores out of round two, taking the group averages into consideration. The goal of this round was primarily to come to a greater consensus in the group (cf. the questionnaire of round

3 in Appendix A item 5, as an example from one respondent). At the end of the three rounds, the degree of consensus between the panel members was measured leveraging Kendall's W coefficient scale, specifically for the question on the top-ten IT governance evaluation challenges. The level of consensus reached in this research was 0.49, which is considered moderate and provides a fair degree of confidence in the results (Schmidt, 1997). Based on this result and the fact that the top-ten challenges only slightly differed between the rounds, it was decided that no more iterations are required.

In this type of research, the issue of 'inadequate preoperational explication of constructs threat' presented itself as an obstacle, which in simple terms indicates that different people often have different understandings of the same concept (Cook & Campbell, 1979). A good example is the use of the following terms: IT audit, IS audit, IT governance evaluation, and audit. Although they are clearly distinguished in the literature, many organisations and practitioners use these terms interchangeably or to refer to one of the other terms. To solve this, a short and clear definition was provided, based on the literature, in the questionnaire. The questionnaire was also pilot-tested on five experts (practitioners and academics) for ambiguities and vagueness prior to administering to panel members.

## **5.2 RESULTS AND INTERPRETATIONS**

The Delphi research was conducted in a three-round survey, as discussed in the previous section. The first survey round focused on validating the predefined list of IT governance evaluation challenges specifically for the Queensland public sector. The second and third survey rounds captured the perceptions of the respondents regarding impact and required effort of the evaluation challenges and regarding a set of these challenges that could compose a top-ten list. The results of these surveys rounds are discussed below.

### **5.2.1 Delphi Round 1 – Validating the initial list of IT governance evaluation challenges**

Based on an initial list of evaluation challenges identified from the literature review (see Table 2.2), respondents in this round were asked to validate this general list of challenges to make it more oriented towards the Queensland public sector. The qualitative feedback included suggestions for new challenges and amendments for

existing challenges to better suit the public sector. All received data was structured and analysed, resulting in an extended list of challenges, as illustrated in Table 5.2.

Table 5.2

*Validated list of IT governance evaluation challenges*

<b>Category</b>	<b>Index</b>	<b>IT Governance Evaluation Challenge</b>
Internal	N1	Insufficient skills and competencies to undertake effective IT governance evaluations
	N2	Inadequate evaluation of the effectiveness of IT governance controls with the purpose of providing a value-added service to the organisation
	N3	Lack of developed methodologies and tools to keep pace with changes occurring in the audit and technology field
	N4	Lack of or inadequate understanding of the business context to determine what aspects of evaluation best fit the relevant organisation
	N5	Poor training arrangements for public sector auditors
	N6	Failure of an audit team to appropriately apply required substantive evaluation procedures
	N7	Poor scope management due to cross-agency service models resulting in imbalanced or incomplete perspective
	N8	Subsequent lack of objectivity in conducting evaluations due to familiarity with staff or fear of exposure of management weaknesses
	N9	Lack of a specific legislative or mandatory framework to ensure a consistent evaluation approach
	N10	Inadequate appreciation of risk management in the application of controls or in considering IT governance control weakness
External	E1	Inconsistent execution of evaluation methodology across public sector organisations
	E2	Limited knowledge within the audit team of emerging risk exposures related specifically to the organisation
	E3	Evaluated public sector organisation lack of necessary skills or displaying reticence to cooperate
	E4	Pressure to prematurely sign off on evaluation reports while not following specific legislative requirements
	E5	Weak auditee and auditor relationship in the public sector
	E6	Expectation gap between public sector perceptions of IT governance evaluation and actual IT governance evaluation practices
	E7	Insufficient evidence of IT governance implementation (methodology, practices and processes)
	E8	IT governance evaluation could be subjective or biased towards “more positive” findings
	E9	Discovery may be slow or non-existent if information is masked, inconsistent, unusable, or made unavailable by the organisation
	E10	Repetition of evaluation activity in place of identification of systemic control failures
Organisational	O1	Difficulty in recruiting and retaining experienced IT governance auditors in the public sector
	O2	Tendency to focus on mere compliance with legislation rather than quality
	O3	Lack of executive support for, resource allocation to, and understanding of extensive IT governance evaluation programs
	O4	Reduced influence of audit committees and ill-established internal audit units
	O5	Loss of continuity (evaluation cycle) due to mandatory audit rotation
	O6	Perceived low value of IT governance evaluations in comparison with other evaluations
	O7	Lack of executive management IT governance ownership and accountability
	O8	Lack of communication between business units
	O9	Public administration tendency to deny or conceal systemic IT governance problems, preventing identification and remediation
	O10	Organisational changes impacting roles, responsibilities, and stability of the IT governance model, both internally and externally driven



Specific internal challenges that were added are “poor scope management due to cross-agency service models resulting in imbalanced or incomplete perspective”, “subsequent lack of objectivity in the conduct of evaluation due to familiarity with internal staff or fear of exposure of management weaknesses”, “lack of a specific legislative or mandatory framework to ensure a consistent evaluation approach”, and “inadequate appreciation of risk management in the application of controls or in considering IT governance control weakness”. External challenges that were added are “insufficient evidence of IT governance implementation (methodology, practices and processes)”, “IT governance assessment could be subjective or biased towards ‘more positive’ findings”, “discovery may be slow or non-existent if information is masked, inconsistent, unusable, or made unavailable by the organisation” and “repetition of evaluation activity in place of identification of systemic control failures”. Finally, some organisational challenges were added, more specifically “perceived low value of IT governance evaluation in comparison with other IT evaluations”, “lack of executive management IT governance ownership and accountability”, “lack of communication between business units”, “public administration tendency to deny or conceal systemic IT governance problems, preventing identification and remediation”, and “organisational changes impacting roles, responsibilities, and stability of the IT governance model, both internally and externally driven”. Based on this round, a validated list of challenges was used as basis to start up rounds two and three.

### **5.2.2 Delphi rounds two and three – evaluating IT governance evaluation challenges**

The aim of Delphi survey rounds two and three was to capture input from the panellists regarding PIM and PEA, and their priority list of IT governance evaluation challenges. The overall results from these research steps are shown in Table 5.3 and specific visual views on this dataset are provided in Figure 5.1, Figure 5.2, Figure 5.3, and Figure 5.4. The results of each of the challenges are discussed in the paragraphs following, in the context of one or more of the abovementioned figures, depending on the relevance in the context of that specific table.

Table 5.3

## Overall IT governance evaluation challenges results

IT governance evaluation challenges		Perceived impact (PIM)				Perceived effort to address (PEA)			
		IT	Audit	Average per challenge	Average per domain (N - E - O)*	IT	Audit	Average per challenge	Average per domain (N - E - O)*
N1	Insufficient skills and competencies to undertake effective ITG evaluations.	4.2	4.2	4.2	3.6	3.3	3.4	3.3	3.0
N2	Inadequate evaluation of the effectiveness of ITG controls with the purpose of providing a "value-added" service to the organisation.	3.8	4.0	3.9		3.0	3.4	3.2	
N3	Lack of developed methodologies and tools to keep pace with changes occurring in the auditing and technology field.	3.9	3.8	3.9		3.5	3.6	3.5	
N4	Lack of or Inadequate understanding of the business context to determine what aspects of evaluation best fit the relevant organisation.	3.5	3.8	3.7		2.8	2.6	2.7	
N5	Poor training arrangements for public sector auditors.	3.0	3.2	3.1		2.6	2.8	2.7	
N6	Failure of an audit team to appropriately apply required substantive evaluation procedures.	3.9	3.4	3.7		2.5	2.6	2.5	
N7	Poor scope management due to cross-agency service models resulting in imbalanced or incomplete perspective.	3.2	3.6	3.4		3.0	3.2	3.1	
N8	Subsequent lack of objectivity in conducting evaluations due to familiarity with staff or fear of exposure of management weaknesses.	3.3	3.4	3.3		2.5	2.6	2.5	
N9	Lack of specific legislative or mandatory framework to ensure a consistent evaluation approach.	3.2	2.8	3.0		2.9	3.2	3.1	
N10	Inadequate appreciation of risk management in the application of controls or in considering ITG control weakness.	3.6	4.4	4.0		3.1	4.0	3.5	
E1	Inconsistent execution of evaluation methodology across public sector organisations.	3.3	2.8	3.0	3.4	2.9	3.2	3.1	3.2
E2	Limited knowledge within the audit team of emerging risk exposures related specifically to the organisation.	3.7	3.6	3.7		3.3	3.2	3.2	
E3	Evaluated public sector organisation lack of necessary skills or displaying reticence to co-operate.	3.8	3.6	3.7		3.4	3.6	3.5	
E4	Pressure to prematurely sign-off on evaluation reports whilst not following specific legislative requirements.	3.2	3.0	3.1		2.6	2.8	2.7	
E5	Weak auditee and auditor relationship in the public sector.	3.1	3.6	3.3		2.6	2.8	2.7	
E6	Expectation gap between public sector perceptions of ITG evaluation and actual ITG evaluation practices.	3.4	4.0	3.7		3.1	3.8	3.4	
E7	Insufficient evidence of ITG implementation (methodology, practices and processes).	3.5	3.4	3.4		3.0	3.6	3.3	
E8	ITG evaluation could be subjective or bias towards "more positive" findings.	3.4	3.2	3.3		2.5	3.2	2.9	
E9	Discovery may be slow or nonexistent if information is masked, inconsistent, unusable or made unavailable by the organisation.	3.3	3.8	3.5		3.5	3.8	3.7	
E10	Repetition of evaluation activity in place of identification of systemic control failures.	3.5	3.4	3.4		2.8	3.2	3.0	
O1	Difficulty to recruit and retain experienced ITG auditors in the public sector.	4.0	4.0	4.0	3.8	3.9	4.0	4.0	3.5
O2	Tendency to focus on mere compliance with legislation rather than quality.	4.2	4.2	4.2		3.3	3.6	3.4	
O3	Lack of executive support for, resource allocation to and understanding of extensive ITG evaluation programs.	3.6	4.0	3.8		3.4	3.4	3.4	
O4	Reduced influence of audit committees and ill-established internal audit units.	3.6	3.8	3.7		3.3	3.6	3.4	
O5	Loss of continuity (evaluation cycle) due to mandatory audit rotation.	2.8	3.0	2.9		2.6	3.0	2.8	
O6	Perceived low value of ITG evaluations in comparison to other evaluations.	3.2	3.6	3.4		3.0	3.0	3.0	
O7	Lack of executive management ITG ownership and accountability.	4.3	4.4	4.3		3.9	4.0	4.0	
O8	Lack of communication between business units.	3.5	3.8	3.7		2.9	3.4	3.2	
O9	Public administration tendency to deny/conceal systemic ITG problems which prevents identification and remediation.	3.9	4.0	4.0		3.6	4.0	3.8	
O10	Organisational changes impacting roles, responsibilities and stability of the ITG model, both internally and externally driven.	3.9	4.2	4.1		3.5	4.0	3.7	
		<b>Total average:</b>			<b>3.6</b>	<b>Total average:</b>		<b>3.2</b>	

\* N: Internal ; E: External ; O: Organisational

***Results for perceived impact and perceived effort to address per group of respondents***

Table 5.3 displays the outcome of the rating for perceived impact and perceived effort to address, and shows the average score for each evaluation challenge per group of respondents, IT (5) and audit (11), the total average score (unweighted) per IT governance evaluation challenge and the total average score per domain – internal (N), external (E), and organisational (O).

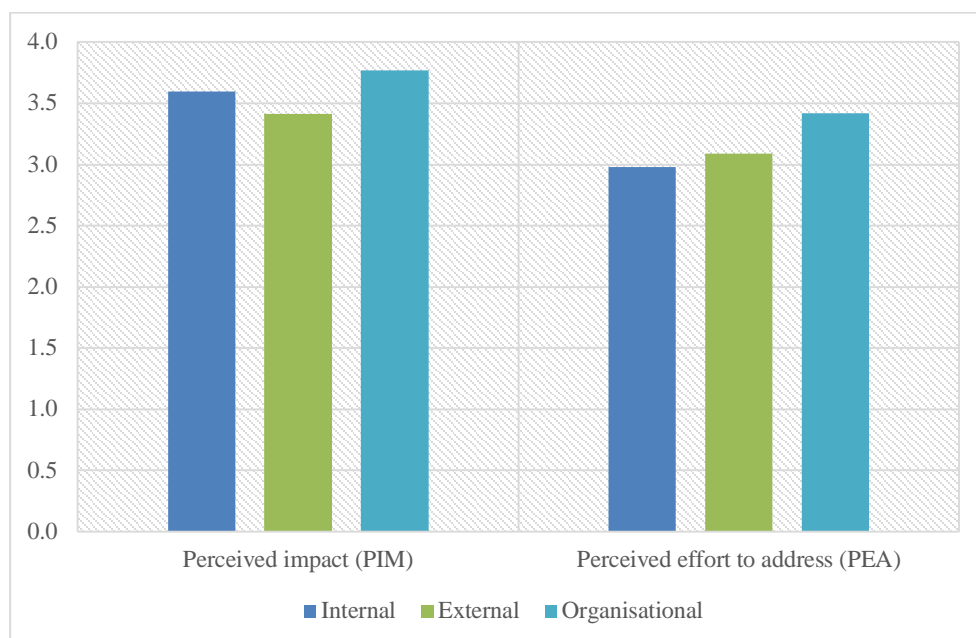
The total averages per challenge and domain (internal, external, and organisational) are discussed in the following sections, but drilling down into the data per group of respondents assists in better understanding or explaining specific results. For example, it is not surprising that the “lack of executive management IT governance ownership and accountability” received the highest scores for PIM by the audit respondents group. This leads to the assumption that respondents from the audit discipline place more emphasis on the role of the board and organisational culture for the success of IT governance evaluation in the public sector. A noticeable difference between the impact rating of the IT and audit groups exist for some of the identified challenges. For instance, “perceived low value of IT governance evaluations in comparison with other evaluations” received one of the highest scores for PIM by the audit respondents group, unlike their counterparts, who scored it low. The opposite applies for “insufficient skills and competencies to undertake effective IT governance evaluations”, as it received one the highest scores for PIM by the IT respondents group but was not scored high by the audit respondents group. This illustrates an expectation gap regarding the value of governance evaluation between the different respondent groups from different backgrounds within public sector organisations (PSOs). Noticeably, the two respondent groups had higher differences between their PEA ratings for some of the evaluation challenges. For example, organisational challenges “lack of communication between business units” and “organisational changes impacting roles, responsibilities, and stability of the IT governance model, both internally and externally driven” is perceived to require extensive effort to address by the audit respondents group, which apparently the IT respondents group found easier to address. This result might be explained by the fact that the IT group have been more involved in organisational changes and have experienced that such issues are easier to address in organisations. However, it seems

that the audit respondents group are less involved in decision-making at an executive level and receive less support from other business and IT units.

In the following sections, the overall results per IT governance evaluation challenge is discussed in more detail. Where relevant, reference will be made to Table 5.3 in trying to identify possible explanations for specific results, as the examples mentioned in the previous paragraph.

***Results for PIM and PEA per category (internal, external, and organisational)***

Figure 5.1 provides the aggregated averages of the ratings for PIM and PEA per category of IT governance evaluation challenges. In general, it appears that organisational and internal challenges are perceived as having a higher impact on the public sector than external challenges. However, it appears that internal and external challenges are perceived as being easier to address compared with organisational challenges. However, in many cases internal and organisational challenges are closely related. A good example here is the “lack of executive support for, resource allocation to, and understanding of extensive IT governance evaluation”, which is a crucial element to address the “insufficient skills and competencies ...” challenge through the provision of training, but the latter is perceived as easier to address compared with the former challenge.



*Figure 5.1. Average impact and effort to address evaluation challenges.*

Figure 5.1 also shows that external challenges are perceived to require less effort to address compared with organisational challenges, probably because some of the implemented solutions in the public sector for organisational challenges are considered ineffective, such as ineffective committees (Van der Nest, Thornhill, & De Jager, 2008). In contrast, solutions for external challenges are perceived to have a more useful result, such as communication and coordination between IT executive or senior management and external audit (Barrett, 2001; Stewart & Subramaniam, 2010).

***Results for PIM and PEA individual evaluation challenges***

As depicted in Figure 5.2 and Figure 5.3, the research demonstrates that, according to the panel of experts, some of the identified challenges have higher impact or require more effort to address compared with others.

The dominance of organisational challenges is clear, as they occupy four out of the top five for impact and required effort to address. This falls in line with previous research that highlighted the lack of board-level understanding and support when it comes to IT governance (Buckby, Best, & Stewart, 2005; Howard & Seth-Purdie, 2005; Posthumus et al., 2010). This also emphasises the effect of organisational changes and the role of various committees on IT governance (R. Huang, R. W. Zmud, & R. L. Price, 2010b; Nolan & McFarlan, 2005; Prasad, Heales, & Green, 2010), and also stresses the importance of auditors' experience to the success of IT governance evaluation in the public sector (Merhout & Havelka, 2008; Stoel et al., 2012).

Since numerous IT governance definitions highlight the prime responsibility of the board of directors in IT governance (ITGI, 2003; Trautman & Altenbaumer-Price, 2011), it is no surprise that these results reveal that challenges relating to the board (e.g., “lack of executive support for, resource allocation to, and understanding of extensive IT governance evaluation programs” and “lack of executive management IT governance ownership and accountability”) are among the top-ranked challenges for impact and required effort in IT governance evaluation. This can be attributed to the fact that making the board of directors more knowledgeable about IT governance and associated evaluation activities is not easy to achieve (De Haes & Van Grembergen, 2009). Potentially, the results of this research raise

questions on how public sector organisations can increase the board's involvement in practice.

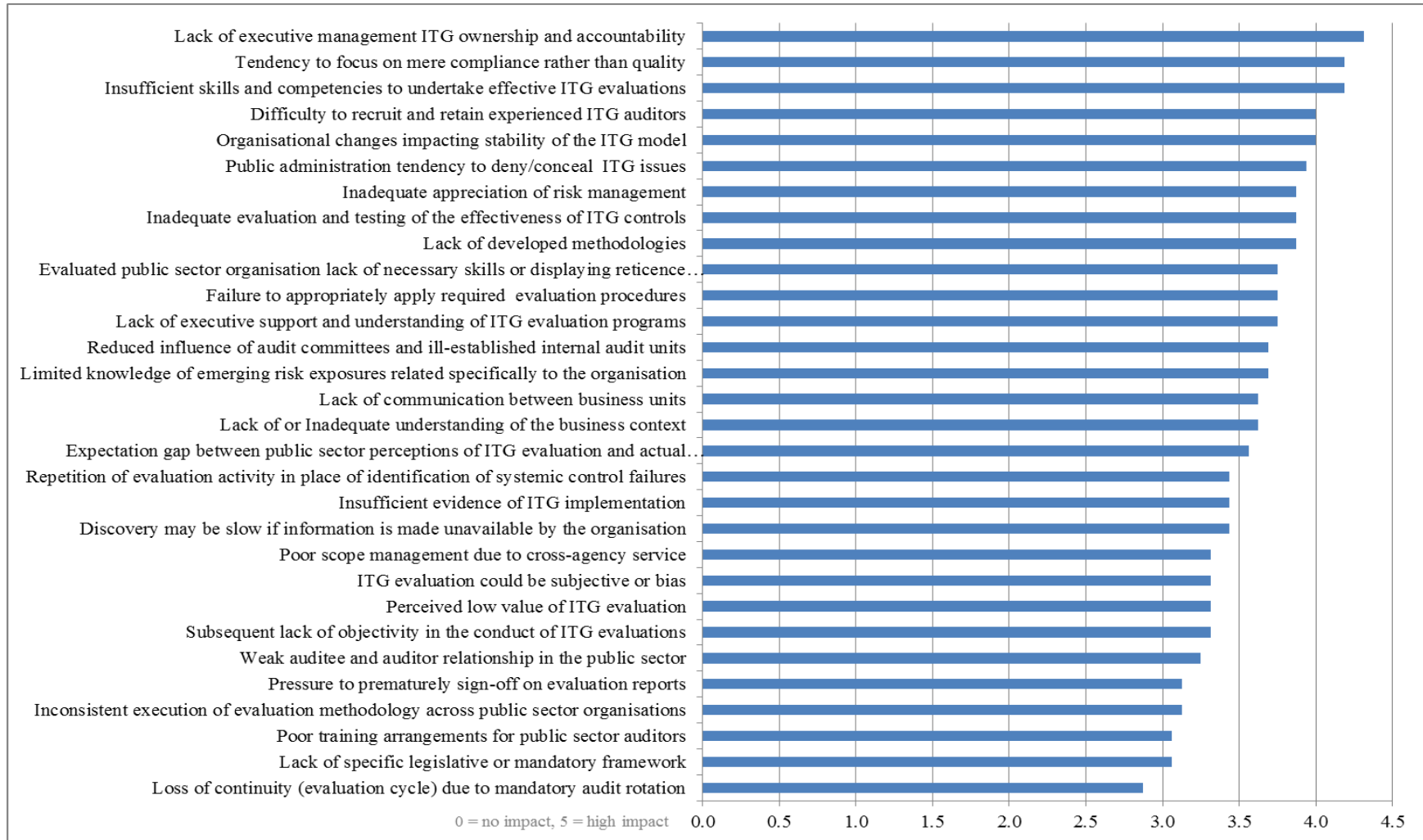


Figure 5.2. Perceived impact (PIM) of individual IT governance evaluation challenges.

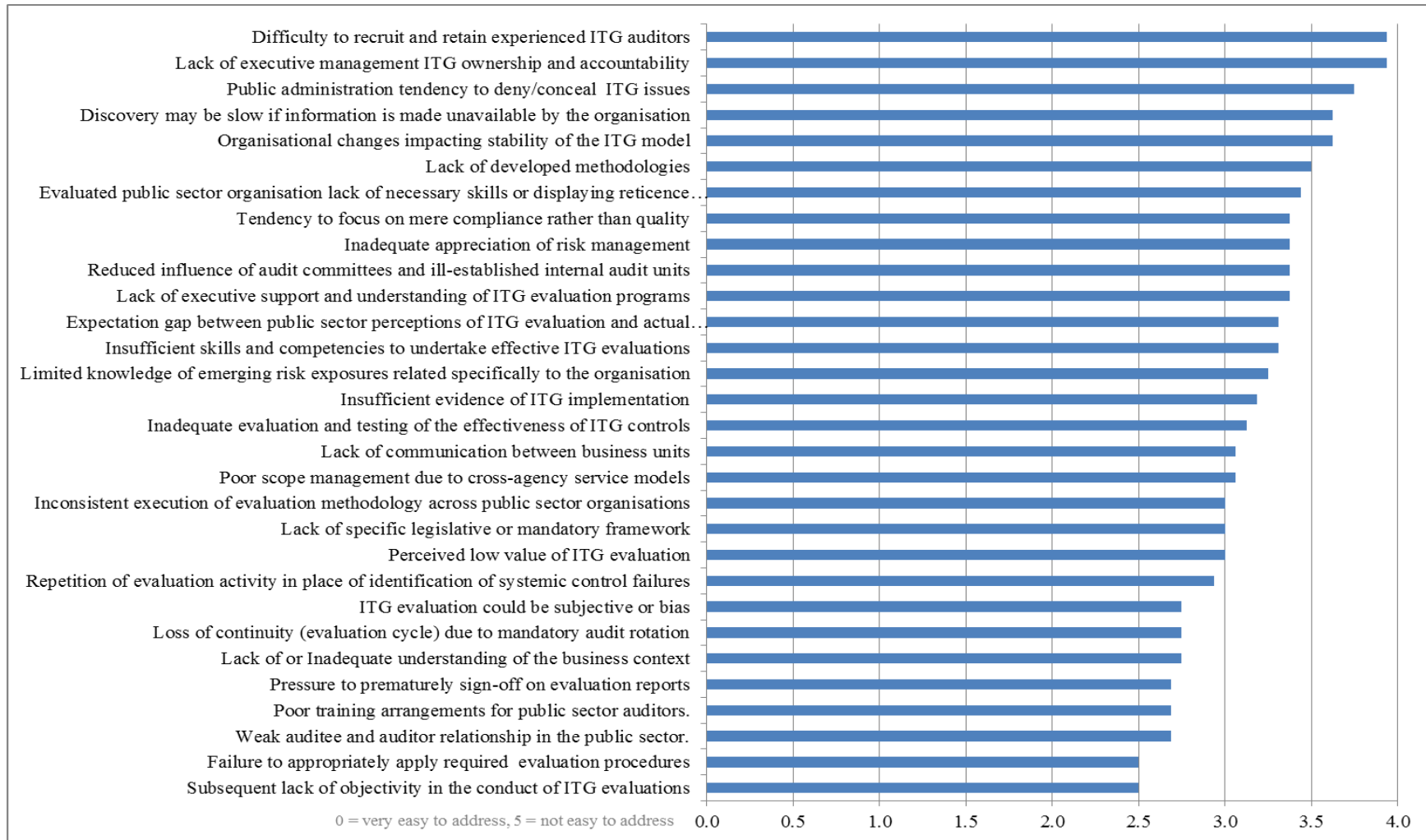


Figure 5.3. Perceived effort to address (PEA) of individual IT governance evaluation challenges.



The “lack of developed methodologies and tools” received an impact score (3.9) around the overall average (3.6). This emphasises the need for methodologies and frameworks that enable executives to govern and manage an enterprise’s use of IT effectively and efficiently, in addition to providing auditors with a framework to assist in conducting performance evaluations. Many methodologies and frameworks have been developed in recent years to assist and evaluate the implementation of IT governance. From an audit and evaluation perspective, COBIT has a strong emphasis on monitoring and enables the assessment of existing IT governance processes and structures (Gomes & Ribeiro, 2009a; F. Lin et al., 2010; Van Grembergen, 2003; Warland & Ridley, 2005). However, the literature described in Chapter 2 has already given indications that there is still a low adoption and little in-depth knowledge of this framework in the field. This low adoption might be an explanation of the fact that it is perceived as being not easy to implement and requires above-average level of effort (3.5). This might be due to the fact that practitioners need a considerable amount of knowledge and experience in the COBIT framework to be able to conduct successful IT governance performance assessments (Radovanovic et al., 2010; Simonsson et al., 2007). This could also explain the high ratings of impact and effort to address the challenges relating to tools, methodologies, and skills, namely, “insufficient skills and competencies to undertake effective IT governance evaluation”, “difficulty in recruiting and retaining experienced IT governance auditors in the public sector”, and “inadequate evaluation and testing of the effectiveness of IT governance controls”. Drilling down into the data per respondents group (Table 5.3) also reveals that both groups (IT and audit) assigned high scores for PIM and also to PEA. This could be explained by the fact the COBIT framework originated as an audit framework, having gained a large user base and acceptance in the audit community, and that its value to PSOs is now acknowledged by IT professionals.

The “weak auditee and auditor relationship in the public sector” challenge received high rating for impact by the audit respondent group but was perceived as one of the easiest to address by both respondent groups. This demonstrates that establishing an IT governance relational mechanism, such as communication between business and IT executives, which is perceived as being fairly effective, does not always have to be difficult to implement and could have an informal

character. Establishing communication channels between business and IT managers to discuss general issues was perceived as very powerful (Rowlands, Haes, & Grembergen, 2014).

***Priority list (top ten) challenges in conducting IT governance evaluation within the public sector***

Table 5.4 shows the results of the third question in the survey, in which the respondents were asked to identify the crucial issues or challenges (in a top ten) of IT governance evaluation in the Queensland public sector. These are the challenges that are identified as significant in any PSO, which in other words can be defined as a kind of priority list for IT governance evaluation. The respondents were asked to build up this ranking list in terms of the top-ten challenges, taking the attributes of PIM and PEA into account, together with their professional experience. Table 5.4 shows the final top ten resulting from this ranking exercise, including the ranking and total ranking score.

Table 5.4

*Top 10 list of IT governance evaluation challenges*

<b>Rank</b>	<b>Index</b>	<b>IT governance evaluation challenge</b>	<b>Total score</b>
1	E2	Limited knowledge of emerging risk exposures related specifically to the organisation	32
2	N1	Insufficient skills and competencies to undertake effective IT governance evaluations	33
3	O7	Lack of executive management IT governance ownership and accountability	42
4	O2	Tendency to focus on mere compliance with legislation rather than quality	47
5	N2	Inadequate evaluation and testing of the effectiveness of IT governance controls	48
6	O1	Difficulty in recruiting and retaining experienced IT governance auditors in the public sector	54
7	E10	Repetition of evaluation activity in place of identification of systemic control failures	58
8	E3	Audited organisation lack of necessary skills or displaying reticence to cooperate	60
9	N10	Inadequate appreciation of risk management in the application of controls or in considering IT governance control weakness	62
10	N3	Lack of developed methodologies and tools to keep pace with changes occurring in the audit and technology field	70

As could be expected, many of the challenges that were rated high in Table 5.3 recurred in the priority list (top-ten list). Good examples of the latter are the four challenges mentioned first, more specifically “lack of executive management IT governance ownership and accountability”, “insufficient skills and competencies to undertake effective IT governance evaluations”, “difficulty in recruiting and retaining experienced IT governance auditors in the public sector”, and “inadequate evaluation and testing of the effectiveness of IT governance controls”. These evaluation challenges have been discussed in previous paragraphs.

Only two new evaluation challenges appear in the priority list, namely, “limited knowledge of emerging risk exposures related specifically to the organisation” and “repetition of evaluation activity in place of identification of systemic control failures”. Unlike all of the evaluation challenges on the priority list, they did not receive high scores for PIM or PEA. A possible explanation is that there is a growing focus on a risk-based evaluation approach and tailoring IT governance to suit the diverse business objectives of each organisation, instead of the traditional one-size-fit-all controls testing (or compliance) approach (Kanellou & Spathis, 2011; Koutoupis & Tsamis, 2009). IT governance evaluation frameworks (ITGEFs), such as COBIT, are extending the scope of evaluation beyond the conventional tick-and-flick<sup>5</sup> approach to include an assessment of the effectiveness of governance processes (Burnaby & Hass, 2009). To that end, audit professionals increasingly find it necessary to understand the unique risks associated with each organisation being audited (Brazel & Agoglia, 2007; Hunton, Wright, & Wright, 2004).

The remainder of the priority list consists of the following challenges: “tendency to focus on mere compliance with legislation rather than quality”, “inadequate appreciation of risk management in the application of controls or in considering IT governance control weakness”, and “inadequate evaluation and testing of the effectiveness of IT governance controls”. The predominant information cue is the value created by the IT governance evaluation. The results indicate that both respondent groups perceive value when IT governance evaluation brings insight

---

<sup>5</sup> Those audits or evaluations that are just looking at whether an action was completed or not, such as compliance with internal policies and procedures (Trotman, 2013).

to the organisation that will improve business systems, processes, and performance, and identify ways to reduce costs. The consensus was that auditors conducting evaluations need to understand the business context and apply control effectiveness and risk-based assessments to show how identified weaknesses relate to the risks of the business. Another reason for the heavy emphasis on insufficient skills and methods is the Queensland government adoption of Cloud-first and progressive move towards “ICT as a service”, where traditional evaluation techniques cease to apply. The nature and complexity of Cloud computing environments require auditors to adopt contemporary evaluation techniques (e.g., continuous assurance and effectiveness assessment) to perform risk assessments and detailed testing of controls on a comprehensive basis (Kotb, Sangster, & Henderson, 2014). As a result, this requires skills and technical capabilities not traditionally assumed to be part of the skillset of a public sector auditor (Stoel et al., 2012), a vision that seems to be shared among the Delphi respondent groups.

Surprisingly, two evaluation challenges received high scores for PIM and PEA ratings but were not chosen as one of the top-ten priority challenges by respondent groups: “public administration tendency to deny or conceal systemic IT governance problems, preventing identification and remediation” and “organisational changes impacting roles, responsibilities, and stability of the IT governance model, both internally and externally driven”. As good governance practised in the public sector involves high levels of transparency (Al Omari & Barnes, 2014; Doyle & Jayasinghe, 2014), the former challenge’s likelihood of occurrence diminishes and thus was not allocated any importance by the respondent groups. As for the latter challenge, it is anticipated that significant organisational changes, such a restructuring and machinery of government (MoG), although having a high impact and requiring a considerable amount of effort to adapt to and address, will remain outside the respondents’ realm of control. This might explain why it did not yield much importance.

Finally, the top-ten priority list not only represents evaluation challenges at strategic and management levels, but also identifies an important challenge relating to tools and methodologies used for IT governance evaluation within the public sector. The “lack of developed methodologies and tools ...” not only scored high in

PIM and PEA, but also was chosen by the expert panellists as one of the top-ten challenges.

***Looking for high-impact evaluation challenges that are easy to address (Quick Wins)***

Figure 5.4 brings it all together, plotting the previous results on two axes. The vertical axis measures the PEA while the horizontal axis addresses the PIM. The challenges in the black shape highlights the identified top-ten IT governance evaluation challenges in the Queensland public sector. They all have high impact and are perceived as being rather hard to address, which demonstrates consistency in the answers of the experts. The top-ten challenges are to be regarded as a priority list of IT governance evaluation for each Queensland PSO. They should be supplemented with other challenges as required by the specific environment.

As detailed in Figure 5.2 and Figure 5.3, it is identified that “quick wins” are a general priority. In the context of this research, we refer to a quick win as a situation whereby a challenge received a high score for impact, was perceived to require minimal effort, and can be addressed in a short period of time, or requires reduced resources in a timely and cost-effective manner. The main quick wins identified are: “insufficient skills and competencies to undertake effective IT governance evaluations”, “inadequate evaluation and testing of the effectiveness of IT governance”, and “failure of an audit team to appropriately apply required substantive evaluation procedures”. Examining the previous challenges shows that they all belong to the internal category and focus on the audit team involvement in evaluating IT governance. On the other side, respondents considered these challenges to be easy to address. Basically, training and building an understanding of the activities and risks of the organisation being assessed appears to be the main solution. This result is also supported by earlier research, which identified the crucial need for auditor training (Axelsen, Coram, Green, & Ridley, 2011) and continual knowledge development, as technology and standards change (Curtis, Jenkins, Bedard, & Deis, 2009), to build the essential expertise required to carry out high-quality evaluation programs (Borthick, Curtis, & Sriram, 2006; Stoel et al., 2012). An understanding of the assessed organisation business, IT strategy, and the IT governance structures should be obtained by the auditor prior to conducting an evaluation (ISACA, 2002).



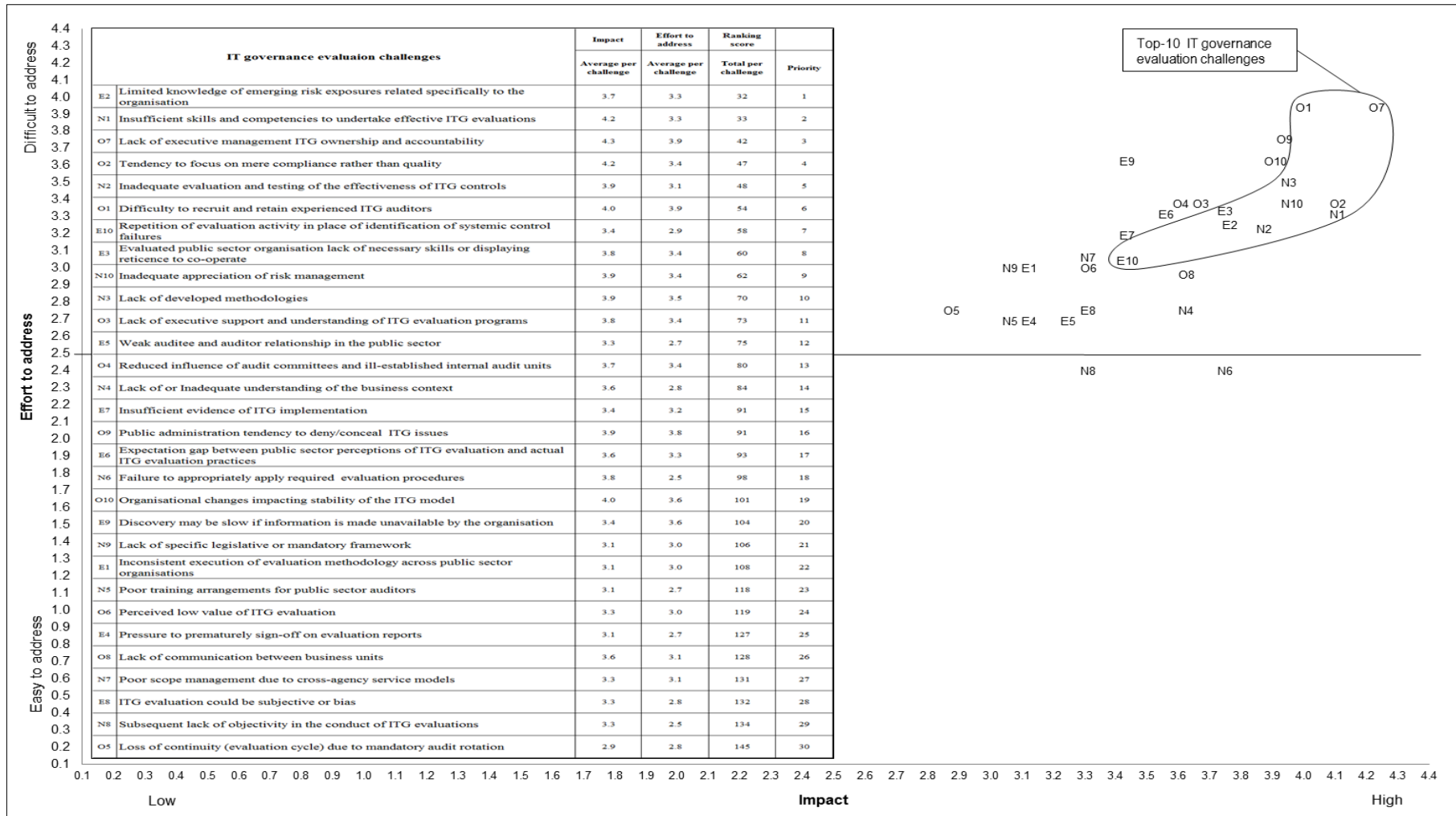


Figure 5.4. Impact, effort to address, and top-ten IT governance evaluation challenges.

In the past, IT auditors have often focused on mere compliance and have repeatedly utilised long lists of weaknesses instead of providing positive assurance to the organisation (Lawton, 2007). This is changing due to IT governance initiatives driving the implementation of effective management structures and controls, thus creating opportunities for IT auditors to become providers of assurance to management (Hardy, 2008). The expert knowledge of IT risks and controls places IT auditors in high demand and short supply. However, auditors need to be business-savvy and capable of engaging with top management to be successful (Gheorghe, 2010).

IT governance evaluation challenges that received a low impact rating and high effort to address score are, of course, the least interesting challenges. In this group, “insufficient evidence of IT governance implementation (methodology, practices, and processes)” is located, although the value of the challenge, in the context of IT governance evaluation, can of course itself be challenged.

### **5.3 SUMMARY**

This chapter reveals that, according to a group of experts, Queensland PSOs are facing a wide range of internal, external, and organisational challenges when performing IT governance evaluation to ensure that adequate IT governance processes are in place to support business and IT alignment. This research reveals a list of 30 IT governance evaluation challenges.

The research demonstrates that some of the identified challenges are regarded as having high impact on IT governance evaluation compared with others. The five challenges being perceived as to have the highest impact on the Queensland public sector are “lack of executive management IT governance ownership and accountability”, “insufficient skills and competencies to undertake effective IT governance evaluations”, “tendency to focus on mere compliance with legislation rather than quality”, “organisational changes impacting roles, responsibilities, and stability of the IT governance model, both internally and externally driven”, and “difficulty in recruiting and retaining experienced IT governance auditors in the public sector”. All these challenges were also identified as not being easy to address. The least important challenge was “insufficient evidence of IT governance implementation”. Regarding some challenges, the results of this research contradict



other research efforts. For example, where in this research the “lack of a specific legislative or mandatory framework to ensure a consistent evaluation approach” is not perceived as having a high impact, other research has concluded that this is one of the crucial elements in IT governance evaluation and assessment. Explaining this contradiction requires new analysis in future research.

Some challenges were perceived as fairly influential and easy to address. Good examples in this high-impact and easy-to-address domain were “insufficient skills and competencies to undertake effective IT governance evaluations”, “inadequate evaluation and testing of the effectiveness of IT governance”, and “failure of an audit team to appropriately apply required substantive evaluation procedures”. These challenges should be the main focus of organisations trying to achieve the best value for as little effort as possible.

An interesting case for this research was “lack of developed methodologies and tools”, as IT governance frameworks have been receiving a lot of attention in research and particularly in the field of audit, and did come out very high in this research. As discussed in Chapter 2, best-practice frameworks, in particular COBIT, provides a comprehensive approach for IT capability assessment and is heavily utilised as an ITGEF. However, when taking into consideration other important challenges raised by the panel of experts in this research, such as “inconsistent execution of evaluation methodology across public sector organisations” and “inadequate evaluation and testing of the effectiveness of IT governance controls”, the need for a systematic approach to adapt COBIT for IT governance evaluation becomes irrefutable. The optimisation of the massive framework will also inhibit the practice of randomly selecting controls or processes from the framework in a “hit and miss” style, which leads to dissimilar sets of evaluation tools and inconsistent findings across the public sector.

Another finding to emphasise is that, corresponding to several IT governance definitions referred to in the beginning of this research, which stress the prime responsibility of the board of directors in IT governance in general and the role of executive committees in particular, the results reveal that challenges relating to the board of directors (i.e., “lack of executive support for, resource allocation to, and understanding of extensive IT governance evaluation programs” and “lack of executive management IT governance ownership and accountability”) were rated

relatively high in terms of PIM. The results show that these challenges are also rated relatively high in terms of PEA. This can possibly be explained by the fact that making the board of directors more literate in IT governance and audit is not easy to achieve. The results of this research has raised questions on how public sector organisations realise the board's involvement in practice.

It was also demonstrated that, in general, internal challenges are perceived as being easier to address compared with organisational challenges, although in many cases they are closely related. For example, the organisational challenge “lack of executive support for, resource allocation ...” embodies a crucial element to deal with the internal challenge “insufficient skills and competencies ...” through the provision of training; however, the latter is perceived as easier to address compared with the organisational challenge.

This chapter has also brought up a list of challenges, specifically for the Queensland public sector, that can be regarded as a priority list when conducting evaluation of IT governance systems. This suggests that, in evaluating IT governance processes within a specific PSO, these challenges may play an important role in determining the success or failure of the evaluation program. These challenges are listed in Table 5.4. It was unexpected that all three challenge categories appear in the top-ten list, almost with equal share for each (e.g., internal challenges = 4, external challenges = 3, and organisational challenges = 3), while many authors in the literature stress that one or the other is more dominant when considering IT governance evaluation challenges. A possible explanation is that, just as in the literature, less detailed knowledge and expertise is available on IT governance evaluation challenges in the public sector, which often have more intangible and informal characteristics than in the private sector.

It is also important to point out that the priority list should be regarded as a holistic set of evaluation challenges, contributing overall to better IT governance evaluation in the public sector. This insight explains that some of the individual challenges, such as “limited knowledge of emerging risk exposures related specifically to the audited organisation”, received individually a lower score for impact. Its value, however, is constituted in it being part of the top-ten list.

As a recommendation to practitioners, this top-ten list of challenges can be regarded as a focal starting point to perform successful IT governance evaluation.

Each public sector organisation should at least consider these challenges, regardless of other contingencies. Of course, they should be supplemented with other challenges and issues, as required by the specific environment, organisational culture, or size, to build a broader and more complete set of IT governance evaluation challenges. To select these extra challenges, it is best to focus on those issues that are perceived as highly effective and relatively easy to address, such as “insufficient skills and competencies to undertake effective IT governance evaluations”, “inadequate evaluation and testing of the effectiveness of IT governance”, and “failure of an audit team to appropriately apply required substantive auditing procedures”.



## Chapter 6: Refinement of the Conceptual IT Governance Evaluation Framework

---

This chapter, following the Delphi research findings in Chapter 5, examines the empirical investigation of the existence of an IT governance evaluation framework (ITGEF) adapted from the COBIT framework. This investigation is based on the most important high-level IT processes, as perceived by public sector organisations (PSOs) for conducting IT governance evaluation. A quantitative investigation using an online survey was employed to refine the initial conceptual ITGEF, using the insights gained from respondents to address the research's second subordinate question (see Section 4.2).

This step in the research is mainly performed to put forward a proposition to address the challenge presented by the “lack of developed methodologies and tools to keep pace with changes occurring in the audit and technology field”, identified within the Queensland public sector by the questionnaire respondents (Al Omari et al., 2012a). In addition, the proposed ITGEF will operate as a unified approach to evaluate IT governance across the public sector in an effort to allow a more meaningful and targeted evaluation.

The remainder of the chapter is structured as follows: Section 6.1 outlines the quantitative approach used. This is followed by analysis of the results in Section 6.2. The chapter concludes with summary and discussion in Section 6.3.

### 6.1 SURVEY RESEARCH

This chapter aims to address the second sub-research question (Section 4.2): “How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?” Thus, the objective of this chapter is to seek support for and refinement of the ITGEF adapted from the COBIT framework that is most suited for evaluating IT governance in PSOs. This is achieved through determining the high-level IT processes from the COBIT framework that are perceived by Queensland PSOs to be the most important. As discussed in Chapter 3, this is done in part to tailor the evaluation measures for the public sector needs, as

best-practice frameworks, including COBIT, are considered too large and impractical to conduct an evaluation of IT governance that covers all the areas it prescribes.

As the majority of the IT governance literature and research available is practitioner based and quantitative in nature, this research activity adopts a quantitative method in order to be relevant and well perceived in the field. Quantitative methods are used to establish quantitative or numerical relationships among variables (Creswell, 2013; Punch, 2013). Surveys are arguably the most commonly used technique in management research and it are ideal in providing quantified information through gathering information from individuals using a formally designed list of questions (Veal & Ticehurst, 2005). The use of questionnaires provides transparency for data collection and analysis and also facilitates others reanalysing the same data, extending the research or providing an alternative interpretation. Only a proportion (sample) of the population is commonly targeted by a survey. However, findings from a properly derived sample can be subsequently generalised to the whole population (Baruch & Holtom, 2008). This section outlines the development and administration of a survey instrument.

### **6.1.1 Survey design**

Permission was sought to use the text of the COBIT 5 framework (see Appendix B item 1) prior to developing a data collection instrument. Subsequently, an online questionnaire was developed consisting of two sections (see Appendix B item 4). The first section included key ethical information as required by the QUT Ethics Committee and contained general information about the study, such as the survey aims, suggested length of time required to complete the questionnaire, and guidance on how participants should complete the questions. Brief details were also sought in the first section of the questionnaire: about the organisation's function within the public sector, participants' position level within their department, and a ranking of familiarity with both business objectives and IT processes on a five-point Likert-type scale. The second section asked participants to rate the 37 high-level IT processes from the COBIT 5 framework according to their importance to the PSO on a five-point Likert-type scale.

Pilot testing is an important survey design mechanism to test various aspects of the questionnaire, including wording, layout, and analysis techniques, on a group similar to the main target population (Cooper & Schindler, 2003). The pilot test of

the questionnaire was administered to five known participants: one academic and four IT professionals from the public sector. Based on their feedback, some minor grammatical and typographical errors were identified and fixed but no significant amendments were required to the developed questionnaire.

Hypotheses are usually formed to postulate, validate, and test relationships between variables in quantitative research. In general, they are grounded in the existing literature or on the basis of informal observation; however, there is no significant body of research to draw on for hypothesis formation. Considering the exploratory nature of this study, in addition to the lack of academic literature, hypothesis testing was not considered adequate.

### **6.1.2 Data collection**

The survey was kept short in order to increase the responses. The survey included participants drawn from two different sources to limit any sample frame bias, namely, members of the Information Systems and Control Association (ISACA), excluding private sector members; and members of a Queensland government IT/IS auditors' forum managed by the Queensland Government Chief Information Office (QGCIO). The targeted population included participants at different levels (c-suite, managers and senior IT, audit and business officers) who have knowledge of IT governance within the Queensland public sector. Support was gained from the aforementioned groups to email a personal invitation to potential participants (see Appendix B item 2) containing a link to the online questionnaire and an information research sheet (see Appendix B item 3).

Data collection for the survey was organised in the period May 2012 – October 2012 and a total of 112 emails were distributed. Follow-up emails were sent to encourage non-respondents to participate and a total number of 60 responses were received. However, only 57 complete surveys were included as only completed surveys were considered in the final analysis. The response rate at 57 valid responses was 65%, which is considered above average for academic research and thus representative of the whole population (Baruch & Holtom, 2008). The release of COBIT 5 in April 2012, shortly before starting data collection, might explain the good response rate for this research, suggesting it was recognised as both credible and relevant to the public sector.

### 6.1.3 Data analysis

As data collected was quantitative in nature and included a series of ratings on a Likert-type scale, it was essential to consider the issue of non-response bias before commencing any statistical testing. Non-response bias occurs in surveys if the answers of respondents differ in a consistent manner from the potential answers of non-respondents (Bergk, Gasse, Schnell, & Haefeli, 2005). To estimate the extent of non-respondent bias, it was not possible to compare respondents' with non-respondents' answers. This is because the survey was anonymous and the researcher had access only to names and e-mail addresses of participants, unlinked to their responses, and not those who chose not to participate. As a result, a non-response bias test was undertaken by comparing early respondents with late respondents instead (Lewis-Beck, Bryman, & Liao, 2003). Also known as extrapolation, this test is based on the assumption that late respondents (those who responded after a reminder) are likely to have characteristics similar to those of non-respondents. As there is no literature that distinguishes the characteristics for comparing early and late respondents, this research compared the first 28 respondents, who answered within the first month, with the last 29 respondents, who answered after the one-month mark, on all items using the Mann–Whitney U test. The result was not statistically significant and we could not state with 95% certainty that there was a difference between the two groups of respondents. This implies that non-response bias can be ruled out.

Overall, in view of the preliminary nature of this study, the non-response bias test and response rates reported in information systems (IS) research, the 57 responses can be considered as a reasonable sample.

## 6.2 RESULTS AND INTERPRETATIONS

The questionnaire was divided into two sections. The first section contained the demographic data, including the organisation's function within the public sector and participant's position level. The second section required the participants to rate the importance of the 37 high-level IT processes from the COBIT 5 framework according to their importance to the PSO on a five-point Likert-type scale. The results were exported from the online survey into a Microsoft Excel spreadsheet. The ratings were summed to give a total for each high-level IT process; the data was then



sorted in descending order on the basis of these totals. Any IT processes with the same totals were subjected to a second sort on the mean. The totals were then subjected to statistical testing to determine points at which significant differences existed. The results of the t-tests performed are included in Section 6.2.

### 6.2.1 Descriptive statistics

The results for the type of organisation in which the respondents worked are presented in Table 6.1. Of a total of 57 respondents, 80%, or 46 respondents, reported they worked for a government department (e.g., Department of Education), 5%, or 11 respondents, worked for a government agency (e.g., Queensland State Archives), 5.5%, or 3 respondents, for a government-owned corporation (e.g., Centre for Information Technology and Communications [CITEC]), and only 3.5%, or 2 respondents, worked for a local government body.

Table 6.1

*Type of organisation in which respondents are employed*

Organisational type	Frequency	%
Government department	46	80
Government agency	6	11
Government-owned corporation	3	5
Local government	2	4

The results for the position level of the respondents are presented in Table 6.2. From the 57 responses received, 23% (13 respondents) specified officer, 31.5% (18 respondents) specified senior officer, 31.5% (18 respondents) specified manager, 14% (8 respondents) specified director, while none specified c-suite.

Table 6.2

*Position level of respondents within the public sector*

Position level	Frequency	%
Officer	13	23
Senior officer	18	31.5
Manager	18	31.5
Director	8	14

C-suite	0	0
---------	---	---

The demographic data derived from the first section of the questionnaire comprised organisational type, respondent's position level, familiarity with IT processes, and familiarity with the business goals of the organisation. This provides a context for the data obtained from the second section of the questionnaire, the rating of the high-level COBIT IT processes.

### **6.2.2 IT processes rating analysis**

To produce a ranked list of high-level IT processes, ratings from the second section of the questionnaire were analysed to provide a total score, average, and standard deviation for each of the 37 high-level IT processes. Data were sorted in descending order based on the mean values. In case of matching means, IT processes were then sorted in descending order based on the total values. The ranked list is presented in Table 6.3.

Table 6.3

Rating for COBIT 5 high-level IT processes as perceived by Queensland PSOs

<i>Tier</i>	<i>Rank</i>	<i>COBIT 5 high-level IT processes</i>	<i>Total</i>	<i>Mean</i>	<i>t stat</i>	<i>P</i>
1	1	<i>DSS05 Manage Security Services</i>	304	5.33	-	-
	2	<i>EDM03 Ensure Risk Optimisation</i>	298	5.23	0.76	0.23
	3	<i>APO13 Manage Security</i>	296	5.19	1.05	0.15
	4	<i>DSS04 Manage Continuity</i>	291	5.11	1.52	0.07
	5	<i>EDM02 Ensure Benefits Delivery</i>	290	5.09	1.61	0.06
2	6	<i>APO12 Manage Risk</i>	287	5.04	2.21	0.02
	7	<i>BAI06 Manage Changes</i>	283	4.96	0.65	0.26
	8	<i>APO02 Manage Strategy</i>	282	4.95	0.8	0.21
	9	<i>DSS01 Manage Operations</i>	282	4.95	0.68	0.25
	10	<i>EDM01 Ensure Governance Framework Setting and Maintenance</i>	281	4.93	0.85	0.2
	11	<i>DSS03 Manage Problems</i>	278	4.88	1.22	0.11
	12	<i>DSS02 Manage Service Requests and Incidents</i>	276	4.84	1.35	0.09
3	13	<i>APO01 Manage the IT Management Framework</i>	272	4.77	2.17	0.02
	14	<i>BAI04 Manage Availability and Capacity</i>	270	4.74	0.26	0.4
	15	<i>EDM04 Ensure Resource Optimisation</i>	270	4.74	0.22	0.41
	16	<i>APO06 Manage Budget and Costs</i>	270	4.74	0.24	0.41
	17	<i>MEA01 Monitor, Evaluate and Assess Performance and Conformance</i>	269	4.72	0.49	0.31
	18	<i>BAI02 Manage Requirements Definition</i>	269	4.72	0.39	0.35
	19	<i>MEA03 Monitor, Evaluate and Assess Compliance with External Requirements</i>	269	4.72	0.39	0.35
	20	<i>BAI09 Manage Assets</i>	266	4.67	0.69	0.25
	21	<i>BAI01 Manage Programs and Projects</i>	265	4.65	1.15	0.13
	22	<i>MEA02 Monitor, Evaluate and Assess the System of Internal Control</i>	265	4.65	0.8	0.21
	23	<i>DSS06 Manage Business Process Controls</i>	263	4.61	1.22	0.11
	24	<i>APO11 Manage Quality</i>	263	4.61	1.03	0.15
	25	<i>BAI03 Manage Solutions Identification and Build</i>	262	4.6	1.46	0.08
	26	<i>APO07 Manage Human Resources</i>	257	4.51	1.54	0.06
4	27	<i>BAI05 Manage Organisational Change Enablement</i>	254	4.46	2.38	0.01
	28	<i>BAI07 Manage Change Acceptance and Transitioning</i>	251	4.4	0.69	0.25
	29	<i>APO03 Manage Enterprise Architecture</i>	251	4.4	0.45	0.33
	30	<i>EDM05 Ensure Stakeholder Transparency</i>	250	4.39	0.49	0.31
	31	<i>APO08 Manage Relationships</i>	250	4.39	0.52	0.3
	32	<i>BAI10 Manage Configuration</i>	248	4.35	0.83	0.21
	33	<i>BAI08 Manage Knowledge</i>	248	4.35	0.97	0.17
	34	<i>APO09 Manage Service Agreements</i>	248	4.35	0.95	0.17
	35	<i>APO05 Manage Portfolio</i>	246	4.32	1.34	0.09
	36	<i>APO10 Manage Suppliers</i>	243	4.26	1.53	0.07
5	37	<i>APO04 Manage Innovation</i>	235	4.12	2.31	0.01

As part of the statistical analysis employed by this research, the ratings were subjected to the paired sample student's t-test to identify significant differences between high-level IT processes. The test commenced from the top of the list, the highest ranked high-level IT processes, (DSS05) at  $p < 0.05$  and 56 degrees of freedom, and continued until a group, or tier, was identified through detecting a significant difference. The test then recommenced using the first high-level IT processes in the next grouping as the point of comparison until the list of 37 high-level IT processes was exhausted and five groupings, or tiers, were identified.

Five groups of high-level IT processes were identified through the statistical analysis of the perceived ratings, presenting several points at which an adapted ITGEF could be formed. Previous research by Guldentops et al. (2002) identified a list of 15 important control objectives, while the study by Huissoud (2005) classified 16 as being most important. The Australian study by Gerke and Ridley (2006) derived an abbreviated list of 17 important control objectives, as perceived by the Tasmanian public sector. Based on these sources, it was proposed that the initial ITGEF for the Queensland public sector would be created using the first two tiers to give a size of 12 high-level IT processes as displayed in Table 6.4. A list of this size is in line with the recommended size of 10–15 control objectives (Gerke & Ridley, 2006).

Table 6.4

*Initial IT governance evaluation framework in the Queensland public sector ranked by importance*

<i>Tier</i>	<i>Rank</i>	<i>COBIT 5 high-level IT processes</i>
<i>1</i>	1	<i>DSS05 Manage Security Services</i>
	2	<i>EDM03 Ensure Risk Optimisation</i>
	3	<i>APO13 Manage Security</i>
	4	<i>DSS04 Manage Continuity</i>
	5	<i>EDM02 Ensure Benefits Delivery</i>
<i>2</i>	6	<i>APO12 Manage Risk</i>
	7	<i>BAI06 Manage Changes</i>
	8	<i>APO02 Manage Strategy</i>
	9	<i>DSS01 Manage Operations</i>
	10	<i>EDM01 Ensure Governance Framework Setting and Maintenance</i>
	11	<i>DSS03 Manage Problems</i>

12 *DSS02 Manage Service Requests and Incidents*

The initial ITGEF consisted of high-level IT processes from four of the five domains of the COBIT 5 framework: Evaluate, Direct and Monitor (EDM); Align, Plan and Organise (APO); Build, Acquire and Implement (BAI); Deliver, Service and Support (DSS). The surveyed organisations did not consider any high-level IT processes from the Monitor, Evaluate and Assess (MEA) domain to be of high importance, which indicates that this domain is heavily undervalued. Notwithstanding the importance of all domains, rankings were important to determine the composition of an adapted ITGEF. As displayed in Table 6.5, three high-level IT processes (25%) were selected from each of the first two domains, while only one (8%) high-level IT process was selected from the BAI domain and five (42%) from the DSS domain. The strong emphasis placed on the APO and DSS domains (PO and DS in COBIT 4.1) is clear and has been observed in previous research. These domains used to attract the highest ratings among other high-level IT processes, in the same way they did in this research. However, the introduction of the new domain, EDM, has slightly changed this trend as it has quickly become one of the most important domains within the framework by consuming 25% of high-level IT processes in the adapted ITGEF within the Queensland public sector.

Table 6.5

*Comparison of high-level IT processes ratings by domain*

<i>COBIT domains</i>	<i>Location</i>	<i>Total</i>	<i>EDM</i>	<i>APO/PO</i>	<i>BAI/AI</i>	<i>DSS/DS</i>	<i>MEA/M</i>
<b>Current study</b>	Australia / Queensland	12	3 (25%)	3 (25%)	1 (8%)	5 (42%)	0 (0%)
<b>Hiererra (2012)</b>	Indonesia	17	n/a	6 (35%)	4 (24%)	7 (41%)	0 (0%)
<b>Wood (2010)</b>	USA	16	n/a	5 (31.25%)	5 (31.25%)	5 (31.25%)	1 (6.25%)
<b>Gerke and Ridley (2009)</b>	Australia / Tasmania	15	n/a	5 (33%)	4 (27%)	5 (33%)	1 (7%)
<b>Huissoud (2005)</b>	International	16	n/a	5 (31.25%)	5 (31.25%)	5 (31.25%)	1 (6.25%)
<b>Guldentops et al. (2002)</b>	International	17	n/a	6 (35%)	4 (24%)	7 (41%)	0 (0%)

As the 12 high-level IT processes in the conceptual model have been drawn mainly from the first four domains and none from the fifth domain (MEA) this would indicate the focus on early-cycle activities of IT governance implementation instead of those concentrating on monitoring and evaluating. Similar to the findings of Gerke and Ridley (2006) within the Tasmanian public sector in Australia, it is suggested that the IT governance maturity level in participating Queensland PSOs is not well developed, as monitoring activities appear to be less important than others. It also came into view that Queensland PSOs are shifting towards governance activities in lieu of traditional management activities. Potentially, this may raise questions on what other jurisdictions within Australia share the same IT governance maturity levels and IT services characteristics.

It is no surprise that IT processes *DSS05 Ensure Systems Security* and *APO13 Manage Security* were rated first and third most important respectively. This could be attributed to the requirement by the Queensland Government Financial Accountability Act 2009 to safeguard agencies' assets by establishing internal controls through the implementation of Information *Standard 18 (IS18): Information Security* (Queensland Government Chief Information Office, 2011). The IS18 standard requires agencies to develop, implement, maintain, and review appropriate security controls to protect the information they hold, as detailed by this information standard and its supporting documents. Also, agencies are required to submit a compliance report based on IS18 annually. Therefore, the issue of security in the Queensland public sector will continue to be critical.

The importance of risk minimisation in the public sector is again emphasised as participants rated *EDM03 Ensure Risk Optimisation* the second most important high-level IT process and have also included *APO12 Manage Risk* in the conceptual model (ITGEF). The importance of managing risk is not a new topic, as the Commonwealth Auditor-General has nominated it as one of the most pressing issues facing the public sector in Australia (English, Guthrie, & Parker, 2005). From an audit perspective, there is a growing focus on a risk-based evaluation approach, in addition to recognising differences in the nature of business and related risks instead of the traditional one-size-fits-all controls testing (compliance) approach (Kanellou & Spathis, 2011; Koutoupis & Tsamis, 2009).

### **6.2.3 Refining the conceptual model**

The analysis of data collected during the study led to a number of changes in the Initial Conceptual Model, resulting in a Refined Conceptual Model. This section details the data analysis for the results of this research in comparison with previous studies by Gerke and Ridley (2006); Guldentops et al. (2002); Hiererra (2012); Huissoud (2005); S. Ismail et al. (2009); and Wood (2010), as displayed in Figure 6.1.





Current research results	Hiererra (2012)	Wood (2010)	Ismail et al. (2009)	Gerke and Ridley (2006)	Huissoud (2005)	Guldentops et al. (2002)
COBIT 5 high-level IT-processes	COBIT 4/4.1 Control Objectives					
EDM02 Ensure Benefits Delivery APO02 Manage Strategy	PO1 Define a Strategic IT Plan					
EDM03 Ensure Risk Optimisation APO12 Manage Risk	PO9 Assess Risks					
	PO10 Manage Projects			PO10 Manage Projects		
	AI2 Acquire and Maintain Application Software					
BAI06 Manage Changes	AI6 Manage Changes					
DSS04 Manage Continuity	DS4 Ensure Continuous Service					
APO13 Manage Security DSS05 Manage Security Services	DS5 Ensure Systems Security			DS5 Ensure Systems Security		
DSS03 Manage Problems DSS02 Manage Service Requests and Incidents	DS10 Manage Problems					
	DS11 Manage Data			DS11 Manage Data		
	ME1 Monitor and Evaluate IT Performance			ME1 Monitor and Evaluate IT Performance		
DSS01 Manage Operations	DS13 Manage Operations					
EDM01 Ensure Governance Framework Setting and Maintenance	PO6 Communicate management aims and direction					
<b>Legend</b>						
Common across more than 4 previous studies and the current research						
Common across more than 4 previous studies but not the current research						
Common across more than 1 previous study and the current research						

Figure 6.1. Comparison of high-level IT processes identified as being important in previous studies.

Three categories emerged from this comparison. The first category presented a list of high-level IT processes, or control objectives in COBIT4/4.1, that were common across at least four previous studies and the current research results. Of the 12 high-level IT processes, 10 (83%) identified by this research have been previously identified by at least four previous studies as being significant in their context. Consequently, analysis indicates that all 12 high-level IT processes rated as most important by this research were not just unique to the Queensland public sector. That the earliest list was originally derived in 2002, and thus was at least ten years old when the Queensland study was undertaken, implies that some high-level IT processes can be considered to be important regardless of the context (international, national, or state) and are of continuing interest.

Noticeably, two high-level IT processes (*PO1 Define a Strategic IT Plan* and *AI6 Manage Changes*) have been identified by all six previous studies considered by this research as highly important. Defining a strategic plan involves “determining long-term objectives by analysing the strengths and weaknesses of an organization, studying opportunities and threats in the business environment, predicting future trends, and projecting the need for new products and services” (Schwalbe, 2013, p. 143). As discussed in Section 1, strategic alignment is one of the focus areas of IT governance that aims to facilitate long-term understanding and greater communication between IT and an organisation’s overall direction and objectives (Schwalbe, 2013). The importance of strategic IT planning and the fact that it must align with the organisation’s long-term strategy is also emphasised in the COBIT framework. The importance of strategic planning and alignment between IT and business goals has been extensively recognised in the literature. Therefore, it is not surprising that all previous studies accentuated the importance of PO1 Define a Strategic IT Plan, regardless of the organisational context and geographical location. On the other hand, the importance placed on *AI6 Manage Changes* could be driven by the fear of lost revenue, cost overruns, and decreased productivity for staff and the organisation as a whole, which can be caused by failure of this IT process. As IT change management is considered a critical yet problematic process and is prone to failure (Rebouças, Sauv e, Moura, Bartolini, & Trastour, 2007), it is no surprise that all previous studies positioned this high-level IT process among the most important processes.

The second category comprises two of the 12 high-level IT processes (17%) identified by this research that are common across at least one previous study (*DSS01 Manage Operations*; and *EDM01 Ensure Governance Framework Setting and Maintenance*). The former IT process is common across two studies of which one was conducted within a local government organisation in the United States by Wood (2010) and the second took place at an individual government department (Ministry of Education) in Malaysia by S. Ismail et al. (2009). As the title suggests, *Manage Operations* is concerned with IT operations management and is considered important because product management by IT managers is highly integrated into every aspect of the organisation (Wood, 2010). The rating of importance from this research seems to indicate that the *Manage Operations* process is contributing a high value to PSOs and is interacting somehow with more tactical or strategic processes. However, based on the results, no assertion on the causal relationship between these studies can be made. This raises the question of whether the COBIT framework is more suitable for tactical or strategic processes and not operational processes. Similarly, the latter IT process (*EDM01*) was also common across two studies, one being the same Malaysian study and the other conducted by Gerke and Ridley (2006) in Australia. This finding echoes the need for focus on IT governance frameworks in the Australian public sector as discussed in Chapter 3. It also falls into line with the assertion that, on average, processes from the Evaluate, Direct and Monitor (EDM) domain of COBIT 5 are most effective but the most difficult to implement (Bartens et al., 2015). Overall, these two processes seem to have received a great deal of attention over many years. However, in the context of this study, there is not enough commonality between the previous studies to justify including them in this conceptual model (ITGEF).

The third category indicates four control objectives that are common across at least four previous studies but are not rated as important by this research. These include: *PO10 Manage Projects*; *AI2 Acquire and Maintain Application Software*; *DS11 Manage Data*; and *ME1 Monitor and Evaluate IT Performance*. The extensive standards and policies established by the QGCIO between 2009 and 2011 that cover the “information and data” aspects within PSOs, in particular *Information Standard 31 (IS31): Retention and disposal of public records*; *Information Standard 33 (IS33): Information access and use guideline*; and *Information Standard 40 (IS40):*

*Recordkeeping*, ensure a systematic approach that governs activities relating to information within all public authorities. This might explain why *DS11 Manage Data* was reported as very important by another Australian state (Tasmania) in the study by Gerke and Ridley (2006) and previous studies as highlighted in Figure 6.1 but is not rated important in this research, as other established standards covers this high-level IT process. The same applies to *AI2 Acquire and Maintain Application Software*, as the “Software currency policy” developed by QGCIO in 2010 covers the software portfolio aspects within PSOs and therefore *AI2* was not rated as important as other high-level IT processes by this research. The higher political influences in the public sector in Australia, particularly as government is primarily financed by taxation, require PSOs to pay more attention to and put more priority on managing and monitoring IT investments and projects. These attributes specific to the public sector might contribute to the difference in the remaining two of the four most highly ranked IT processes (*PO10 Manage Projects*; and *ME1 Monitor and Evaluate IT Performance*) by the other mixed-sector international studies but not by the Australian study of Gerke and Ridley (2006) and the current research results.

Within the public sector in Australia, examining the top-five control objectives identified by Gerke and Ridley (2006) (*DS5 Ensure Systems Security*; *DS4 Ensure Continuous Service*; *PO1 Define a Strategic IT Plan*; *DS11 Manage Data*; and *DS12 Manage Operations*) in comparison with the top-five high-level IT processes identified by this research in Table 6.4 shows a pattern in the way organisations are maturing over time. The top-five list in 2006 contained one control objective from the Plan and Organise (PO) domain, currently Align, Plan and Organise (APO), and four from the Deliver and Service (DS) domain (currently Deliver, Service and Support (DSS), signifying the need at the time to focus on delivering and supporting IT services. Not surprisingly, the previously considered most important control objective from the PO domain was *PO1 Define a Strategic IT Plan*, demonstrating the essential need for strategic planning in IT. At present, this research identified one high-level IT process from the PO domain, two from the DS domain and two from the new EDM domain. The APO high-level IT processes chosen in this research was *APO02 Manage Strategy*, which is the equivalent control objective, using the COBIT 4.1 to COBIT 5 mapping, chosen in previous research (ISACA, 2012b). Not only that, but participants also selected *EDM02 Ensure Benefits Delivery* to emphasise the

importance of governance in strategic planning and to ensure that the business gets the best value out of IT investments.

In general, compared with the Tasmanian study, this research reveals that both operational and management of security is one of the top priorities in Queensland. It also highlights the importance of ensuring the delivery of value to the business as an outcome of IT strategic planning and demonstrates the increasing concern over risk optimisation within a state public sector. The results also show decreasing importance of data and operations management and rather demonstrates the shift towards continuity management, possibly due to the effects of the recurring natural disasters on PSOs in Queensland.

When comparing results with the international, cross-sector study by Guldentops et al. (2002), it was noticed that 11 control objectives (92%) were in common albeit the fundamental differences in the study setting. Equally, 11 control objectives (92%) were similar to the study by Huissoud (2005), which focused on public sector audit organisations in Europe. In the Australian context, commonalities can also be found, as the Tasmanian study by Gerke and Ridley (2006), which focused on public sector organisations, shared 11 control objectives (92%) with the findings of this study. Given the similarities found between the Queensland results and previous studies, the consistencies between the results support the suggestion that the importance of some control objectives is independent of geographical context. In view of the difference in the organisational setting between previous studies, the results also demonstrate clear evidence that the importance of some control objectives is also independent of organisational type.

Consequently, the initial conceptual model was refined, as shown in Figure 6.2. This research concluded that an ITGEF for the Australian public sector can be adapted from the COBIT framework based on the ten high-level IT processes that are found in common across at least four previous studies to be of high importance.

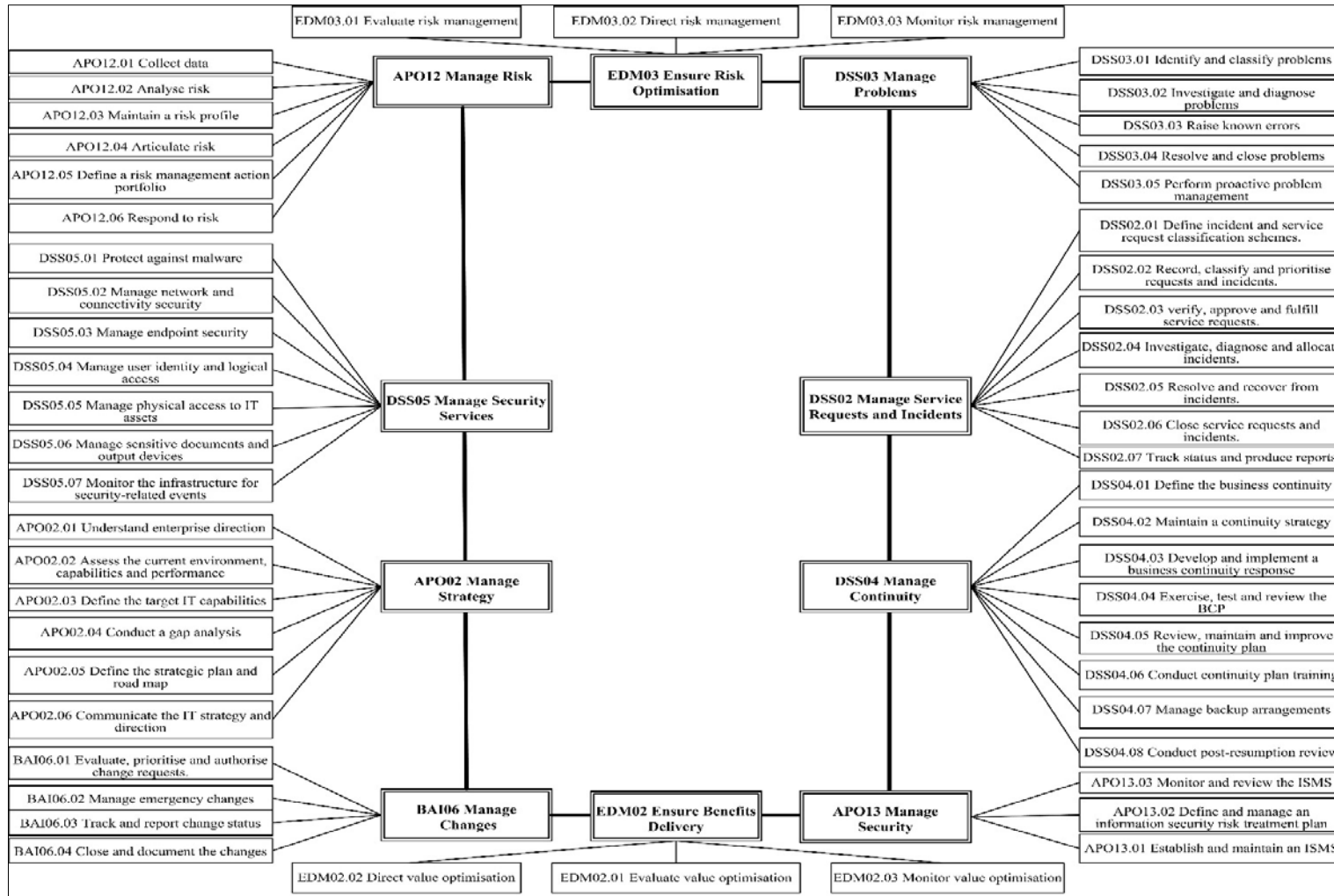


Figure 6.2. Adapted IT Governance Evaluation Framework (ITGEF) for public sector organisations.

### 6.3 SUMMARY

This chapter endeavoured to identify the high-level IT processes from the COBIT framework that were perceived by IT and audit professionals within Queensland PSOs in Australia as being important to their organisations at the time of the survey. From the most important processes, an adapted ITGEF, also referred to as a self-assessment tool or abbreviated list, for evaluating IT governance within PSOs was developed.

The high-level IT processes identified as being most important were drawn from four of the five broad domains in the COBIT 5 framework, namely; Evaluate, Direct and Monitor (EDM); Align, Plan and Organise (APO); Build, Acquire and Implement (BAI); Deliver, Service and Support (DSS); and Monitor, Evaluate and Assess (MEA), with the Monitoring domain seen as irrelevant and more focus given to the APO and DSS domains. This indicates a focus on early-cycle activities of IT governance instead of those concentrating on monitoring and evaluating. The abbreviated list initially derived contained 12 high-level IT processes. The high-level IT process seen to be most important, *DSS05 Manage Security Services*, was the same as that identified by prior national and international studies.

From the research results, three categories emerged when compared with six similar previous studies. The first category comprised ten high-level IT processes that have been previously identified by at least four previous studies, as well as this study, as being significant in their context. These included: *DSS05 Manage Security Services*, *EDM03 Ensure Risk Optimisation*, *APO13 Manage Security*, *DSS04 Manage Continuity*, *EDM02 Ensure Benefits Delivery*, *APO12 Manage Risk*, *BAI06 Manage Changes*, *APO02 Manage Strategy*, *DSS03 Manage Problems*, and *DSS02 Manage Service Requests and Incidents*. In addition, two of these ten high-level IT processes (*PO1 Define a Strategic IT Plan* and *AI6 Manage Changes*) have been identified by all six previous studies considered by this research as highly important, which implied that some high-level IT processes can be considered to be of high importance to organisations regardless of the context (international, national, or state). The second category consisted of two of the initial 12 high-level IT processes identified by this research that were common across at least one of the previous studies examined, namely, *DSS01 Manage Operations*; and *EDM01 Ensure*

*Governance Framework Setting and Maintenance.* The emphasis placed on the latter IT process in an Australian public sector context corresponds to the findings of Chapter 3, which identified the need to focus on IT governance frameworks. The third and final category included four high-level IT-processes that were identified by at least four previous studies as highly important but were not rated as such by this research. These included: *PO10 Manage Projects*; *AI2 Acquire and Maintain Application Software*; *DS11 Manage Data*; and *ME1 Monitor and Evaluate IT Performance*.

As only one similar study has been undertaken within the context of the public sector in Australia, limited insight could be obtained as a result of comparing the two studies. However, when the top-five high-level IT processes were put side by side, a shift from a planning and organising stage towards a focus on delivering and supporting could be identified. This signified that perhaps PSOs in Queensland have progressed within the IT governance implementation lifecycle when compared with counterpart organisations in Tasmania. Then again, the Tasmanian study is more than nine years old; current studies could demonstrate a similar progression as in Queensland.

The ten high-level IT processes common to at least four of the previous studies investigated as being important in other contexts and the initial list derived from this study were: *DSS05 Manage Security Services*, *EDM03 Ensure Risk Optimisation*, *APO13 Manage Security*, *DSS04 Manage Continuity*, *EDM02 Ensure Benefits Delivery*, *APO12 Manage Risk*, *BAI06 Manage Changes*, *APO02 Manage Strategy*, *DSS03 Manage Problems*, and *DSS02 Manage Service Requests and Incidents*. Given the similarities found between this research results and previous studies, the consistencies between the results supported the suggestion that the importance of some high-level IT processes are independent of geographical context. In view of the difference in the organisational setting between previous studies examined, the results also demonstrated clear evidence that the importance of some high-level IT processes is also independent of organisational type. As a result, this chapter concludes that an adapted ITGEF within the Australian public sector can be derived from the COBIT framework based on the ten high-level IT processes identified to be both enduring and relevant across geographical and organisational contexts as presented in Table 6.6.



Table 6.6

*Top-ten high-level IT processes for public sector organisations*

<b>Top-ten high-level IT processes</b>
DSS05 Manage Security Services
EDM03 Ensure Risk Optimisation
APO13 Manage Security
DSS04 Manage Continuity
EDM02 Ensure Benefits Delivery
APO12 Manage Risk
BAI06 Manage Changes
APO02 Manage Strategy
DSS03 Manage Problems
DSS02 Manage Service Requests and Incidents



# Chapter 7: Evaluating IT Governance across the Public Sector

---

In this chapter, following the survey research findings in Chapter 6, support for and refinement of the adapted IT Governance Evaluation Framework (ITGEF) is sought through conducting an evaluation of IT governance processes, or IT processes for short, in the Queensland public sector. This was in response to the research's third subordinate question, i.e. "How can public sector organisations (PSOs) evaluate IT governance using adapted best-practice frameworks?" To achieve this goal, this research activity evaluated IT governance in Queensland PSOs in terms of the capability levels of IT processes using the adapted ITGEF, which was then compared with PSOs in other Australian and international jurisdictions.

The remainder of the chapter is structured as follows: Section 7.1 outlines the case study research used, followed by analysis of the results in Section 7.2, and concluding with a summary and discussion in Section 7.3.

## 7.1 CASE STUDY RESEARCH

In order to gain a detailed understanding of the process for evaluating IT governance using the adapted ITGEF based on the COBIT model, previously unexplored in the Queensland public sector, exploratory case study research was deemed appropriate. Specifically, this research activity applied case study research considering that "where only limited theoretical knowledge exists on a particular phenomenon, an inductive research strategy can be a valuable starting point" (Siggelkow, 2007, p. 21). An inductive, multiple case study strategy was adopted as it facilitates the identification of practical insights to IT governance evaluation frameworks within several individual PSOs. It also allows "replication logic", whereby multiple cases are treated as a series of experiments, with each case serving to confirm, or not, the inferences drawn from previous cases (Yin, 2013). This approach also matches the research's paradigm (i.e., realism) and adds credibility to the study (Tsang & Kwan, 1999). In addition, the use of case study research permits a flexible and thorough approach by employing a variety of data sources and research methods (Denscombe, 2014).

### **7.1.1 The unit of analysis**

The unit of analysis in this research was the IT governance process that is in place, as this selection enabled the scope of the data collection to be clearly defined. The IT governance process specifically relates to the research questions discussed in Chapter 2. The IT governance process is composed of a series of detailed IT-related goals, process goals, practices, activities, and matrices that determine the achievement of the core outcomes of IT governance (ISACA, 2012b). In the evaluation of IT governance using the COBIT framework, organisations make assertions about the way in which these IT governance processes are met. This is verified by internal or external auditors or by conducting self-assessments. The COBIT framework utilises capability levels to assess IT processes on a scale from 0 (non-existent) to 5 (optimised). A more detailed discussion of capability levels can be found in Section 3.2. The process used to assign capability levels adopted a self-evaluation method as outlined in Section 7.1.3.

### **7.1.2 Selection of industry and cases**

Case selection involved three key decisions. First, a single sector (the public sector) was chosen to eliminate possible confounds that might arise from investigating multiple sectors. The research involved Queensland PSOs, which were selected for a number of reasons:

- PSOs are highly dependent on IT to support their core functions. IT governance is likely to be a significant concern to these organisations and the study therefore more relevant.
- PSOs are generally more supportive of research studies and consequently likely to assist in this study.
- Throughout Australia, PSOs are likely to be facing many of the same challenges and pursuing similar goals. This also allowed the exploration of how IT governance capability levels differ in organisations of a similar nature.
- Limiting to Australian-based case studies avoided the complications that may arise from the different laws and environments of other countries.

Second, individual cases were selected using a convenience sample<sup>6</sup> approach. The population included non-financial PSOs with over 50 full-time employees. The requirement was selected to ensure inclusion of organisations that have a complex governance structure, which more likely leads to utilising IT governance frameworks. Educational and financial organisations, health networks and hospitals, and foreign government representatives were excluded from the scope as some of these organisations are controlled by a combination of federal and state governments, such as universities (Liu & Ridley, 2005).

Third, two groups of survey respondents likely to be able to evaluate each IT governance process in the ITGEF were chosen for this research activity. The respondents selected were IT and audit staff members who could provide the most insight into the IT governance processes of the PSO and in particular the capability level of these processes.

### **7.1.3 Data collection**

The data collection process involved (1) inviting public sector organisations to participate in the study, (2) inviting potential respondents within participating organisations, and (3) developing the data collection instrument.

Ethical approval (QUT Ethics Approval No.: 1100001017) was received prior to inviting organisations or commencing data collection. Details of the PSOs considered for inclusion in the study were obtained from the Queensland government directory. The Chief Information Officer (CIO) or equivalent from each of the proposed case studies was sent an invitation to participate (M. Marshall, 1996). The letter (Appendix C item 1) outlined the purpose of the study and the methods of data collection, and sought the details (name, title, position, phone number, and email address) of potential respondents by return email. Along with the letter, CIOs were also provided with the participants' information sheet (Appendix C item 3). PSOs invited to participate were advised that the origin and details of individual respondents would not be directly identified in any publication or other material

---

<sup>6</sup> Convenience sampling is a non-random sampling strategy where participants are selected based on their accessibility and/or availability to the researchers.

arising from the research. This was considered an important factor in the success of the research, as obtaining the CIOs' permission conveyed top management support for the study. Participating PSOs returned this information and each person nominated by their organisation was emailed a personal invitation (Appendix C item 2) outlining the research study, its motivation, and information about the interview process. For each participating organisation, at least one senior member (i.e., a manager or above) from the IT and audit teams was selected. The total number of respondents was 25.

Of the 20 suitable PSOs in Queensland, 11 organisations, or 55%, agreed to participate<sup>7</sup>. Table 7.1 provides a summary of characteristics of each participating organisation in the study. It highlights the diversity of the cases in the sample. PSOs were coded alphabetically to protect the identity of each organisation. Data collection processes were designed to evaluate the levels of IT governance processes in PSOs using the ITGEF, as discussed in Chapter 6. Initially, a semi-structured, open-ended data collection instrument and interview protocol were developed for this research activity. However, on contacting nominated respondents to arrange a suitable time and place for the interview, every one of them indicated that they were, although keen to assist, uncomfortable with participating in a face-to-face interview and would prefer to respond to an anonymous questionnaire instead. As a result, the researcher decided to utilise an online questionnaire as a data collection instrument, as shown in Appendix C item 4. A questionnaire was considered an appropriate method to collect perceptions of capability levels from respondents within the organisations in our case study. A principal advantage of this technique was the ability to cost-effectively collect data in a timely fashion from a significant number of organisations. Where the data was collected from more than one person for a given process, the between-person variation was typically within one level of maturity. Data are, of course, self-reported and subject to bias.

---

<sup>7</sup> Information obtained on May 2013.

Table 7.1  
*Summary of key attributes of public sector cases*

Cases	Level	Size <sup>8</sup>	Organisational Type	No. of respondents
A	Local	Medium	Municipal	3
B	State	Small	Department (agency)	2
C	State	Medium	Department (agency)	2
D	State	Large	Department (agency)	3
E	State	Medium	Department (agency)	2
F	State	Small	Department (agency)	2
G	State	Small	Department (agency)	2
H	State	Medium	Department (agency)	2
I	Local	Small	Municipal	2
J	State	Large	Department (agency)	3
K	State	Large	Department (agency)	2

The first section of the questionnaire includes key ethical information, as required by the QUT Ethics Committee, and contains general information about the study, such as the research aim, suggested length of time required to complete the questionnaire, and guidance on how participants should complete the questions.

In the second section, respondents were asked to self-evaluate IT governance processes in their organisations based on the ITGEF, which contained ten high-level IT processes (see Figure 6.2), as this approach was consistent with that of the original study (Gerke & Ridley, 2009). The guidelines provided through the “Process Assessment Model (PAM): Using COBIT5” contained nine process capability levels to evaluate the IT governance processes of an organisation as described in Chapter 3 (see Figure 3.3). Taking one IT process at a time, the questionnaire introduces the process purpose and key practices from the PAM so that respondents could simply chose the process capability level for each of the nine attributes for that process.

For each organisation, a maximum of 100 data points were collected, which represents achievement levels for ten attributes (nine process attributes + level zero

---

<sup>8</sup> Large = full-time employees (FTEs) >5,000; medium = FTEs 1,000 to <5,000; small= FTEs <1,000 (Public Service Commission, 2014).

criteria question), for ten processes. When calculating the overall capability level for one process, the highest full or large achievement level of the nine attributes associated with that process was taken. Similarly, a simple average of responses was calculated when more than one score was given. The capability levels for the ten most important IT processes reported a mean for each process.

This research activity also prepared and analysed a list of possible process work products (WP) according to the evaluated IT processes (ISACA, 2013a). The WPs included strategic and operational plans, structures, processes, policies, frameworks, service level agreements, performance reports, and so forth. The nominated WPs were included in the data collection instrument to elicit well-informed responses by respondents. For instance, in the process *Manage Strategy – APO02*, respondents were instructed to consider the existence of a strategic IT plan as a work product of that process if it was the organisation's practice. In other words, this allowed the triangulation of different data sources, thus adding to the credibility of the evaluated IT governance processes (Yin, 2013). The list of possible WPs included in the self-evaluation instrument can be found in Appendix C item 5. The researcher was not able to validate independently the responses by inspection of each IT process WP listed or through other techniques. Therefore, based on the researcher's experience in the field, only two WPs were chosen and included in the questionnaire for each IT process as an indication of capability levels. The number of level 0 and level 1 responses received indicates the respondents seemed candid in the information they provided.

In the last section of the questionnaire, respondents were asked to rate the importance of 17 enterprise goals and 17 IT-related goals of IT governance of their respective organisations. This will assist in building a mapping between enterprise goals, IT-related goals, and IT governance processes similar to the goals cascade established by the COBIT 5 framework (ISACA, 2012b).

Before distributing the final version of the self-evaluation instrument, a web-based pilot was created. This pilot was posted online and four senior public sector IT auditors were asked to complete it for a real-life situation. Based on their comments and suggestions, the instrument was made more user-friendly and accessible. Data collection for this research activity was performed in the period April–August 2013.



After data collection, a draft case report for each organisation was sent back to respondents within that organisation for review and confirmation.

#### 7.1.4 Data analysis

The data collected from the questionnaire was analysed using Microsoft Excel to establish the capability level of selected IT governance processes within a public sector context. MS Excel was selected as an exploratory data analysis tool because of the combination of its simplicity and its capability to calculate and present the results in tables and graphs. Specifically, respondents' scores (from "not achieved" to "fully achieved") for each attribute description of the evaluated IT process were incorporated into an Excel workbook (see Table 7.2 as an example). This was carried out for the key practices (see Appendix C item 6) and statements of each capability level (from 0 to 5). Eventually, the capability level of each IT process was obtained. This was carried out for all ten IT processes in each studied organisation.

Table 7.2

*Example of detailed IT governance process capability evaluation*

Process name	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
<i>DSS05</i>	<i>Y/N</i>	<i>PA1.1</i>	<i>PA2.1</i>	<i>PA2.2</i>	<i>PA3.1</i>	<i>PA3.2</i>	<i>PA4.1</i>	<i>PA4.2</i>	<i>PA5.1</i>	<i>PA5.2</i>
Rating by criteria	Y	F	F	L	P	N				
Capability level achieved				2						
Rating scale:										
N: Not Achieved (0–15%)			P: Partially Achieved (15%–50%)			L: Largely Achieved (50%–85%)			F: Fully Achieved (85%–100%)	

All data collected was analysed in respect of each case study individually, across the case studies, and collectively for all case studies combined. The evaluation of the IT governance processes from this analysis is discussed further in the next section.

This study opted to distinguish between the utilisation of maturity and capability levels as these terms were found to be used loosely in previous studies. Often considered as similar concepts, *organisational maturity* applies to an organisation's overall maturity and is concerned with evaluating a set of process areas across an organisation, whereas *process capability* relates to evaluating a set of sub-processes and generic practices for a process area that can improve the

organisation's processes associated with that area (S. Huang & Han, 2006). A maturity level results from aggregating the capability levels of all capability areas and demonstrates the extent to which an organisation has developed its capabilities (Forstner, Kamprath, & Röglinger, 2014).

## **7.2 RESULTS AND INTERPRETATIONS**

Once the IT governance process capability levels were available for all cases, the aim was to meet the goal of this research activity and, in doing so, explore the question "How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?" by analysing the average process capability level for each IT governance process and average maturity level of the 11 studied PSOs. This also applies to the individual organisations' maturity levels and the comparison of their maturity levels with those of PSOs nationally and internationally.

The analysis of the average maturity level across the 11 studied PSOs involved calculating the average of each IT process capability level across these organisations. The averages provided the range within which the maturity levels of all assessed IT processes were calculated. The overall capability ratings of each IT process as evaluated by the respondents across all participating PSOs are presented in Table 7.3. The ten IT processes are presented in the order of priority for Queensland government organisations, as discussed in Chapter 4. The table also displays the means for the individual processes of each organisation as well as the overall mean for each IT process.

Table 7.3

*Summary of capability levels for the ten most important IT processes (in order of priority) for Queensland public sector organisations*

COBIT 5 high-level IT process	Organisation											Mean Capability level	
	A	B	C	D	E	F	G	H	I	J	K		
<i>DSS05 Manage Security Services</i>	3	3	1	2	2	2	2	3	2	1	4	2.3	2
<i>EDM03 Ensure Risk Optimisation</i>	2	2	1	3	2	2	2	3	2	1	2	2.0	2
<i>APO13 Manage Security</i>	3	2	2	3	2	2	1	3	1	1	3	2.1	2
<i>DSS04 Manage Continuity</i>	2	2	1	2	2	1	1	3	1	1	3	1.7	2
<i>EDM02 Ensure Benefits Delivery</i>	2	1	1	2	2	2	1	2	1	1	1	1.5	1
<i>APO12 Manage Risk</i>	2	1	1	2	1	1	1	2	2	1	3	1.5	2
<i>BAI06 Manage Change</i>	3	3	3	2	2	2	2	3	3	1	3	2.5	3
<i>APO02 Manage Strategy</i>	2	2	1	2	2	2	1	2	1	1	3	1.7	2
<i>DSS03 Manage Problems</i>	3	2	1	2	2	2	1	3	2	1	3	2.0	2
<i>DSS02 Manage Service Requests and Incidents</i>	3	3	4	3	2	2	1	3	3	2	3	2.6	3
Organisational maturity level	3	2	2	3	2	2	2	3	2	1	3	2.0	2

The analysis of the individual organisations' maturity levels was carried out using the obtained capability level for each IT process from each organisation's point of view. Different from the previous one, the capability levels of IT processes were compared at the level of individual organisations. Such comparisons provided the relative evaluation of the processes in each organisation and led to the individual organisations' maturity levels for the adapted ITGEF based on the COBIT model.

The maturity levels of Queensland PSOs were compared with those of PSOs nationally and internationally through the obtained capability levels of IT processes in Queensland PSOs with respect to the data obtained from previous studies. In this case, these data were from PSOs in Australia (Gerke & Ridley, 2006; Liu & Ridley, 2005) and internationally across a range of nations (Guldentops et al., 2002; Nfuka &

Rusu, 2010). This analysis was carried out with MS Excel as the exploratory data analysis tool, in which the capability levels of ten IT processes from the three groups of data (i.e. Queensland PSOs, nationally within Australia, and internationally) were incorporated and analysed, and visual representation created.

The following sections examine the capability levels assigned for each IT process and maturity levels across participating organisations.

### 7.2.1 Capability level analysis

#### *DSS05 Manage Security Services and APO13 Manage Security*

The most highly ranked IT process in the Queensland public sector, *DSS05 Manage Security Services*, is concerned with “protect[ing] enterprise information to maintain the level of information security risk acceptable to the enterprise in accordance with the security policy” (ISACA, 2012b) and was assigned a capability level of 3. While no organisation was assigned level 0 (incomplete), two reported level 1 (performed), and only one at level 4 (predictable). The low process evaluation for some individual cases may indicate a deficiency in the way that some aspects of this process were addressed within these organisations. In particular, two key practices of *DSS05*, as listed Appendix C item 6, received low capability scores by respondents, namely, “Information processed on, stored on and transmitted by endpoint devices is protected”, and “Electronic information is properly secured when stored, transmitted or destroyed”.

The third most important IT process from the COBIT 5 framework as perceived by Queensland PSOs, *APO13 Manage Security*, which deals with defining, operating, and monitoring a system for information security management, was also evaluated at capability level 3. Similar to the other security-related process, *DSS05*, none of the respondents perceived this process as incomplete or non-existent (level 0). However, the key practice item “Information security solutions are implemented and operated consistently throughout the enterprise” received a low score by some of the respondents (see Appendix C item 6). Considering the nature of this practice, factors such as organisational size may have contributed to the low score in some cases.

The Queensland government, through the Financial Accountability Act 2009, requires all PSOs to establish an internal controls framework in line with *Information*

*Standard 18: Information Security.* This standard seeks to ensure all agencies implement a consistent approach to the implementation of information security to protect information assets, and any ICT assets that create, process, store, view, or transmit information, against unauthorised use or accidental modification, loss, or release (Queensland Government Chief Information Office, 2011). This legislative requirement is expected to be a strong influence on security practices within the Queensland public sector and, therefore, would explain the high capability level for security-related IT processes in this study.

***EDM03 Ensure Risk Optimisation and APO12 Manage Risk***

The IT process *EDM03 Ensure Risk Optimisation* was ranked second most important in the adapted ITGEF and is focused on “ensur[ing] that IT-related enterprise risk does not exceed risk appetite and risk tolerance, the impact of IT risk to enterprise value is identified and managed, and the potential for compliance failures is minimised” (ISACA, 2012b). Although considered important by PSOs, the process scored a low capability level (2). Similarly, *APO12 Manage Risk*, which is concerned with the operational aspect of risk management and aims at identifying, assessing, and reducing IT-related risk, was also perceived at a low capability level of 2.

Moreover, two respondents evaluated *EMD03* as incomplete or non-existent (level 0), while only one evaluated *APO12* at the same level. In particular, one of the key practices for *EMD03*, “Risk thresholds are defined and communicated and key IT-related risk is known”, and another from *APO12*, “Risk management actions are managed as a portfolio of significant incidents not identified and included in the risk management portfolio”, were scored lower than other key practices (see Appendix C item 6). This signifies that there is a perception of lack of well-developed risk management frameworks and that identification of IT-related risks is poorly conducted within these organisations. It also demonstrates that there are perceived inconsistencies and a disconnect between IT risk management and enterprise risk management practices in PSOs.

***DSS04 Manage Continuity***

IT process *DSS04 Manage Continuity* is concerned with the business goal of “establish[ing] and maintain[ing] a plan to enable the business and IT to respond to incidents and disruptions in order to continue operation of critical business processes

and required IT services” (ISACA, 2012b). Of the five key practices associated with this process, three made reference to an established, effective, and communicated continuity plan. The majority of respondents perceived that there was no such plan in their respective organisations or considered this plan to be very basic and hardly fit for purpose, as reflected by evaluating the three corresponding key practices attributes “not achieved” or “partially achieved” (see Appendix C item 6). While many respondents indicated through their evaluation scores that the organisation’s business-critical information is available to the business in line with minimum required service levels, most suggested that the relevant continuity plans were poorly communicated and scarcely tested. This finding is reflected in the high score for key practice number one: “Business-critical information is available to the business in line with minimum required service levels.”

#### ***EDM02 Ensure Benefits Delivery***

Despite being ranked fifth in importance to PSOs, this IT process was indicated by many as almost impossible to achieve as it received the lowest capability score of 1 (Performed). *EDM02 Ensure Benefits Delivery*, which is concerned with optimising the value contribution to the business from IT services resulting from investments made by IT, was perceived to be managed poorly by many organisations as evidenced by six respondents evaluating this process at level 0 (non-existent). Likewise, most of the key practice areas within this process were not perceived by respondents to be effective in their organisations as they were evaluated as “not achieved” or “partially achieved” for most key practice areas (see Appendix C item 6). However, the wide variation among assigned key practices within this process may indicate an inconsistent approach to *value management* within individual organisations. To facilitate improved value realisation within the public sector, organisations need to manage their IT budgets in a way that delivers better performance through tying IT investments to business benefits.

#### ***BAI06 Manage Change***

The IT process *BAI06 Manage Change* is concerned with “enabl[ing] fast and reliable delivery of change to the business and mitigation of the risks of negatively impacting the stability or integrity of the changed environment” (ISACA, 2012b). This process was perceived as being among the high scores for IT processes, at capability level 3. In addition, none of its key practices was evaluated as “not

achieved” or “partially achieved” (see Appendix C item 6). This can be attributed to good stakeholder management and related interactive communication mechanisms in PSOs, which are likely to enhance organisational performance and more specifically change management practices.

#### ***APO02 Manage Strategy***

The objective of this IT process is to “provide a holistic view of the current business and IT environment, the future direction, and the initiatives required to migrate to the desired future environment” (ISACA, 2012b). Although identified as one of the ten most important IT processes in PSOs, the capability level for this process was among the lowest at level 2. Evaluation scores obtained from key practices (see Appendix C item 6) in practice number three, “Clear and concrete short-term goals can be derived from and traced back to specific long-term initiatives, and can then be translated into operational plans,” indicates inadequate linkage of both long- and short-term IT plans to the organisational long- and short-term plans. A possible interpretation is that respondents perceive IT strategy in their respective organisations as directionless, which could be partially due to these organisations still undergoing organisational reform due the recent machinery of government (MoG) changes. An alternative explanation is that respondents were not themselves part of forming the IT strategy within their organisations and therefore perceived that the outcome of the strategy did not take into account their views.

In addition, key practice number four, “IT is a value driver for the enterprise,” scored low in process attribute rating in comparison with other practice areas (see Appendix C item 6). This could be associated with the very low process capability rating assigned for *EDM02 Ensure Benefits Delivery*. In other words, if IT strategy is not driving the IT initiatives and investments then, without a doubt, very few benefits will be realised from these investment decisions.

#### ***DSS03 Manage Problems***

This process is focused on identifying and classifying problems and their root causes and provides timely resolution to preventing recurring incidents. The *DSS03 Management Problems* process was assessed by respondents in the public sector at capability level 2. As seen in Appendix C item 6, the majority of the key practices for this IT process, which are concerned with developing processes, were evaluated as “largely achieved” or “fully achieved” with the exception of key practices number

four: “Problems and resulting incidents are reduced.” Accordingly, this could lead to the assumption that this IT process has just built the required capabilities to achieve its objective but still needs to develop appropriate implementation mechanisms to realise the benefits.

### *DSS02 Manage Service Requests and Incidents*

While ranked last of the top-ten most important IT governance processes in the Queensland PSOs, the *DSS02 Manage Service Requests and Incidents* process received a high process capability score, at level 3. The aim of this process is to increase productivity and minimise disruptions by providing timely and effective response to user requests and resolution of all types of incidents. As indicated by the respondents’ evaluation scores, most cases are perceived to have well-developed policies and procedures around the management of service requests and incidents. This is reflected in the process key practice scores seen in Appendix C item 6. This could lead to the assumption that Queensland PSOs have a strong focus on service management and, subsequently, the availability of IT-related services. The Queensland Auditor-General Report to Parliament No. 4 (Queensland Audit Office, 2009) detailed a number of key security issues relating to security incident management and found that formal processes for security incident and problem management are not in place. This is expected to have been a strong influence on incident management within the Queensland public sector.

Figure 7.1 provides a box plot of the average capability level by IT process. The mean capability level for all ten COBIT 5 processes is at level 2 (managed process) but with a significant variation (SD 0.97), which is strikingly clear from the whiskers in the box plots below. There are outliers at the lowest and highest levels of capability for each of these processes. As shown in Figure 7.1 there are clear differences between the ten most important processes. The average level of process capability scores is relatively low within Queensland PSOs, with most processes having a mean capability level score between 1 (30%) and 2 (43%) on a scale from 0 to 5. Only 25% of the processes had a mean capability level of 3, while just 2% had a mean capability level of 4.



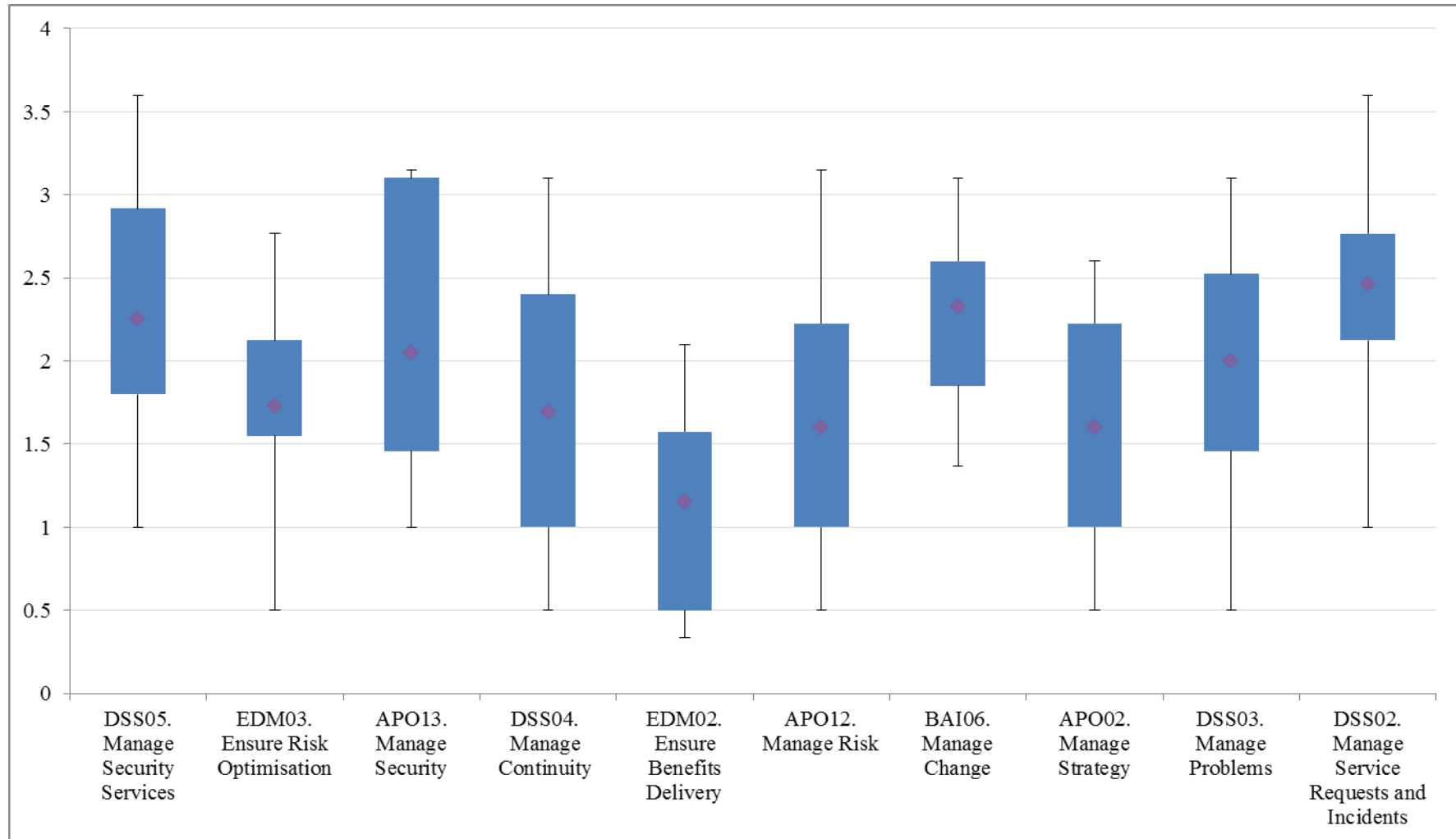
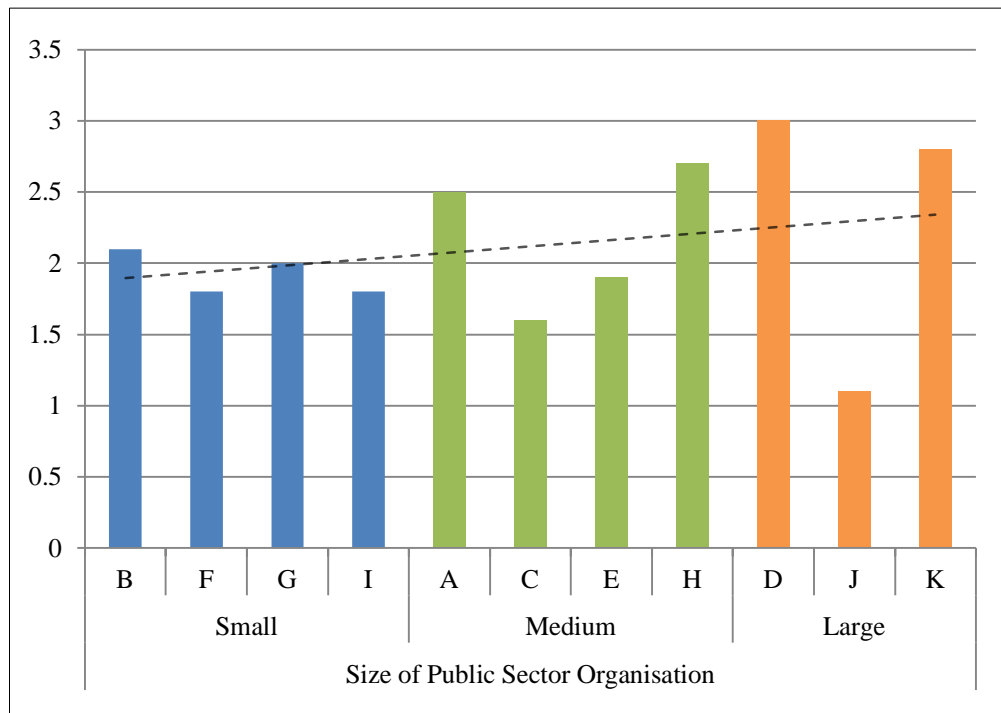


Figure 7.1. Range and distribution of capability level scores for the top-ten IT processes in Queensland PSOs.

### 7.2.2 Maturity level analysis

From a domain perspective, the Align, Plan and Organise (APO) and Deliver, Service and Support (DSS) domains are perceived to have lower capability levels than the other three domains. With the exception of *DSS05 Manage Security Services*, *DSS02 Manage Service Requests and Incidents*, and *APO13 Manage Security*, none of the IT processes from those two domains were in the top quartile of processes. Most of the processes in these domains are in the lowest quartile. An even more distinct result applies to the Evaluate, Direct and Monitor (EDM) domain, with one process (*EDM02 Ensure Benefits Delivery*) being in the lowest quartile of capability. The more prosaic process has a relatively higher level of capability (*EDM03 Ensure Risk Optimisation*). The Build, Acquire and Implement (BAI) domain was only represented by one process (*BAI06 Manage Change*), which was in the top quartile of processes. None of the processes from the Monitor, Evaluate and Assess (MEA) domain was considered of high importance by the Queensland PSOs.

Figure 7.2 demonstrates the maturity levels of Queensland PSOs grouped by the size of organisation (small, medium, and large). Although the mean maturity level of each category is very close at 1.9, 2.2, and 2.3 respectively, the trend line suggests that the size of the organisations was positively associated with overall IT governance maturity. Similar to previous research (Marrone, Gacenga, Cater-Steel, & Kolbe, 2014; Sethibe et al., 2007; Teo & Tan, 2010; Van Grembergen et al., 2004), the results of this research activity revealed that larger organisations attain on average higher maturity levels for their IT processes.



*Figure 7.2. Public sector maturity levels by size of organisation.*

### 7.2.3 Comparison with previous studies

Queensland PSOs' IT processes capability levels were compared with levels of PSOs from another Australian state (Gerke & Ridley, 2009), across Australia (Liu & Ridley, 2005), a developing country (Nfuka & Rusu, 2010), and internationally (Guldentops et al., 2002). Of the ten most highly ranked IT processes considered in this research, only four were included in all previous studies (see Table 7.4), suggesting the broadly accepted importance of these processes. The mean process capability levels (known as maturity levels in previous studies) of the IT processes from each of the other previous studies are displayed in Table 7.4, along with a comparison with those for the current study, set in Queensland.

Table 7.4

*IT process capability level means for common IT processes compared with previous studies*

<b>IT process<sup>9</sup></b>	<b>Current study</b>	<b>Nfuka and Rusu (2010)</b>	<b>Gerke and Ridley (2009)</b>	<b>Liu and Ridley (2005)</b>	<b>Guldentops et al. (2002)</b>
<i>Location</i>	<i>Queensland</i>	<i>Tanzania</i>	<i>Tasmania</i>	<i>Australia</i>	<i>International</i>
<i>DS5 Ensure Systems Security</i>	2.2	1.5	3.2	3.4	2.7
<i>DS4 Ensure Continuous Service</i>	1.7	2.0	3.5	3.2	2.3
<i>AI6 Manage Changes</i>	2.5	2.1	2.3	3.2	2.4
<i>PO1 Define a Strategic IT Plan</i>	1.6	2.0	2.8	2.9	2.2

As expected, the mean assigned capability level would not correspond to the order of importance of the IT process to the organisations, as seen from the previous studies results. The same could be said about this study as *DSS05*, which was perceived as the most important IT process in Queensland PSOs, was not the highest scoring IT process within the adapted ITGEF. For example, when considering the mean assigned capability levels, the Tasmanian public sector organisations were found to perform best in IT process *DS4* rather than in *DS5*. In the same way, Queensland PSOs were perceived to perform better in processes *BAI06* and *DSS02* rather than in *DSS05*. However, this is not the case for the study by Liu and Ridley (2005).

Notably, the highest difference was in process *DS05*, relating to IT security, indicating that IT systems in PSOs in Tanzania are less controlled and secure. Given the increasing use of IT in PSOs in developing nations, it seems that security practices are either less established or not yet developed (Nfuka & Rusu, 2010). In addition, the characteristic of well-defined legislative requirements for maintaining

<sup>9</sup> According to the mapping between IT processes from COBIT 4.1 and COBIT 5, as discussed in Chapter 5 and in line with the COBIT 5 standard (ISACA, 2012b). That is, *DS5* = avg. (*DSS05*, *APO13*); *PO1* = avg. (*EDM02*, *APO02*); *PO9* = avg. (*EDM03*, *APO12*); *DS10* = avg. (*DSS02*, *DSS03*).

the security of data and IT systems in developed countries may have acted to influence the mean assigned capability level found for IT security-related processes in PSOs from previous studies, including this one. For example, the capability level for IT security-related processes continued to be perceived at a high level, between 2.5 and 3, within Australian PSOs for the past ten years.

As data collection for this research activity took place shortly after a change of government in the state of Queensland in March 2012 and federally in September 2013, it is anticipated that the MoG processes were still in motion. Thus, PSOs were in what appeared to be a state of organisational restructure. In such a so-called transitional period, improving IT governance processes in general often receives less attention, as organisational resources are leveraged to support the new government policy outcomes. Organisational restructure, which is often induced by changes in government, is disruptive and unsettling for staff, and impacts negatively on productivity and processes (Crawford, Simpson, & Koll, 1999). This could be why the capability levels of some IT processes such as *DS4 Ensure Continuous Service* and *PO1 Define a Strategic IT Plan* decreased, while the capability level of some IT processes such as *AI6 Manage Changes* improved in times of uncertainty within PSOs. This could also explain the variation seen in Figure 7.2, notably for medium organisations 'C' and 'E' and large organisation 'J'.

When organisational maturity levels are calculated based only on the four common IT processes between all previous studies, it seems that the maturity level for the Queensland public sector (evaluated at level 2) is perceived to trail behind PSOs in Tasmania (evaluated at level 3) and Australian PSOs (evaluated at level 3), as displayed in Figure 7.3. However, when comparing the maturity level scores with those of previous studies, it is important to remember that the current study is based on results from 11 organisations, whereas, for example, the study by Gerke and Ridley (2009) focused on 9 organisations from a relatively smaller Australian state. Similarly, the study by Liu and Ridley (2005) gathered data from all states in Australia, including much larger organisations (e.g., federal agencies) and a more developed public sector (the New South Wales public sector).

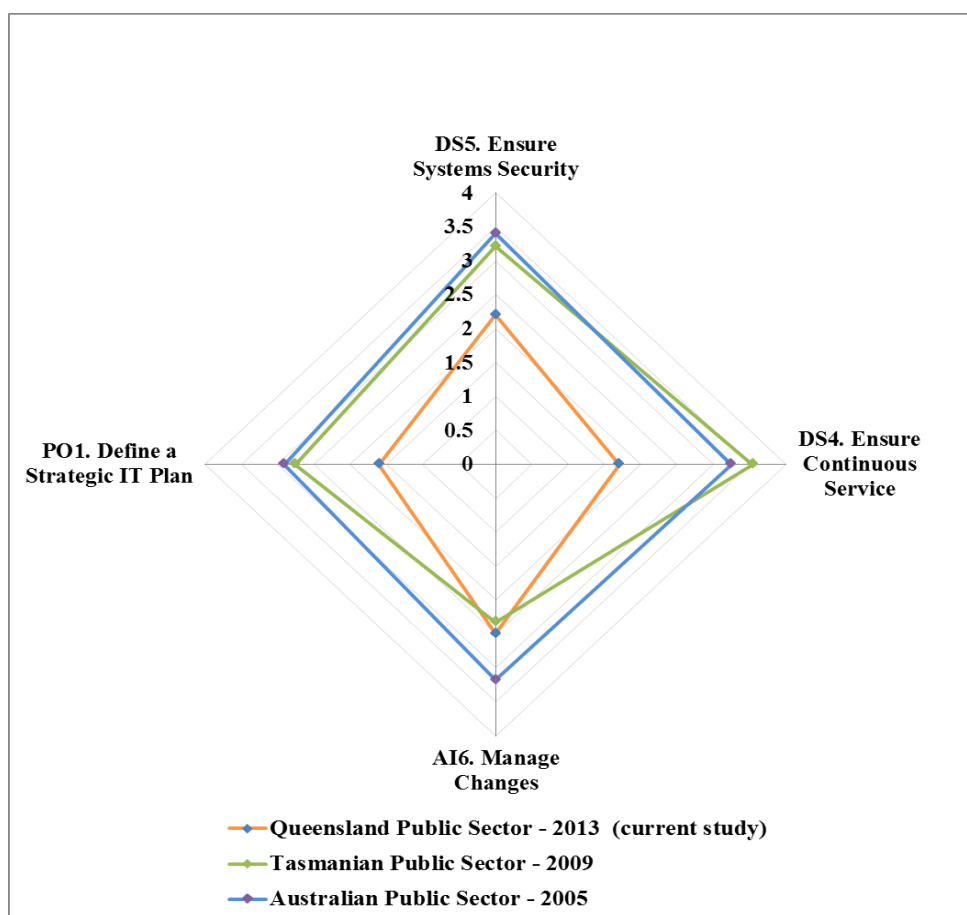


Figure 7.3. A comparison of Queensland public sector IT processes capability levels with public sector organisations from previous studies.

From an international public sector perspective, this study shared six IT processes of the ten most highly ranked in the adapted ITGEF from the COBIT framework, as displayed in Figure 7.4. Particularly, the results from a study by Guldentops et al. (2002) demonstrated that capability levels of IT processes, except one (AI6), are at higher levels than in the Queensland public sector. In addition, the maturity level of internal PSOs (level 3) is higher than the perceived maturity level of Queensland PSOs (level 2). Nevertheless, the evaluation criteria developed for the current study was based on COBIT 5, whereas a previous version of the framework (COBIT 4.1) was used in the international study. Similarly, the current study adopted the new *ISO/IEC 15504* process capability assessment model, whereas the previous utilised a generic maturity model. As a result, this could have led to a more rigorous evaluation of IT process capability scores, resulting in lower maturity levels for PSOs in Queensland.

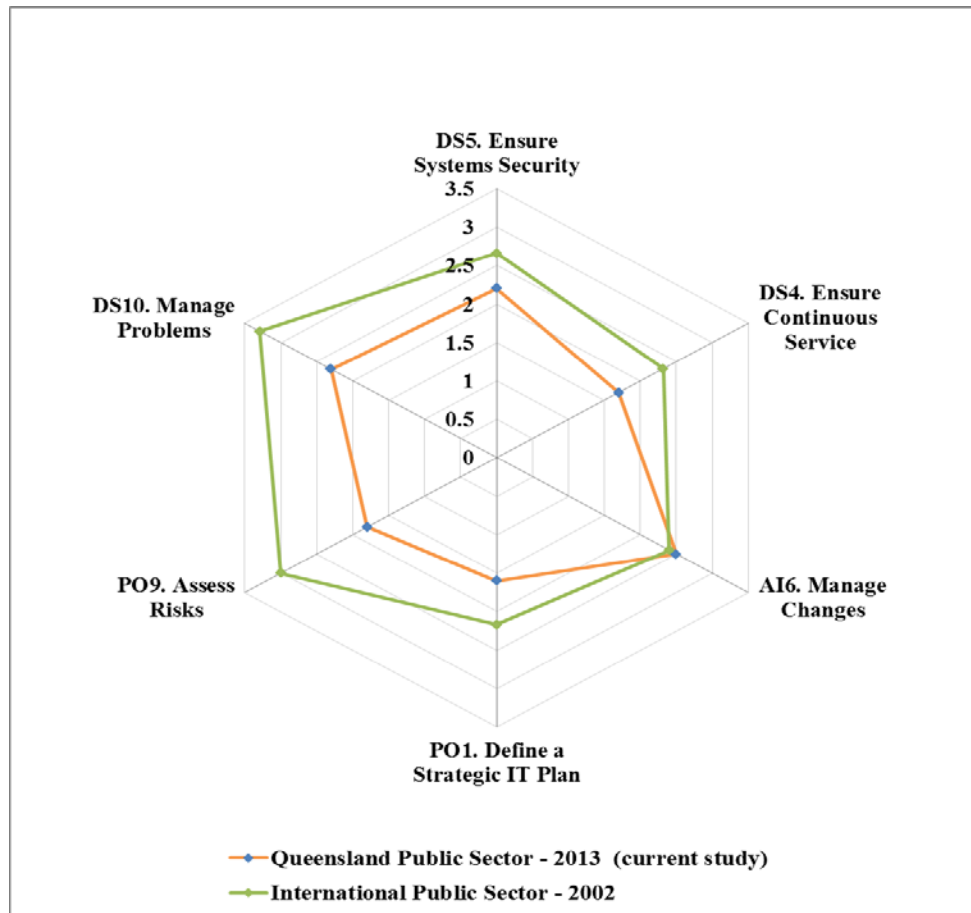


Figure 7.4. Comparison with public sector international benchmark results.

#### 7.2.4 Goals cascade

As discussed in Chapter 2, the COBIT goals cascade mechanism that translates and links stakeholders' needs into specific enterprise goals, IT-related goals, and COBIT IT processes. The questionnaire asked respondents to rate the importance for each of the 17 enterprise goals and 17 IT-related goals from the COBIT 5 framework according to their importance to the public sector on a five-point Likert-type scale. The focus of this undertaking is not on enterprise goals or IT-related goals themselves but rather to confirm, through the COBIT 5 goals cascade, the importance of the adapted ITGEF (see Figure 6.2) for the Queensland public sector. The results were analysed to produce a ranked list of enterprise goals and IT-related goals, and to provide a total score and average for each of the enterprise goals and IT-related goals. The enterprise goals and IT-related goals ranked list is presented in Table 7.5 and Table 7.6 respectively.

Table 7.5

*Rating for enterprise goals as perceived by Queensland PSOs*

<i>Tier</i>	<i>Rank</i>	<i>Enterprise goal</i>	<i>Mean</i>	<i>Total</i>	<i>T stat</i>	<i>P</i>
1	1	Customer-oriented service culture	4.64	116	-	-
	2	Stakeholder value of business investments	4.48	112	0.901	0.188
	3	Managed business risk (safeguarding of assets)	4.40	110	1.155	0.130
	4	Optimisation of service delivery costs	4.40	110	1.000	0.164
	5	Skilled and motivated people	4.40	110	1.187	0.124
	6	Optimisation of business process costs	4.36	109	1.238	0.114
2	7	Compliance with external laws and regulations	4.32	108	1.772	0.045
	8	Business service continuity and availability	4.32	108	0.000	0.500
	9	Product and business innovation culture	4.32	108	0.166	0.435
	10	Agile responses to a changing business environment	4.28	107	0.385	0.352
	11	Optimisation of business process functionality	4.28	107	0.253	0.401
	12	Operational and staff productivity	4.28	107	0.419	0.340
	13	Compliance with internal policies	4.20	105	1.000	0.164
	14	Financial transparency	4.16	104	0.720	0.239
	15	Information-based strategic decision-making	4.16	104	0.848	0.203
3	16	Portfolio of competitive products and services	3.96	99	2.387	0.013
	17	Managed business change programs	3.96	99	-0.214	0.416

As part of the statistical analysis employed by this research activity, the ratings were subjected to the paired sample student's t-test to identify significant differences between enterprise and IT-related goals. The test commenced from the top of the list, the highest ranked enterprise goal and the highest ranked IT-related goal both at  $p < 0.05$  and 24 degrees of freedom and continued until a group, or tier, was identified through detecting a significant difference. The test then recommenced using the first goal in the next grouping as the point of comparison until the list of 17 enterprise and 17 IT-related goals were exhausted and three groupings, or tiers, were identified for each category.



Table 7.6

*Rating for IT-related goals as perceived by Queensland PSOs*

<i>Tier</i>	<i>Rank</i>	<i>IT-related goal</i>	<i>Mean</i>	<i>Total</i>	<i>T stat</i>	<i>P</i>
1	1	Commitment of executive management for making IT-related decisions	4.68	117	-	-
	2	Alignment of IT and business strategy	4.60	115	0.440	0.332
	3	Realised benefits from IT-enabled investments and services portfolio	4.56	114	0.901	0.188
	4	Managed IT-related business risk	4.52	113	1.366	0.093
2	5	Delivery of IT services in line with business requirements	4.44	111	1.735	0.048
	6	Delivery of programs delivering benefits, on time, on budget, and meeting requirements and quality standards	4.44	111	0.327	0.373
	7	Security of information, processing infrastructure, and applications	4.40	110	0.492	0.314
	8	Optimisation of IT assets, resources, and capabilities	4.36	109	0.327	0.373
	9	Knowledge, expertise, and initiatives for business innovation	4.36	109	0.901	0.188
	10	IT agility	4.32	108	1.163	0.128
	11	Availability of reliable and useful information for decision-making	4.32	108	1.141	0.133
	12	Competent and motivated business and IT personnel	4.32	108	1.696	0.052
	13	Transparency of IT costs, benefits, and risk	4.28	107	0.681	0.251
	14	IT compliance and support for business compliance with external laws and regulations	4.24	106	1.310	0.102
3	15	Adequate use of applications, information and technology solutions	4.16	104	2.304	0.015
	16	Enablement and support of business processes by integrating applications and technology into business processes	4.16	104	0.327	0.373
	17	IT compliance with internal policies	4.00	100	1.225	0.116

Three groups of enterprise and IT-related goals were identified through the statistical analysis of the perceived ratings, presenting several points at which a priority list for each category could be formed. However, as no previous research could be found in the literature to compare against, and considering that the second tier in both lists contained at least 14 out of 17 goals, it was proposed that the perceived priority list of enterprise and IT-related goals for the Queensland public

sector consist of those controls in the first tier only. That is, the priority list for the enterprise goals was made of six goals, whereas the same list for IT-related goals consisted of four.

The purpose of the mapping table in Figure 7.5 is to demonstrate how enterprise goals are supported, or translate into, IT-related goals. Subsequently, Figure 7.6 contains the mapping table between the IT-related goals and how these are supported by IT processes, as part of the goals cascade (ISACA, 2012a). The results revealed that the required IT processes, a total of 28 IT processes, to support the perceived important IT-related goals for the Queensland public sector include the entire ITGEF total 10 IT processes, as perceived by the same sector (see Chapter 5). This validates the conceptual model (ITGEF) for IT governance evaluation in PSOs. This also allowed the triangulation of different data sources, thus adding to the credibility of the adapted ITGEF.

COBIT IT Processes	IT-related Goals															
	Customer-oriented service culture	Stakeholder value of business investments	Managed business risk (safeguarding of assets)	Optimisation of service delivery costs	Skilled and motivated people	Optimisation of business process costs	Compliance with external laws and regulations	Business service continuity and availability	Product and business innovation culture	Agile responses to a changing business environment	Optimisation of business process functionality	Operational and staff productivity	Compliance with internal policies	Financial transparency	Information-based strategic decision making	Portfolio of competitive products and services
Commitment of executive management for making IT-related decisions	Most important		Important													
Alignment of IT and business strategy																
Realised benefits from IT-enabled investments and services portfolio																
Managed IT-related business risk																
Delivery of IT services in line with business requirements																
Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards																
Security of information, processing infrastructure and applications																
Optimisation of IT assets, resources and capabilities																
Knowledge, expertise and initiatives for business innovation																
IT agility																
Availability of reliable and useful information for decision making	Least important															
Competent and motivated business and IT personnel																
Transparency of IT costs, benefits and risk																
IT compliance and support for business compliance with external laws and regulations																
Adequate use of applications, information and technology solutions																
Enablement and support of business processes by integrating applications and technology into business processes																
IT compliance with internal policies																

Figure 7.5. Mapping enterprise goals to IT-related goals.

COBIT 5 IT Processes	IT-related Goals				COBIT 5 Optimised Sub-set (most important IT processes as perceived by the Queensland Public Sector)
	Alignment of IT and business strategy	Commitment of executive management for making IT-related decisions	Managed IT-related business risk	Realised benefits from IT-enabled investments and services portfolio	
EDM01 Ensure Governance Framework Setting and Maintenance					
EDM02 Ensure Benefits Delivery					<input checked="" type="checkbox"/>
EDM03 Ensure Risk Optimisation					<input checked="" type="checkbox"/>
EDM04 Ensure Resource Optimisation					
EDM05 Ensure Stakeholder Transparency					
APO01 Manage the IT Management Framework					
APO02 Manage Strategy					<input checked="" type="checkbox"/>
APO03 Manage Enterprise Architecture					
APO04 Manage Innovation					
APO05 Manage Portfolio					
APO06 Manage Budget and Costs					
APO07 Manage Human Resources					
APO08 Manage Relationships					
APO09 Manage Service Agreements					
APO10 Manage Suppliers					
APO11 Manage Quality					
APO12 Manage Risk					<input checked="" type="checkbox"/>
APO13 Manage Security					<input checked="" type="checkbox"/>
BAI01 Manage Programmes and Projects					
BAI02 Manage Requirements Definition					
BAI03 Manage Solutions Identification and Build					
BAI04 Manage Availability and Capacity					
BAI05 Manage Organisational Change Enablement					
BAI06 Manage Changes					<input checked="" type="checkbox"/>
BAI07 Manage Change Acceptance and Transitioning					
BAI08 Manage Knowledge					
BAI09 Manage Assets					
BAI10 Manage Configuration					
DSS01 Manage Operations					
DSS02 Manage Service Requests and Incidents					<input checked="" type="checkbox"/>
DSS03 Manage Problems					<input checked="" type="checkbox"/>
DSS04 Manage Continuity					<input checked="" type="checkbox"/>
DSS05 Manage Security Services					<input checked="" type="checkbox"/>
DSS06 Manage Business Process Controls					
MEA01 Monitor, Evaluate and Assess Performance and Conformance					
MEA02 Monitor, Evaluate and Assess the System of Internal Control					
MEA03 Monitor, Evaluate and Assess Compliance with External Requirements					

Figure 7.6. Mapping enterprise goals to IT-related goals and adapted ITGEF.

### 7.3 SUMMARY

The majority of recent IT governance research in Australia has focused on accountability, decision-making requirements, structures and mechanisms, and factors reflecting localised contexts for adoption and implementation. However, a significant yet understudied aspect of IT governance is the capability of PSOs to meet the ever-increasing resources and budget challenges through employing effective IT processes. Measuring IT process capability is considered important to ensure successful governance over IT. Nonetheless, very little empirical data on the level of process capabilities in the public sector context exist. In an effort to overcome this clear gap in the research literature, this research activity endeavoured to seek support for and refinement of the ITGEF adapted from the COBIT model within selected state PSOs in Queensland and to compare the evaluation results with those obtained by other studies.

The adapted ITGEF in Chapter 6 contains four IT processes from COBIT that were also used by previous studies to conduct an evaluation of IT processes. These were: *DSS05 Manage Security Services*; *DSS04 Manage Continuity*; *BAI06 Manage Change*; and *APO02 Manage Strategy*. The remaining six IT processes, *EDM02 Ensure Benefits Delivery*; *EDM03 Ensure Risk Optimisation*; *APO12 Manage Risk*; *APO13 Manage Security*; *DSS02 Manage Service Requests and Incidents*; and *DSS03 Manage Problems*, were not included in the previous studies, and so may reflect the particular needs of the Queensland government organisations that participated in this study.

The proposed ITGEF was considered as appropriate by a number of methods, including triangulation and perceived relevance of the evaluation program. The trial of the ITGEF showed that it contained few evaluation measures that were not relevant to other jurisdictions in Australia or international PSOs, which suggests that its development was appropriate.

The results in this study show that (1) the overall level of process capability in the Queensland public sector is relatively modest; (2) undertaking IT governance evaluation based on COBIT 5 is significantly more rigorous than earlier versions of the framework; (3) there is considerable inter-process variability in capability levels as some processes that were expected to have relatively high capability level were

relatively underdeveloped; and (4) there is similar inter-organisational variation in process capability and maturity level within the Queensland public sector, which appears to be linked to the organisational size.

On that note, the results demonstrated that larger organisations tend to have higher IT governance maturity than smaller organisations. Therefore, when studying PSOs with approximately 15,000 employees, IT governance maturity levels of between 2.5 and 3 should be expected. Insufficient literature exists to determine whether that maturity level is sufficient or not.

In retrospect, it seems highly impractical for PSOs to achieve capability level 5 in all process areas. So, what is the ideal capability level these organisations need to achieve for each process area? It appears that PSOs can very well be successful with a capability level 2 or 3 for most process areas. Depending on business objectives or the type of services being offered, PSOs can aim for specific process areas to be at a higher capability level. In other cases, there would be no incentive or a justified business case for trying to achieve a higher capability level for a given process area.

The results suggest that the adapted version of the COBIT 5 model was fit for conducting an evaluation of IT governance and was contextualised to the needs of Queensland PSOs. Accordingly, this study adds credibility to practitioner reports that it is possible to implement COBIT to produce an effective ITGEF that reflects the needs of individual organisations or sectors.

# Chapter 8: Exploring Factors that Influence Adoption of an Adapted IT Governance Evaluation Framework

---

In this chapter, following the case study research findings in Chapter 7, factors that influence adoption of the IT governance evaluation framework (ITGEF) adapted from the COBIT model are explored in a public sector context. This was in response to the research's fourth subordinate question, "What factors influence the adoption of adapted IT governance evaluation frameworks within a public sector context?" To achieve this goal, this research activity derived a model combining the theoretical foundations of the Technology Acceptance Model (TAM) and the Technology–Organisation–Environment (TOE) framework to explore the relevance of the antecedents of innovation adoption in the context of public sector organisations (PSOs). Subsequently, hypotheses were unearthed from the model and tested.

The remainder of the chapter is structured as follows: Section 8 outlines the development of the conceptual model and survey research used; analysis of the results in Section 8.2; and a summary and discussion in Section 8.3.

## 8.1 SURVEY RESEARCH

This research activity employed a quantitative research design, utilising a survey to determine factors that influence adoption of an IT governance evaluation framework (ITGEF), which was adapted from a best-practice model, within the public sector, in particular the ITGEF developed in Chapter 6. Conducting a survey was deemed appropriate as it was considered the most direct method of obtaining data regarding users' perceptions and intentions, and because of its ability to generate great amounts of data from a large number of respondents (Lu, Hsu, & Hsu, 2005). Using a survey for this research activity resembled the many prior innovation-related studies examined by Tornatzky and Klein (1982), which found that more than 54.7% of previous studies examined employed survey research methods to gather data.

The survey was administered electronically via a web-based questionnaire. The instrument for data collection was based on known theories and associated body of

knowledge. Data was collected and reported, and statistical analysis of the collected data was undertaken to test the hypotheses. The next sections describe the survey design.

### **8.1.1 Development of conceptual model**

As discussed in previous chapters, TAM was “designed to understand the causal chain linking external variables to its user acceptance and actual use in a workplace” (Davis & Venkatesh, 1996, p. 20). According to Venkatesh and Davis (2000), the determinants discussed by TAM are perceived usefulness (PU), which is defined as “the extent to which a person believes that using the system will enhance his or her job performance” (p. 187), and perceived ease of use (PEU), defined as “the extent to which a person believes that using the system were free of effort” (p. 187). This research utilised TAM, as it has been tested and validated over the years to examine users’ acceptance of different information systems (IS) innovations within different contexts and has proven to be a “powerful and robust predictive model of a person’s willingness to accept and use a technology” (King & He, 2006, p. 751). TAM allows the inclusion of and can incorporate antecedents and components from other models to enhance its predictability and practicality, which in turn enables development of more actionable strategies for improving IS usage (Anderson, Al-Gahtani, & Hubona, 2012). In addition, TAM was chosen as a foundation on which to build a better model for investigation of the factors that influence the adoption of adapted ITGEF within the public sector context. TAM is highly relevant within the area of innovation adoption and is thus a major component of the research conceptual model.

ITGEFs have not been subject to review from the perspective of the classical TAM (Parker, 2013). Therefore, individuals’ perceptions with respect to both PU and PEU were captured in this research. TAM provided the theoretical basis and was applied in the context of ITGEF adoption in PSOs as displayed in Figure 8.1.



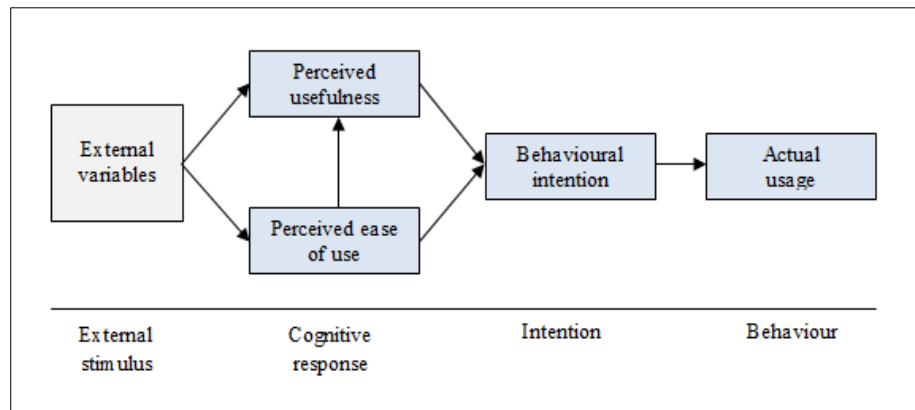


Figure 8.1. Technology Acceptance Model (Davis & Venkatesh, 1996, p. 20).

Subjective norm is referred to as the degree to which an individual perceives that, in the opinion of others, they should adopt the new innovation (Venkatesh et al., 2003). As illustrated in Figure 8.2, subjective norm reflects a person's intention to adopt through the referent of others' actions or organisations' requirements (Burda & Teuteberg, 2013). Thus it is suggested that, when an innovation is relatively new, users may have insufficient knowledge or information by which to formulate their own intentions towards adopting it (Maduka, Sedera, Srivastava, & Murphy, 2014). Therefore intent to adopt the adapted ITGEF can be influenced greatly by the opinions expressed by others (Salim, Sedera, & Sawang, 2014). In the context of the public sector, where the organisation or management makes the majority of the critical decisions, a strong influence could arise from external pressures such as government legislation. Pressure could also come from the organisation itself, for example, by the organisational culture and management directives.

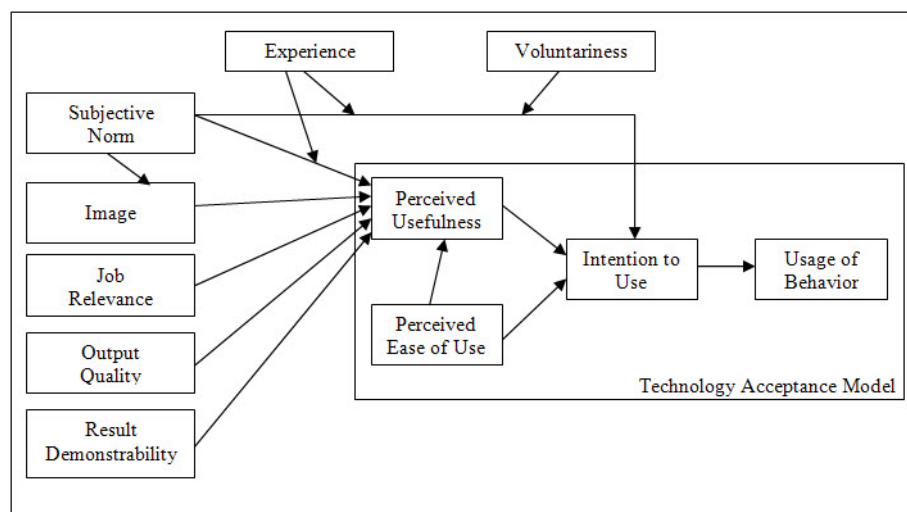
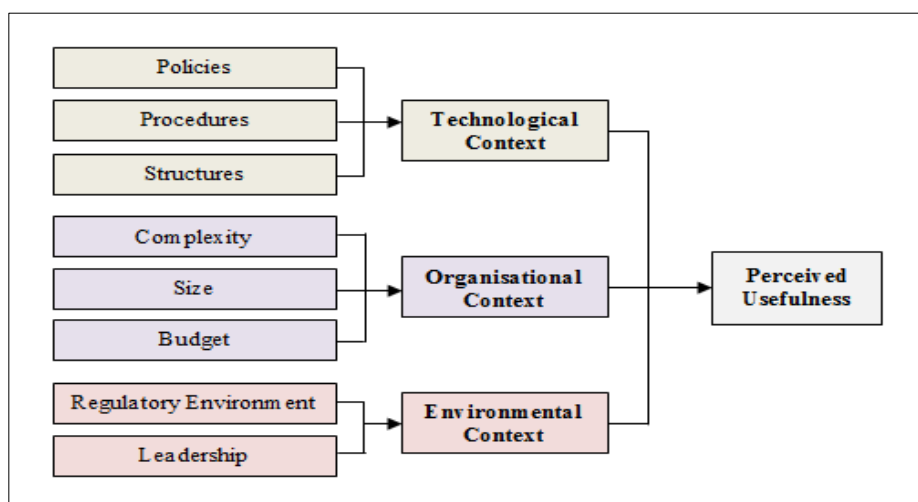


Figure 8.2. Extension of TAM (TAM2) by (Venkatesh & Davis, 2000, p. 188).

The TOE framework, also discussed in Chapter 2, identifies three aspects that influence the process of adopting technological innovations by organisations, namely, the organisational, technological, and environmental factors. The literature has revealed that the TOE framework has broad applicability and possesses explanatory power across a number of technological, industrial, and national or cultural contexts. In addition, the elements of technology, organisation, and environment have been shown to influence the way organisations identify the need for and adopt new technologies (Baker, 2012). Similar to previous research studies (e.g., Parker, 2013), the TOE framework has been incorporated into the conceptual model to explore external variables influencing the adoption of ITGEF in PSOs, as displayed in Figure 8.3.



*Figure 8.3.* Conceptual model: expanded TOE-based conceptual model for ITGEF adoption. Adapted and derived from Tornatzky and Fleischer (1990).

Similar to the study by Parker (2013), technological context was measured by the establishment level of policies, procedures, and structures, such as steering committees, that support internal processes. Organisational factors may influence both the need for, and the ability to, implement ITGEFs. These included descriptive measures such as complexity, size, and budget. The environmental context looked at the surroundings within which the public sector operates. These factors include the role of leadership and level of regulatory environment. The degree of regulatory oversight is an important environmental factor for decision-makers because it reflects potential risk and cost of non-adoption.

### Combination of factors

Similar to the expansion of TAM into TAM2 by Venkatesh and Davis (2000), external factors as described by TOE, combined with the perceptions and intentions of individuals, as addressed in TAM, were incorporated into the research model, as displayed in Figure 8.4. The research model addresses the relationships between the TOE factors and the perceived usefulness within TAM of the adapted ITGEF.

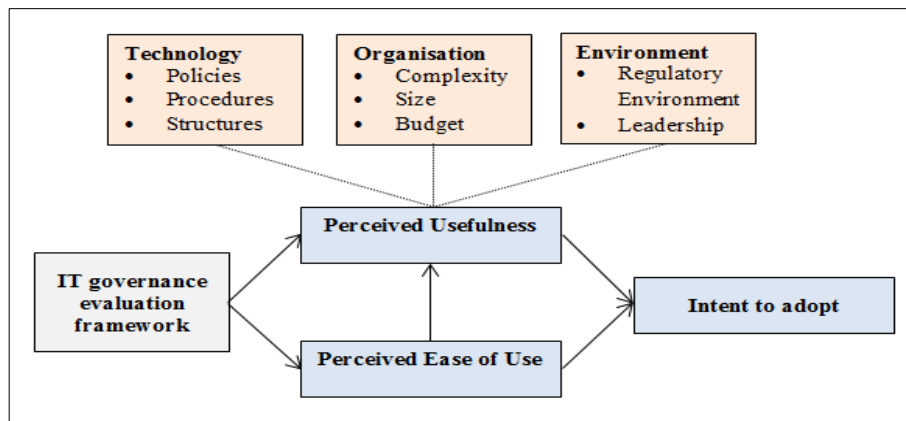


Figure 8.4. Research model: TOE factors impact on TAM's perceived usefulness. Adapted and derived from Tornatzky and Fleischer (1990) and Venkatesh and Davis (2000).

The impact of key technology, organisational, and environmental factors may influence PU, hence affecting the actual intent to adopt the adapted ITGEF. Similarly, the TOE factors may influence the intent to adopt outside of any impact on PU (see Figure 8.5). However, PEU may or may not be a major factor in ITGEF adoption (Parker, 2013). PEU on its own may not be a determinant, although it could be one of the factors influencing PU.

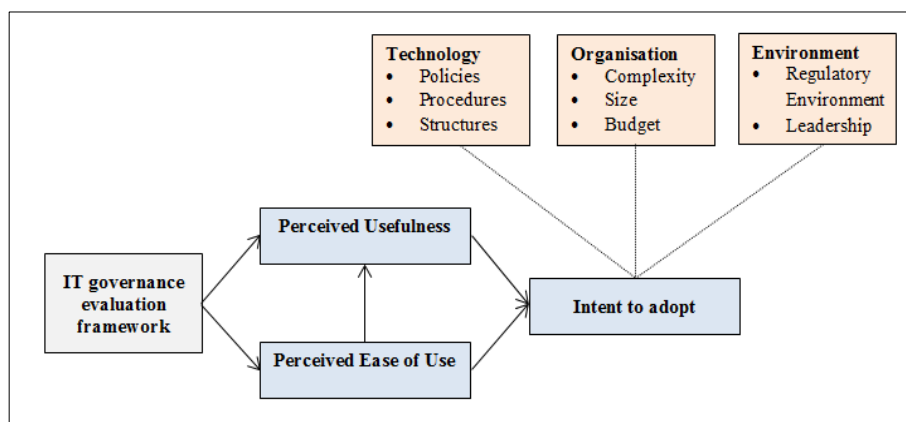


Figure 8.5. Research model: TOE and TAM influence intention. Derived from Agarwal and Prasad (1997); Tornatzky and Fleischer (1990); and Venkatesh and Davis (2000).

The TAM and TOE constructs and the relevant associated derivations and prior research underpinnings are presented in Table 8.1 and Table 8.2.

Table 8.1

*Derivation of TAM constructs*

<b>Construct</b>	<b>Factor</b>	<b>Variable Name</b>	<b>Resource</b>
<b><i>Perceived Usefulness</i></b>	<i>PU1</i>	Quickly	(Davis, 1989; Jones et al., 2010; Parker, 2013)
	<i>PU2</i>	Productivity	(Davis, 1989; Jones et al., 2010; Montgomery, 2011; Parker, 2013)
	<i>PU3</i>	IncPerformance	(Jones et al., 2010; Montgomery, 2011; Parker, 2013)
	<i>PU4</i>	Useful	(Davis, 1989; Jones et al., 2010; Parker, 2013)
	<i>PU5</i>	OrgEffective	(Davis, 1989; Jones et al., 2010; Parker, 2013)
<b><i>Perceived Ease of Use</i></b>	<i>PEU1</i>	EasyUse	(Davis, 1989; Parker, 2013)
	<i>PEU2</i>	ClearUnderstanding	(Davis, 1989; Parker, 2013)
	<i>PEU3</i>	Frustrating	(Davis, 1989; Miville, 2005; Parker, 2013)
	<i>PEU4</i>	LearnEasy	(Davis, 1989; Parker, 2013)
<b><i>Intention to Use</i></b>	<i>I1</i>	IntendUse	(Jones et al., 2010; Lu, Hsu & Hsu, 2005; Parker, 2013; Venkatesh & Davis, 2000)
	<i>I2</i>	WillUseReg	(Parker, 2013; Venkatesh & Davis, 2000)
	<i>I3</i>	AmAdvocate	(Parker, 2013; Venkatesh & Davis, 2000)
	<i>I4</i>	UseMandated	(Parker, 2013; Venkatesh & Davis, 2000)
<b><i>Subjective Norm</i></b>	<i>SN1</i>	OrgUse	(Parker, 2013; Venkatesh & Davis, 2000)
	<i>SN2</i>	ImportantThink	(Jones et al., 2010; Parker, 2013; Venkatesh & Davis, 2000)
	<i>SN3</i>	PeersThink	(Parker, 2013; Venkatesh & Davis, 2000)
	<i>SN4</i>	MgmtConcern	(Parker, 2013; Venkatesh & Davis, 2000)
	<i>SN5</i>	DoMgtWant	(Jones et al., 2010; Miville, 2005; Parker, 2013)

Table 8.2

*Derivation of TOE constructs*

<b>Construct</b>	<b>Factor</b>	<b>Variable Name</b>	<b>Resource</b>
<i>Technology</i>	<i>T1</i>	Policy	(Parker, 2013; Zhu et al., 2002)
	<i>T2</i>	Steering	(Parker, 2013; Zhu et al., 2002)
	<i>T3</i>	StdProcedures	(Parker, 2013; Zhu et al., 2002)
<i>Organisation</i>	<i>O1</i>	People	(Parker, 2013; De Haes & Van Grembergen, 2008; Zhu et al., 2002)
	<i>O2</i>	OrgValue	(Parker, 2013; Zhu et al., 2002)
	<i>O3</i>	Complex	(Parker, 2013; Zhu et al., 2002)
<i>Environment</i>	<i>E1</i>	HiReg	(Parker, 2013; Zhu et al., 2002)
	<i>E2</i>	StratLeadship	(Parker, 2013; Zhu et al., 2002)

**8.1.2 Development of hypotheses**

As a result of the literature review of the subject areas, hypotheses were developed to investigate factors that influence the adoption of the adapted ITGEF within the context of the individual's attitude and perceived expectations in the public sector. The research model (see Figure 8.6) was based on the original TAM developed with intermediate variables of PU and PEU, and additional constructs specific to the context being studied. The external factors may have a direct influence on the intent to adopt the adapted ITGEF or indirectly via an impact on the PU of the TAM framework.

Using the Agarwal and Prasad (1997) model, the independent variables describing differences are the TOE factors of technology, organisation, and environment, while the dependent variable is the intent to adopt innovation (i.e., ITGEF). The hypotheses tested in this study correspond with the relationships depicted in the research model (see Figure 8.6) described above. The specific detailed components of the hypotheses addressing each of the factors are illustrated in Table 8.3.

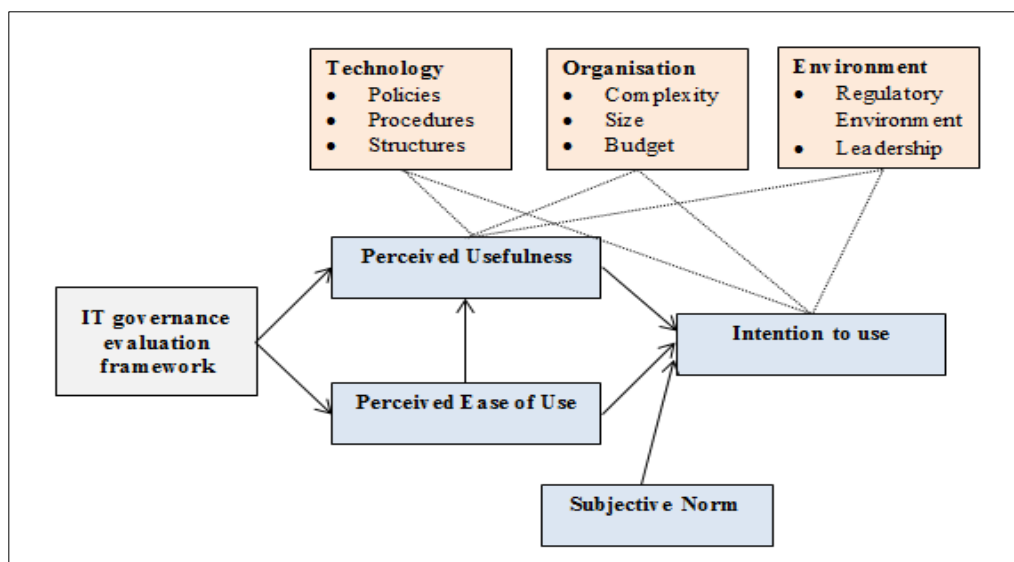


Figure 8.6. Research model (composite model): TOE and TAM influence intention to adopt. Derived from Agarwal and Prasad (1997); Parker (2013); Tornatzky and Fleischer (1990); and Venkatesh and Davis (2000).

Table 8.3

*Research hypotheses*

Category	Index	Hypothesis
Technology Acceptance Model (TAM)	H1	There is a positive relationship between the perceived ease of use (PEU) and the intent to adopt (I).
	H2	There is a positive relationship between the perceived usefulness (PU) and the intent to adopt (I).
	H3	There is a positive relationship between the perceived ease of use (PEU) and perceived usefulness (PU).
	H4	There is a positive relationship between the subjective norms (SN) and the intent to adopt (I).
Impact of technology (T)	H5	There is a positive relationship between technology factors (T) and perceived usefulness (PU).
	H6	There is a positive relationship between technology factors (T) and intent to adopt (I).
Impact of organisation (O)	H7	There is a positive relationship between organisational factors (O) and perceived usefulness (PU).
	H8	There is a positive relationship between organisational factors (O) and intent to adopt (I).
Impact of the environment (E)	H9	There is a positive relationship between environmental factors (E) and perceived usefulness (PU).
	H10	There is a positive relationship between environmental factors (E) and intent to adopt (I).

### 8.1.3 Data collection

In general, self-administered questionnaires are regarded as a cost-effective method for collecting a wide variety of data from a large number of participants (Spacey, Goulding, & Murray, 2004). In line with Kitchenham and Pfleeger (2002) the suggestion that researchers should utilise “previously developed relevant validated instruments or questions that [they] can adopt” (p. 20), the instrument for this research activity was based on prior research (Davis, 1989; Jones et al., 2010; Miville, 2005; Parker, 2013; Venkatesh & Davis, 2000) as the previously developed scales were intended to be generally applicable to a wide variety of innovations and thus were considered appropriate for use in this study. The specific survey questions were derived from the theoretical research model described previously. For each of the hypotheses postulated, the data points necessary to confirm or refute it formed the basis for the survey questions. The specific questions for this study and their theoretical underpinnings are detailed in Appendix D item 1.

The questionnaire is divided into three sections, as set out in Appendix D item 3, along with the theoretical underpinnings of the questions. An introduction and background to the research is presented, which includes the adapted ITGEF based on the COBIT model as discussed in Chapter 6, and provides instructions to the respondents for completing the survey. The first section requests demographic information relating to the respondent, such as position level, academic education level, number of industry certifications held, years of experience, and views on the role of frameworks in the public sector. The second section poses questions about the organisation where respondents work, such the budget of the organisation, the number of IT employees, and the leadership, complexity, and regulatory environment within which the organisation operates. The third section consists of 18 questions as follows: five questions relating to PU, four questions relating to PEU, five questions relating to subjective norms, and four questions assessing the intent to adopt the proposed ITGEF.

Some questions gathered factual data while others captured opinions of the respondents. According to Biffignandi and Bethlehem (2012), factual questions are those that obtain information about facts. As the focus was on the relativity of the factors, factual characteristics, such as size and budget, were treated as ordinal data. Theoretical constructs were then operationalised and measured using items derived

from validated surveys from previous research but were adapted for the current context. Multi-item scales were used similar to previous research by Jones et al. (2010); Parker (2013); and Lu et al. (2005). A “non-responsive” option in the form of “other” and “not sure” was included for most questions to mitigate the risk of loss of an entire response because of a missing data item.

A pre-test (or pilot test) was performed on a selective sample of six participants to ensure validated unambiguity and to provide feedback on the survey questions. The pre-test data were not used as part of the content analysis. The questionnaire was then refined before being distributed to the target population. A convenience sampling using personal contacts was used to select subjects as this sampling technique is considered “helpful in obtaining a range of attitudes and opinions and in identifying tentative hypotheses that can be tested more rigorously in further research” (Galloway, 2005, p. 862). Additionally, snowball sampling was used for this research activity, whereby the initial subjects were requested to generate additional subjects. Subjects were forwarded, via email, an electronic version of the survey questionnaire in a Microsoft Word format and a copy of the research information and consent sheet (see Appendix D item 2). In addition, the researcher personally solicited and distributed hard copies of the questionnaire to attendees of the monthly events and conferences hosted by the Brisbane chapter of the Information Systems Audit and Control Association (ISACA) over the period from October 2014 to March 2015. Data collected was then entered into a Microsoft Excel spreadsheet in an aggregated format to ensure anonymity and confidentiality.

#### **8.1.4 Data analysis**

Pre-analysis data screening was undertaken to aid in detecting problems with the data, such as ensuring accuracy and dealing with the issues of response set, missing data, and extreme cases or outliers (Clarke, 2011). As suggested by Kitchenham and Pfleeger (2003), responses were vetted for consistency and completeness. This was kept to a minimum through the instrument design and implementation as the survey instructions required that all items on a page be answered, even if by the “not sure” or “other” options. Nevertheless, a very small number of responses (three) were found to be incomplete. These were rectified by either communicating with the respondent in person at the events to draw their attention to the missing data. The issue of response sets was non-existent, as all



responses were inspected and no instances were found where answers to all questions were the same. If data were missing and contact with the respondent to seek clarification failed, the response was ignored. The last step in the data screening process included examining the data to detect outliers and extreme cases through the Mahalanobis  $D^2$  measure. According to Hair et al. (2009), in order to improve the ability to generalise for the entire population, observations with a value of 2.5 in a small sample or 3–4 in large samples can be identified as possible outliers. However, no responses were identified as outliers in this case.

Initially, basic descriptive statistical analysis was applied. After that, structural equation modelling (SEM) was used as the most appropriate statistical approach to facilitate the simultaneous examination of the effects of the independent constructs on the intent to adopt the adapted ITGEF. As indicated by Hair et al. (2009), SEM has become prevalent for analysing the cause-and-effect relations between latent constructs within a variety of disciplines. The partial least squares (PLS) approach to SEM offers an advanced form of regression and principal component analysis that examines the relationship between dependent and independent variable matrixes. PLS-SEM is used to test the measurement and structural models concurrently and develop theories in exploratory research. Another advantage offered by PLS also pertinent to this study is that it can handle smaller sample sizes and is not constrained to data sets that meet the homogeneity or normality requirements required by other techniques. For example, ordinal data such as organisations' IT department size and budget would not necessarily meet data requirements necessitated by other techniques. Therefore, this technique was considered suitable for this study.

## **8.2 RESULTS AND INTERPRETATIONS**

The sample for this study was comprised of employees with responsibility, exposure to, or knowledge of IT governance from PSOs across Queensland. The exact number of surveys distributed could not be determined as convenience and snowballing techniques were used to distribute the survey. The survey instrument was distributed in person and using email and captured 71 validated responses. The number of observations met both the suggested size considerations: that it should be the larger if ten times the largest number of formative indicators used to measure one

construct or ten times the largest number of structural paths directed at a particular construct in the structural model (Ringle, Sarstedt, & Hair, 2013, p. 23).

In addition to the main focus of investigating factors that influence adoption of the adapted ITGEF, the survey also captured certain baseline understandings. Specifically, respondents' understandings of ITGEFs in general, the extent of implementation, and other maturity indicators were collected to provide more useful insights into the population and thus enhance the applicability of the findings.

### **8.2.1 Descriptive statistics**

The frequency distribution displays the variables of position level, education level, number of industry certifications, and years of experience. Table 8.4 presents the frequency distribution for the survey respondents.

Table 8.4

*Frequency distribution*

<b>Demographic details</b>	<b>Frequency</b>	<b>%</b>
<b>Position level</b>		
C-suite (CIO/CEO/CTO)	0	0
Director (IT/IS/business/audit)	18	25.25
Manager (IT/IS/business/audit)	18	25.25
Senior officer (IT/IS/business/audit)	24	34
Officer (IT/IS/business/audit)	11	15.5
<b>Academic education level</b>		
Certificate or similar	0	0
Undergraduate degree	9	13
Postgraduate certificate	37	52
Postgraduate degree	25	35
Other	0	0
<b>Number of industry certifications</b>		
None	8	11.5
One	38	53.5
Two	20	28
Three or more	5	7
<b>Years of experience in an IT-related field</b>		
Up to 2 years	0	0
2–6 years	6	8.5
7–10 years	33	46.5
More than 10 years	31	44
Other – not in IT; prefer not to disclose, etc.	1	1

The survey captured perceptions regarding the nature of ITGEFs. The description and understanding of ITGEFs indicated the degree to which respondents considered a framework to be a (required) standard, an (optional) best practice, or a benchmark (tool). As presented in Table 8.5, the results showed that 34% (24 respondents) considered ITGEFs are to be used as an optional best practice, 35% (25 respondents) elected benchmarking tool, 17% (12 respondents) each specified the use of ITGEFs as mandatory, while 14%, (10 respondents) selected “other”, which could be any combination of the specified options.

Table 8.5

*Nature of IT governance evaluation frameworks usage in Queensland PSOs*

<b>Nature of ITGEF</b>	<b>Frequency</b>	<b>%</b>
Best practice (optional)	24	34
Benchmark	25	35
Standard (requirement)	12	17
Other – including “not sure”	10	14

The reported types of deployment of governance frameworks were consistent with prior studies regarding the implementation of adapted or customised frameworks, as shown in Table 8.6. The majority of the respondents (51%) had implemented a customised IT governance framework. In addition, the majority of respondents indicated that their organisation has a governance framework in place (82%), while only 18% indicated that no governance framework was existent. However, only a minority (4%) of these had a standard implementation of governance frameworks. Despite the relatively high proportion that reported that other implementation types had been used, no further insight into those responses was possible.

Table 8.6

*IT governance frameworks implementation type in Queensland PSOs*

<b>Implementation type</b>	<b>Frequency</b>	<b>%</b>
Standard implementation	3	4
Customised or influenced by	36	51
Non-existent	13	18
Other – including “not sure”	19	27

Some of the observations made by examining these tables of frequency include the following: there is a strong correlation between the years of experience and the IT governance framework implementation type as more than 50% of respondents with “7–10 years” and “more than 10 years” of experience indicated that their organisations utilise a customisation of an IT governance framework. However, the same respondent group were not decisive on the nature of IT governance frameworks, as only 33% perceived IT governance frameworks to be either best

practice or a benchmark. A similar correlation exists between the position level of respondents and the IT governance framework implementation type, as more than 50% of respondents with senior positions (manager and director) indicated that their organisations utilise a customisation of an IT governance framework. However, no correlation was found between the same respondent group and the nature of IT governance frameworks. Similarly, no correlations were found among other variables.

### **8.2.2 Statistical analysis**

Statistical analyses were undertaken after the screening procedures described above, with a focus on the extent to which the data confirmed or rejected the hypotheses postulated in Section 8.1.2. The model analysis component of this study explored the relationships between TAM attitudes and the intent to adopt the adapted ITGEF through analysis of the survey data. It also investigated the moderating effects of the TOE factors.

To complete the analysis, PLS using SmartPLS<sup>10</sup> was used. PLS recognises two models: the measurement model (or outer model) and the structural model (or inner model). The former relates the measurements to their own latent variables, whereas the latter relates some endogenous latent variables to other latent variables. A latent variable is an exogenous variable if it never appears as a dependent variable, or is an endogenous variable (H. Wang, Meng, & Tenenhaus, 2010).

#### *Instrument validity and reliability*

According to Ifinedo (2006), measurement models are comprised of relationships among the conceptual factors and the measures underlying each construct. They are assessed by examining reliability and validity. Reliability is the extent to which a measurement gives results that are consistent, whereas validity is the degree to which an assessment or instrument measures what it is supposed to measure. Prior to testing for significant relationships in the structural model, it is necessary to test that the measurement model has a satisfactory level of reliability and validity (Ifinedo, 2006).

---

<sup>10</sup> SmartPLS was selected as an appropriate software for the research because of its ability to perform the SEM analysis and convey the results using a graphical representation instead of a formal or mathematical representation of the PLS path model.

The degree to which the set of indicators of a variable is internally consistent in its measurements is measured through reliability (Hair et al., 2009). Composite reliability and composite validity were examined to measure consistency reliability. The value of composite reliability should be 0.70 or higher for good reliability, as indicated by Hair et al. (2009). The value of the composite reliability of the different latent variables, as shown in Table 8.7, exceeded the recommended acceptable limit indicating reliability.

Table 8.7

*Model reliability*

Construct	Composite reliability	Cronbach Alpha
Intent to adopt (I)	0.935	0.908
Perceived ease of use (PEU)	0.822	0.749
Perceived usefulness (PU)	0.867	0.805
Technology (TECH)	0.906	0.844
Organisation (ORG)	0.886	0.806
Environment (ENV)	0.877	0.742
Subjective norm (SN)	0.892	0.841

Cronbach's Alpha is another measure used for assessing reliability and consistency, which can also be used in quantifying unidimensionality.<sup>11</sup> When the Cronbach's Alpha value is larger than 0.70, the set of examined indicators are considered to be unidimensional (Hair et al., 2009). As shown in Table 8.7, the values of Cronbach's Alpha ranged from 0.739 to 0.908 for the latent variables, which indicated reliability.

Ifinedo (2006) indicated that the two main dimensions for testing the measurement model validity are convergent validity and discriminant validity. *Convergent validity* refers to the extent to which items on a scale are theoretically correlated. A loading of greater than 0.70 indicates convergent validity (Chin, Marcolin, & Newsted, 2003). Table 8.8 presents the loadings for the outer model. The loadings ranged from 0.73 to 0.95 indicating convergent validity. One variable

<sup>11</sup> A unidimensional construct is "one in which the set of indications has only one underlying concept in common" (De Jong & Nooteboom, 2000, p. 44).

scored lower than 0.70 but higher than 0.50 (i.e., PeersThink); however, it was not removed from the model as its respective construct's Cronbach's Alpha value was higher than 0.70 and also its AVE value was higher than 0.50 (Hair et al., 2009).

Table 8.8

*Outer model loadings*

Variable	I	PEU	PU	TECH	ORG	ENV	SN
<i>AmAdvocate</i>	0.84						
<i>IntendUse</i>	0.935						
<i>UseMandated</i>	0.821						
<i>WillUseReg</i>	0.939						
<i>ClearUnderstanding</i>		0.759					
<i>EasyUse</i>		0.674					
<i>Frustrating</i>		0.664					
<i>LearnEasy</i>		0.826					
<i>IncPerformance</i>			0.789				
<i>OrgEffective</i>			0.611				
<i>Productivity</i>			0.83				
<i>Quickly</i>			0.824				
<i>Useful</i>			0.691				
<i>Policy</i>				0.941			
<i>StdProcedures</i>				0.96			
<i>Steering</i>				0.7			
<i>Complex</i>					0.896		
<i>OrgValue</i>					0.774		
<i>People</i>					0.876		
<i>HiReg</i>						0.813	
<i>StratLeadship</i>						0.949	
<i>DoMgtWant</i>							0.873
<i>ImportantThink</i>							0.804
<i>MgmtConcern</i>							0.796
<i>OrgUse</i>							0.933
<i>PeersThink</i>							0.5

The average variance extracted (AVE) is another measure of convergent validity. Values higher than 0.50 indicate convergent validity (Fornell & Larcker, 1981). Table 8.9 shows the average variance extracted for each latent variable. The values were greater than the 0.50 threshold, indicating convergent validity.

Table 8.9

*Average Variance Extracted*

<b>Latent variable</b>	<b>AVE</b>
Intent to adopt (I)	0.784
Perceived ease of use (PEU)	0.537
Perceived usefulness (PU)	0.570
Technology (TECH)	0.766
Organisation (ORG)	0.723
Environment (ENV)	0.781
Subjective norm (SN)	0.619

Hair et al. (2009) refer to *discriminant validity* as the extent a construct or variable is distinct from another variable or construct. To establish discriminant validity, the square root of AVE in each latent variable is used to check if this value is larger than other correlation values among the latent variables (Fornell & Larcker, 1981). For example, the latent variable PEU's AVE is found to be 0.537 (from Table 8.9), hence its square root becomes 0.733. This number is larger than the correlation values in Table 8.8 for the column of PEU (0.734, 0.694, 0.358, and -0.012) and also larger than those in the row of PEU (-0.042, 0.406, 0.084, and 0.734). As shown in Table 8.10, no correlations were equal to or greater than the square root of the average variance extracted. The result indicates that discriminant validity is well established.

Table 8.10

*Latent variable correlations*

<b>Construct</b>	<b>AVE</b>	<b>ENV</b>	<b>I</b>	<b>ORG</b>	<b>PEU</b>	<b>PU</b>	<b>SN</b>	<b>TECH</b>
<b>ENV</b>	0.781	0.884						
<b>I</b>	0.784	-0.021	0.885					
<b>ORG</b>	0.723	-0.065	0.181	0.850				
<b>PEU</b>	0.537	-0.042	0.406	0.084	0.734			
<b>PU</b>	0.570	0.063	0.732	0.083	0.694	0.754		
<b>SN</b>	0.619	-0.138	0.559	0.057	0.358	0.563	0.793	
<b>TECH</b>	0.766	0.037	-0.106	0.074	-0.012	-0.165	-0.177	0.875



In addition, discriminant validity was also tested by reviewing the cross-loadings. As indicated by Hair et al. (2009), the loading of an indicator on its assigned latent variables should be higher than its loadings on all other latent variables. Table 8.11 demonstrates that the loading of an indicator on its assigned latent variables was higher than on all other latent variables. Based on the analysis, the variables were distinct and unidimensional; thus, convergent and discriminant validity were found to be psychometrically sound in this study.

Table 8.11

*Cross-loadings*

Variable	I	PEU	PU	TECH	ORG	ENV	SN
<i>AmAdvocate</i>	<b>0.839</b>	0.39	0.551	0.092	0.218	0.099	0.558
<i>IntendUse</i>	<b>0.937</b>	0.502	0.785	0.137	0.174	0.008	0.492
<i>UseMandated</i>	<b>0.818</b>	0.133	0.403	0.008	0.113	0.041	0.475
<i>WillUseReg</i>	<b>0.94</b>	0.332	0.7	0.121	0.123	0.043	0.463
<i>ClearUnderstanding</i>	0.253	<b>0.756</b>	0.326	0.021	0.172	0.122	0.142
<i>EasyUse</i>	0.337	<b>0.688</b>	0.682	0.066	0.071	0.025	0.48
<i>Frustrating</i>	0.149	<b>0.663</b>	0.139	0.016	0.037	0.137	0.141
<i>LearnEasy</i>	0.338	<b>0.822</b>	0.561	0.029	0.153	0.051	0.179
<i>IncPerformance</i>	0.337	0.539	<b>0.807</b>	0.2	0.02	0.026	0.586
<i>OrgEffective</i>	0.531	0.441	<b>0.616</b>	0.116	0.151	0.002	0.529
<i>Productivity</i>	0.451	0.66	<b>0.847</b>	0.158	0.018	0.057	0.511
<i>Quickly</i>	0.563	0.649	<b>0.818</b>	0.067	0.044	0.1	0.444
<i>Useful</i>	0.148	0.314	<b>0.659</b>	0.1	0.113	0.147	0.243
<i>Policy</i>	0.101	0.054	0.178	<b>0.944</b>	0.085	0.019	0.222
<i>StdProcedures</i>	0.109	0.008	0.158	<b>0.961</b>	0.043	0.054	0.171
<i>Steering</i>	0.066	0.033	0.091	<b>0.694</b>	0.071	0.02	0.015
<i>Complex</i>	0.159	0.106	0.053	0.046	<b>0.896</b>	0.082	0.073
<i>OrgValue</i>	0.16	0.013	0.058	0.185	<b>0.775</b>	0.083	0.051
<i>People</i>	0.141	0.093	0.092	0.047	<b>0.876</b>	0.001	0.02
<i>HiReg</i>	0.031	0.112	0.024	0.126	0.045	<b>0.809</b>	0.065
<i>StratLeadship</i>	0.013	0.001	0.064	0.016	0.065	<b>0.952</b>	0.146
<i>DoMgtWant</i>	0.498	0.302	0.439	0.23	0.053	0.157	<b>0.844</b>
<i>ImportantThink</i>	0.292	0.053	0.461	0.203	0.069	0.1	<b>0.82</b>
<i>MgmtConcern</i>	0.327	0.113	0.148	0.047	0.034	0.237	<b>0.747</b>
<i>OrgUse</i>	0.568	0.307	0.492	0.185	0.172	0.042	<b>0.906</b>
<i>PeersThink</i>	0.406	0.545	0.68	0.003	0.051	0.049	<b>0.575</b>

### Assessing the structural model

The structural model provides information as to how well the theoretical model predicts the hypothesised relationships or paths (Ifinedo, 2006). Path coefficients and the size of the squared multiple correlations (R-squared) values were used to estimate the relationships. As described by Chin et al. (2003), R-squared values indicate the percentage of the variance of the constructs, whereas path coefficient values indicate the strengths of relationships between constructs. Chin et al. (2003) also recommends that path coefficients range between 0.20 and 0.30, along with measures that explain 50% or more of the variance in the latent variable or model. The values of the path coefficients and R-squared are shown in Figure 8.7.

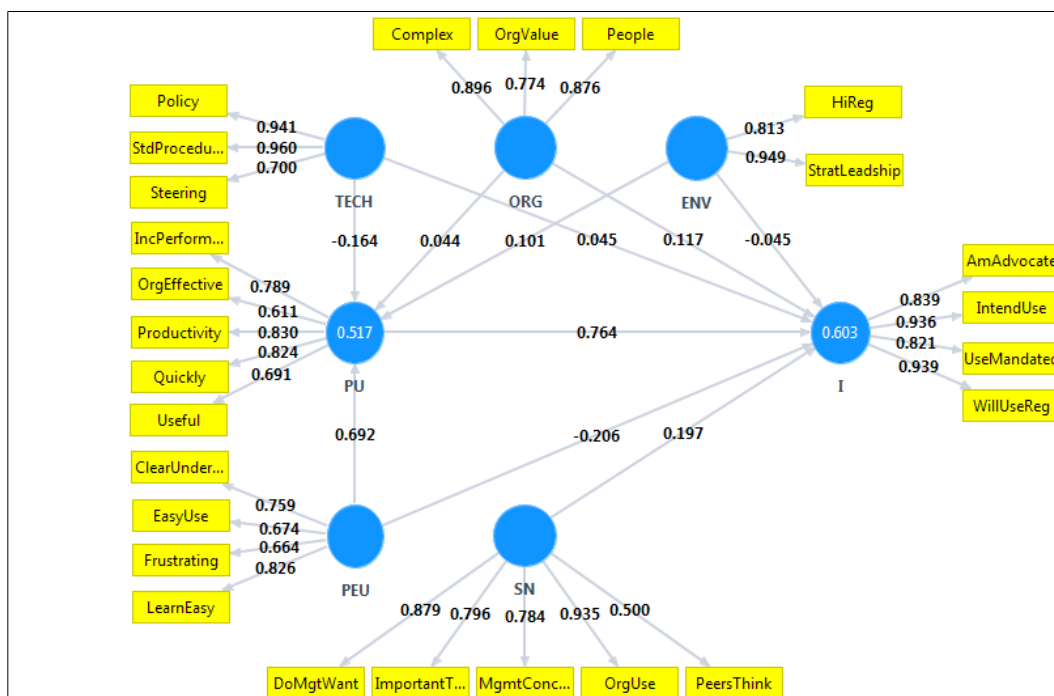


Figure 8.7. Structural model.

Inconsistent with the hypothesis, and somewhat unexpected, there was a negative, albeit slight, relationship between PEU and I (intent to adopt), with a path coefficient of  $-0.206$ . However, it is important to note that PEU also had an indirect yet stronger effect through PU,  $0.692 \times 0.764 = 0.529$ , with a total effect of  $0.327$ , which is almost as strong as that of PU.

As hypothesised, PEU had a significant effect on PU, with a path coefficient of  $0.692$ . Also as hypothesised, PU had a significant effect on I, with a path coefficient of  $0.764$  and similarly SN had a moderate effect on I, with a path coefficient of

0.197. This is consistent with prior research regarding the subjective norms (Jones et al., 2010; Venkatesh & Davis, 2000). However, it is different from findings by Taylor and Todd (1995), who found that, by adding subjective norms to the “relatively simple TAM” (p. 171), the ability of the model to predict IT adoption and usage behaviour did not increase substantially.

The TOE criteria were hypothesised to have an impact on the intent to adopt the proposed ITGEF either directly or by moderating its perceived usefulness. Full mediation for the new construct is established when the inclusion of a new construct into a model changes the strength of the path of an existing construct from significant to non-significant (Hair et al., 2009).

According to Henseler and Fassott (2010), two approaches exist for estimating moderating effects with regression-like techniques, namely, the *product term* approach and the *group comparison* approach. The first approach was used by means of assessing the significance of moderating (or indirect) effects by explicitly modelling the two paths both with and without the mediating construct. Subsequently, both the full TAM–TOE model and the more basic TAM were constructed. However, the full TAM–TOE model analysis did not support an effect from the technological, organisational, or environmental characteristics. On the other hand, support for TAM without the potential moderators of the TOE criteria was clearly evident. The second approach entails a comparison of model estimates for different groups of observations by utilising grouping based on a categorical moderator variable. However, in this case, the data were insufficient, in both variety across the factors and also in quantity, to split out for comparative studies of each subset.

Inconsistent with the hypothesis, technological factors had a very slight negative effect on both perceived usefulness and intent to adopt. Well-established internal processes were actually found to be a negative factor, implying that, in this mature sample, respondents who felt that policies, procedures, and structures were well established in their organisation perceived ITGEFs to be of less use or unnecessary. Organisational factors that were addressed included perceived complexity, size, and budget (in terms of IT department). Consistent with the hypothesis and similar prior research (R. Huang et al., 2010a), there was a slight impact of the organisational factors on both perceived usefulness and intent to adopt.

The relationship between environmental factors of perceived management support and the regulatory environment and perceived usefulness was positive but minor. Surprisingly, there was a negative, albeit very slight, relationship between the environment and intent to adopt. This implies that regulatory considerations were not a significant driver for this population. This aspect in particular may be skewed by the preponderance of a single highly regulated sector but it provides insight into what may have been considered an important determinant – the environment.

Evaluating the structural model was also conducted through a review of the total effects as shown in Table 8.12. Perceived ease of use had a moderate effect on intent to adopt and a strong effect on perceived usefulness. Similarly, perceived usefulness had a strong effect on intent to adopt. Subjective norm also had a moderate effect on intent to adopt. Technology factors had a negative moderate effect on perceived usefulness and a negative insignificant effect on intent to adopt. Organisational factors had an insignificant effect on perceived usefulness and moderate effect on intent to adopt, whereas environment factors had a moderate effect on perceived usefulness and insignificant effect on intent to adopt. The constructs of PU and SN account for most of the variance (63%) in I in the model. However, overall TOE factors had an insignificant effect on PU and on I.

Table 8.12

*Total effects*

<b>Construct</b>	<b>ENV</b>	<b>I</b>	<b>ORG</b>	<b>PEU</b>	<b>PU</b>	<b>SN</b>	<b>TECH</b>
<b>I</b>							
<b>PEU</b>		0.327			0.692		
<b>PU</b>		0.767					
<b>SN</b>		0.193					
<b>TECH</b>		-0.081			-0.164		
<b>ORG</b>		0.151			0.044		
<b>ENV</b>		0.032			0.101		

### 8.2.3 Results of hypothesis testing

The test of significance of all paths was calculated using the bootstrap re-sampling procedure with 5,000 re-samples as shown in Table 8.13. The t values needed to be significant to support the hypothesised paths (1.96 or 2.56 for alpha

levels of 0.05 and 0.01 respectively). Each of the hypotheses was analysed separately as described below.

Table 8.13

*Test Statistics*

	<b>Original sample (O)</b>	<b>Sample mean (M)</b>	<b>Standard error (STERR)</b>	<b>T statistics ( O/STERR )</b>
<b>PEU -&gt; I</b>	-0.205	-0.207	0.118	1.731
<b>PU -&gt; I</b>	0.767	0.774	0.136	5.655
<b>PEU -&gt; PU</b>	0.692	0.695	0.056	12.408
<b>SN -&gt; I</b>	0.193	0.193	0.105	1.849
<b>TECH -&gt; I</b>	0.044	0.042	0.081	0.548
<b>TECH -&gt; PU</b>	-0.164	-0.172	0.087	1.89
<b>ORG -&gt; I</b>	0.117	0.113	0.085	1.386
<b>ORG -&gt; PU</b>	0.044	0.057	0.095	0.458
<b>ENV -&gt; I</b>	-0.045	-0.046	0.08	0.567
<b>ENV -&gt; PU</b>	0.101	0.100	0.094	1.073

The results of the hypotheses testing are shown in Table 8.14.

Table 8.14

*Summary of hypothesis testing results*

<b>Results of hypotheses</b>	<b>Statistical significance</b>
------------------------------	---------------------------------

<b>Results of hypotheses</b>	<b>Statistical significance</b>
H1: There is a positive relationship between the perceived ease of use (PEU) and the intent to adopt (I) the proposed ITGEF.	Null cannot be rejected.
H2: There is a positive relationship between the perceived usefulness (PU) and the intent to adopt (I) the proposed ITGEF.	Reject the null.
H3: There is a positive relationship between the perceived ease of use (PEU) and perceived usefulness (PU).	Reject the null.
H4: There is a positive relationship between subjective norm (SN) and intent to adopt (I) the proposed ITGEF.	Null cannot be rejected.
H5: There is a positive relationship between technology factors (T) and perceived usefulness (PU).	Null cannot be rejected.
H6: There is a positive relationship between technology factors (T) and intent to adopt (I) the proposed ITGEF.	Null cannot be rejected.
H7: There is a positive relationship between organisational factors (O) and perceived usefulness (PU).	Null cannot be rejected.
H8: There is a positive relationship between organisational factors (O) and intent to adopt (I) the proposed ITGEF.	Null cannot be rejected.
H9: There is a positive relationship between environmental factors (E) and perceived usefulness (PU).	Null cannot be rejected.
H10: There is a positive relationship between environmental factors (E) and perceived usefulness (PU).	Null cannot be rejected.

Furthermore, the results of the combined factors for PEU are presented in Table 8.15. From a total of 71 respondents, 13%, or 10 respondents, reported they strongly agree that the adapted ITGEF increases the ease of use the IT governance evaluation process; 44%, or 31 respondents, agreed that the ease of use increases when adopting an adapted ITGEF; 39%, or 28 respondents, were neutral about the perceived ease of use level when using an adapted ITGEF; and only 5%, or 3 respondents, reported that the adapted ITGEF decreases the perceived ease of use.

Table 8.15

*Perceived ease of use (PEU) of the adapted ITGEF*

<b>Perceived ease of use (PEU)</b>	<b>Frequency</b>	<b>%</b>
Strongly agree	10	13
Agree	31	44
Neutral	27	39
Disagree	3	5
Strongly disagree	0	0

The results of the combined factors for PU are presented in Table 8.16. From a total of 71 respondents, 13%, or 10 respondents, reported they strongly agree that the adapted ITGFE increases the usefulness of best-practice models and frameworks when conducting evaluations of IT governance; 49%, or 35 respondents, agreed that the usefulness of best-practice models and frameworks increases when adapting to a particular context; 36%, or 25 respondents, were neutral about the perceived usefulness of adapted best-practice models and frameworks; and only 2%, or 2 respondents, reported that the adapted ITGEF decreases the perceived usefulness.

Table 8.16

*Perceived usefulness (PU) of the adapted ITGEF*

<b>Perceived usefulness (PU)</b>	<b>Frequency</b>	<b>%</b>
Strongly agree	10	13
Agree	35	49
Neutral	25	36
Disagree	2	2
Strongly disagree	0	0

The results of the combined factors for I are presented in Table 8.17. From a total of 71 respondents, 46%, or 33 respondents, reported they strongly agree that the adapted ITGFE increases their intent to adopt best-practice models and frameworks when conducting evaluations of IT governance; 34%, or 24 respondents, agreed that their intent to adopt best-practice models and frameworks increases when adapting to a particular context; 20%, or 14 respondents, were neutral about the perceived intent to adopt adapted best-practice models and frameworks; and none of the respondents reported that the adapted ITGEF decreases their intent to adopt best-practice models and frameworks.

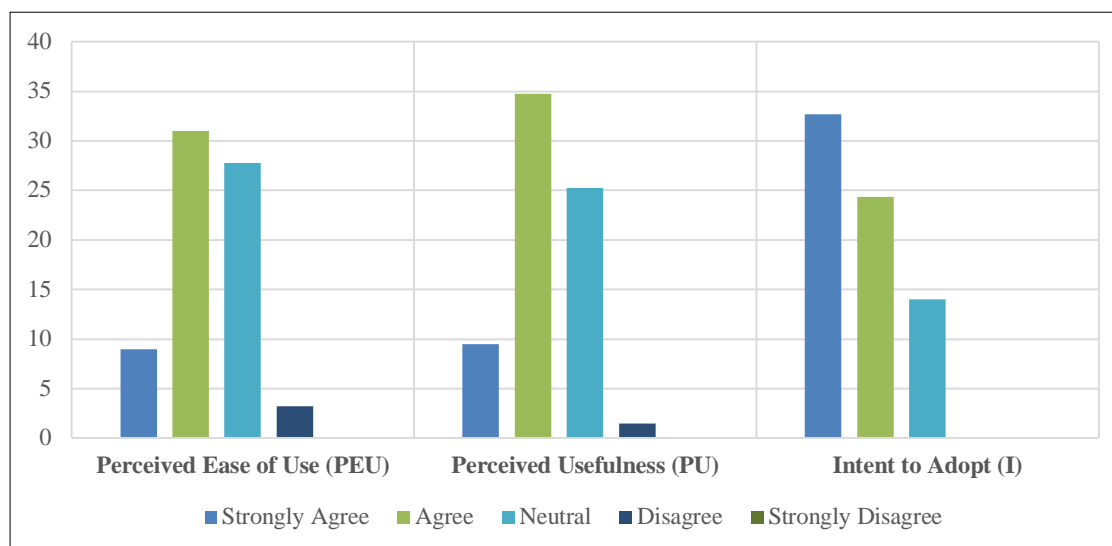
Table 8.17

*Intent to adopt (I) the adapted ITGEF*

<b>Intent to adopt (I)</b>	<b>Frequency</b>	<b>%</b>
Strongly agree	33	46
Agree	24	34

	Intent to adopt (I)	Frequency	%
Neutral		14	20
Disagree		0	0
Strongly disagree		0	0

As displayed in Figure 8.8, public sector respondents perceived that the developed ITGEF, which was adapted from the COBIT model, increases the ease of use and overall usefulness of best-practice models and frameworks. In addition, the same respondent group reported that adapting best-practice models and frameworks, such as the COBIT framework, would increase the acceptance and therefore adoption of these frameworks. As a result, the adapted ITGEF was supported by this respondent group and thus no further refinement is required.



*Figure 8.8.* Perceived ease of use, perceived usefulness, and intent to adopt the adapted IT governance evaluation framework.

### 8.3 SUMMARY

As the majority of literature on IT governance is focused on structures, processes, mechanisms, and frameworks, little attention is given to behavioural and organisational factors (Smits & van Hillegersberg, 2015). Moreover, recent research has suggested that behaviour issues in IT governance deserve more attention, such as the adoption of new innovations (Teo et al., 2013). In conjunction, Venkatesh and Davis (2000) propose that “future research should seek to further extend models of technology acceptance to encompass other important theoretical constructs” (p. 200).



As a result, the final research activity of this study (the fourth) entailed the derivation and testing of a research model that leveraged the theoretical foundations of TAM and included factors from the TOE framework. It applied these constructs in the domain of IT governance, specifically the intent to adopt an adapted ITGEF based on the COBIT model within PSOs.

Through this research activity, the TAM and TOE models were extended into ITGEFs to provide an explanation for information systems acceptance by individuals within a public sector context. The application of TAM and TOE in the context of IT governance made a unique contribution to IS theory by means of addressing the core need for practical guidance regarding ITGEFs as “understanding these underlying factors associated with adoption [facilitates] successful implementation” (Miville, 2005, p. 109). Understanding the underlying drivers of innovation adoption can help organisations deliver appropriate support mechanisms designed to improve efficiency (Venkatesh et al., 2003). The fourth research activity enhanced the understanding of the factors related to acceptance of the proposed ITGEF, providing practitioners with additional knowledge, thus enabling a better understanding, and hence influencing, the adoption of adapted best-practice frameworks and models.

This research activity incorporated an empirical study through the development of a questionnaire to explore factors that influence adoption of adapted ITGEFs in the public sector. There were 71 completed questionnaires obtained for analysis. Partial least squares using Smart PLS was used to analyse the data and test the hypotheses. Seven constructs were incorporated in the model, namely, perceived usefulness, perceived ease of use, intent to adopt, subjective norm, technology, organisation, and environment. Ten hypotheses were proposed. Two of these hypotheses were supported and eight hypotheses were not supported. The results indicated that the TAM hypotheses pertaining to the impact of perceived usefulness were strongly supported. The lesser (however, both directly and indirectly relevant) TAM aspect of ease of use was also moderately supported. In this way, TAM was confirmed as an appropriate theory to provide insight into the adoption of ITGEFs, in addition to its various other contributions to the discipline. Subjective norm was found to only have a light effect on intention to use the ITGEF. These findings therefore provide important information for PSOs.

On the other hand, the hypotheses that TOE factors, such as organisational size attributes, environmental factors (e.g., highly regulated environment) and the maturity of technology (e.g., well-established policies and procedures), were not supported in this research activity. These aspects may nevertheless prove more relevant in a broader and less homogenous population as they have proven to be significant in other studies.

This empirical research indicated that respondents from the public sector perceive the adapted ITGEF based on the COBIT model to be easy to use and useful. The respondent group also reported that their intention to adopt an adapted version of best-practice models and frameworks would increase. It may be beneficial for PSOs to consider adapting the rather onerous best-practice frameworks and models to encourage the proper use of resources for evaluating IT governance.

The findings provide insights for practitioners. The impact of perceived usefulness and the importance of perceived ease of use in support of adoption provide important insight to PSOs looking to utilise ITGEFs. The other area of insight (at least in this specific population) was the extent to which IT governance frameworks had been implemented, and the nature of such frameworks. Similar to other studies, organisations implemented IT governance frameworks without necessarily selecting a standard framework such as ITL, COBIT, or ISO. The data provided added insight into a limited population of relatively mature organisations.

## Chapter 9: Summary and Conclusions

---

In the introduction to this thesis, the overarching research question was identified: “How can best-practice frameworks be adapted and adopted to evaluate IT governance in public sector organisations?” The main research question was formulated to explore the statement by Neto et al. (2014), stating that “frameworks, best practices and standards are useful only if they are adopted and adapted effectively”. In the subsequent chapters this phenomenon was explored through a two-stage, mixed-method approach including four research activities or studies.

While IT governance has received much attention in recent years, there is little research exploring the contextualisation of IT governance frameworks and, in sequence, the influences on the acceptance and adoption of the resultant frameworks in public sector organisations (PSOs) in Australia. The purpose of this research was to contribute to the body of knowledge of IT governance by addressing this gap in the literature.

This chapter provides an overview of the study in Section 9.1, discusses the thesis contributions in Section 9.2, highlights the generalisability and wider application of the research in Section 9.3, details limitations and future research opportunities in Section 9.4, and finishes with an overall conclusion in Section 9.5.

### 9.1 OVERVIEW OF THE RESEARCH STUDY

The purpose of the overview is to briefly describe the planning and conduct of the research in order to help establish the reliability and integrity of the conclusions that are discussed. Chapters 2, 3 and 4 discuss the literature and the development of an a priori model, and establish the research questions and methodology. As detailed in Chapters 5 to 8, the research was divided into four activities as follows:

The first research activity involved a Delphi research, which aimed at exploring the perceived challenges associated with the evaluation of IT governance within PSOs. The input of this research activity consisted of an initial list of issues and challenges that were derived from IT governance literature (cf. Chapter 2). The Delphi research entailed a three-round on-line questionnaire and was leveraged to build up a consensus among a group of 24 experts from the Queensland public

sector. The expert group perceived challenges linked to the role of frameworks in conducting IT governance evaluations as being important, such as “lack of developed methodologies and tools”, “inconsistent execution of evaluation methodology across public sector organisations”, and “inadequate evaluation and testing of the effectiveness of IT governance controls”. This was expected as governance best-practice models and frameworks, in particular COBIT, provide a comprehensive approach for IT capability assessment and are heavily utilised as IT governance evaluation frameworks (ITGEFs). As a result, this research activity established a need for a systematic approach to contextualise or adapt best-practice frameworks, such as COBIT, for IT governance evaluation to prevent the random selection of evaluation criteria from the framework in a “hit and miss” style.

In the second research activity, an empirical investigation of how to adapt best-practice frameworks and models to conduct IT governance evaluations within a public sector context was undertaken. The aim of this research activity was to put forward a proposition to address the need for a systematic approach to contextualise or adapt the COBIT model as identified by the panel of experts in the previous research activity. A quantitative investigation using an online survey was employed to elicit a list of the most important high-level IT processes as perceived by PSOs. This prioritised list was then used to develop a conceptual model, or an ITGEF, from the COBIT framework. The analysis of the research data collected identified ten high-level IT processes from COBIT as most suited for evaluating IT governance in the Queensland public sector.

Following this, the adapted ITGEF based on the COBIT model was trialled in the third research activity by conducting an evaluation of IT governance in the Queensland public sector. As exploratory multiple case study research was employed to conduct 11 evaluations of IT governance in organisations ranging in size from government departments to local government bodies. The research activity concluded that an adapted version of the COBIT framework could be derived and subsequently used successfully to conduct evaluation of IT governance. The ability to conduct 11 evaluations of IT governance systems during the allocated timeframe of this research indicated the size of the instrument is appropriate.

The fourth and final research activity entailed the derivation and testing of a research model that leveraged the theoretical foundations of the Technology

Acceptance Model (TAM) and included Technology–Organisation–Environment (TOE) considerations. It applied these constructs in the domain of IT governance, specifically the intent to adopt an IT governance evaluation framework in Queensland PSOs. Through the survey, this research activity focused on exploring the factors that affect and influence the adoption and acceptance of IT governance frameworks. This empirical research indicated that respondents perceived an adapted version of the COBIT framework, which was contextualised to suit the public sector, to be easy to use and useful. This in turn demonstrated that these two factors influence the acceptance and adoption of ITGEFs in a public sector context. The research questions and corresponding research findings are demonstrated in Table 9.1 below.

Table 9.1

*Summary of hypothesis testing results*

Research questions	Findings
<p><b>RQ1. Are existing best-practice frameworks perceived as challenging when evaluating IT governance within the public sector?</b></p>	<ul style="list-style-type: none"> <li>• The Queensland public sector is expected to encounter a wide range of internal, external, and organisational challenges when conducting evaluations of IT governance systems.</li> <li>• A priority list encompassing the top-ten most important challenges that may play an important role in determining the success or failure of the IT governance evaluation program is identified.</li> <li>• The main quick wins, whereby a challenge is perceived to have high impact and is also easy to address, are identified as: “insufficient skills and competencies to undertake effective IT governance evaluations”, “inadequate evaluation and testing of the effectiveness of IT governance”, and “failure of an audit team to appropriately apply required substantive evaluation procedures”.</li> <li>• The need for a systematic approach to adapt best-practice frameworks for the evaluation of IT governance is established through the emphasis placed on the following challenges in the context of the Queensland public sector: “lack of developed methodologies and tools”, “inconsistent execution of evaluation methodology across public sector organisations”, and “inadequate evaluation and testing of the effectiveness of IT governance controls”.</li> <li>• The adaptation of massive best-practice frameworks, such as COBIT, inhibits the practice of randomly selecting controls or processes from these frameworks in a “hit and miss” style, which leads to creating dissimilar sets of evaluation tools and inconsistent findings across the public sector.</li> </ul>

Research questions	Findings
<p><b>RQ2. How can best-practice frameworks be adapted to conduct IT governance evaluations within a public sector context?</b></p>	<ul style="list-style-type: none"> <li>• Best-practice frameworks could be adapted to meet the needs of individual organisations or sectors.</li> <li>• The COBIT framework was chosen for this study as most suitable for conducting IT governance evaluations.</li> <li>• Twelve high-level IT processes from COBIT were identified as most important by the Queensland public sector, namely: <i>DSS05 Manage Security Services</i>, <i>EDM03 Ensure Risk Optimisation</i>, <i>APO13 Manage Security</i>, <i>DSS04 Manage Continuity</i>, <i>EDM02 Ensure Benefits Delivery</i>, <i>APO12 Manage Risk</i>, <i>BAI06 Manage Changes</i>, <i>APO02 Manage Strategy</i>, <i>DSS01 Manage Operations</i>, <i>EDM01 Ensure Governance Framework Setting and Maintenance</i>, <i>DSS03 Manage Problems</i>, and <i>DSS02 Manage Service Requests and Incidents</i>.</li> <li>• Ten of the twelve high-level IT processes are common across more than four previous studies as being significant in their context, namely: <i>DSS05 Manage Security Services</i>, <i>EDM03 Ensure Risk Optimisation</i>, <i>APO13 Manage Security</i>, <i>DSS04 Manage Continuity</i>, <i>EDM02 Ensure Benefits Delivery</i>, <i>APO12 Manage Risk</i>, <i>BAI06 Manage Changes</i>, <i>APO02 Manage Strategy</i>, <i>DSS03 Manage Problems</i>, and <i>DSS02 Manage Service Requests and Incidents</i></li> <li>• The developed IT governance evaluation framework (ITGEF) based on COBIT, which consists of the above-mentioned ten high-level IT processes, is considered suitable for evaluating IT governance regardless of a specific context (international, national or state) and is expected to be of continuing interest.</li> </ul>
<p><b>RQ3. How can public sector organisations evaluate IT governance using adapted best-practice frameworks?</b></p>	<ul style="list-style-type: none"> <li>• The developed ITGEF could be utilised to evaluate IT governance within organisations by measuring the capability of IT processes.</li> <li>• The developed ITGEF for the public sector was supported by the specific enterprise goals and IT-related goals perceived important by the same sector.</li> <li>• A self-evaluation instrument based on the COBIT framework could be used to establish a baseline of IT capability level within a specific organisation or across a particular sector.</li> <li>• The trial of the self-assessment instrument showed that it contained evaluation measures that were not relevant to other jurisdictions in Australia or international public sector organisations, which suggests that its development was appropriate.</li> <li>• Undertaking IT governance evaluation based on COBIT 5 is significantly more rigorous than earlier versions of the framework.</li> </ul>
<p><b>RQ4. What factors influence the adoption of adapted IT governance</b></p>	<ul style="list-style-type: none"> <li>• The Technology Acceptance Model (TAM) was confirmed as an appropriate innovation adoption theory to provide insight into the factors affecting the adoption</li> </ul>

Research questions	Findings
<p><b>evaluation frameworks within a public sector context?</b></p>	<p>of ITGEFs.</p> <ul style="list-style-type: none"> <li>• The Technology–Organisation–Environment (TOE) framework did not provide useful insight into the factors affecting the adoption of ITGEFs.</li> <li>• The perceived usefulness of the ITGEF is found to strongly affect the acceptance and adoption of these frameworks.</li> <li>• The developed ITGEF ease of use is found to moderately influence the acceptance and adoption of these frameworks.</li> <li>• Subjective norms were found to have only a slight effect on the acceptance and adoption of adapted ITGEFs.</li> <li>• None of the technological, organisational, or environmental factors had an influence on the perceived usefulness or the acceptance and adoption of adapted ITGEFs.</li> </ul>

## 9.2 CONTRIBUTIONS

The goal of this research was to explore whether there is a perceived challenge relating to the way IT governance frameworks are utilised in the public sector; design and trial a contextualised version of the COBIT framework for conducting evaluations of IT governance systems; and explore factors that influence its acceptance and adoption. The contributions towards this research goal are in line with the results presented in the previous chapters.

The main contributions of this research are as follows:

- It highlights challenges associated with conducting IT governance evaluation, previously unexplored from the perspective of a specific sector.
- It provides a contextualised framework for conducting evaluations of IT governance systems in PSOs.
- It analyses IT governance capability and organisational maturity levels in the Queensland public sector.
- It identifies factors that affect the acceptance and adoption of an adapted ITGEF previously unexplored from the perspective of a specific sector.

All these contributions have addressed the research problem, goal, and questions, and are further discussed in this chapter.

The contribution of this research work in determining IT governance challenges associated with conducting evaluations of IT governance systems in the public sector is a focus area that did not exist in the knowledge base. The contribution is important because no previous empirical research has been carried out on IT governance evaluations in the Australian public sector. The identified list of challenges, specifically for the Queensland public sector, suggests that, in performing IT governance evaluation within a PSO, these challenges may play an important role in preventing a successful outcome, as they are considered inhibiting factors. The list of these challenges can act as a checklist for audit and IT managers when planning for an IT governance evaluation program. Notably, this research complements the body of knowledge on IT governance by revealing that the degree of complexity of IT governance, and especially frameworks, is considered fairly high and problematic.

The contribution of this research in identifying an ITGEF adapted from the COBIT framework specifically for the Australian public sector is an approach that did not exist in the knowledge base. In this way, an adapted (or contextualised) version of the COBIT framework was determined to provide insights for practitioners and researchers. Specifically, the adapted framework will allow PSOs to optimise the scarce resources and concentrate on the most important IT governance processes that are necessary for effective IT governance and greater IT contribution in public service delivery in the Australian public sector. In this way, the adapted version of the COBIT framework contributes to theory and practice.

From a practitioner perspective, the methodology used for adapting and validating the ITGEF for a specific context will be of interest and has the potential to be used to develop similar frameworks or models to implement or evaluate IT governance systems in other contexts. Furthermore, the adapted ITGEF has the potential to be the basis of application to IT evaluations performed within PSOs by specialist IT audit practitioners. For state and national audit offices, it provides a viable alternative to the inconsistent evaluation programs and a methodology to reassess the suitability of the ITGEF at a future point, when it may no longer be as relevant because of environmental changes.

Another contribution is related to IT governance maturity in terms of IT processes' capability levels in and across the studied organisations. This contribution has provided the maturity levels for overall and individual IT processes in and across



the studied organisations. It also offered the possibility for comparison with others, in this case PSOs in Australia and internationally from a range of nations. Such a benchmark has not previously been available for Australian PSOs, and thus this could add to the knowledge base in terms of context and IT governance practices. The contribution of determining the IT governance maturity levels of Australian PSOs showed the strengths and weaknesses of IT governance processes. This included suggestions for the further improvement of IT governance in these organisations.

This research has helped to demonstrate the applicability of the core TAM theoretical construct in the domain of IT governance. The research provided insight into practical aspects of the IT discipline, helping to bridge the gap identified between IT academia and its application in industry. It addressed the expressed need that, while some researchers have developed contextualised IT governance frameworks, they have provided no guidance on how to turn this theory into practice.

In this case, the contribution of determining factors that affect the acceptance and adoption of an adapted ITGEF demonstrated that the perceived usefulness of IT governance frameworks offers a significant influence on the intention to adopt such a practice.

### **9.3 GENERALISATION AND WIDER APPLICATION OF RESEARCH**

Yin (2013) described two types of generalisation, namely, analytical and statistical. *Analytical generalisation* is defined as the application of the research findings to a theory of the phenomenon studied. In the case of this research, the theory and findings contributed to the general literature and theory of IT governance. However, the generalisation is constrained by the limited context of the PSOs that were studied and the consideration from the perspective of a specific innovation adoption theory, namely, TAM.

Maxwell (1992) indicates that *statistical generalisation* is divided into two areas, internal and external generalisation (or reliability). The former applies within the setting that is the subject of the research, whereas the latter extends beyond the setting of the research (Onwuegbuzie & Collins, 2007).

The setting of this research is IT governance in Queensland PSOs. A cross-section of PSOs was selected from categories that represented a variety of

organisational sizes. In terms of the population of PSOs in Queensland, 11 case studies representing 55% were selected, a relatively large sample. Internal generalisation or the ability to apply the findings of this research to other PSOs in other states within Australia is expected to be high.

External generalisation is more limited in that Australian PSOs have a unique structure and motivation that distinguishes them from most other organisations. Despite their individuality, in many ways the public sector resembles decentralised organisations, with complex interactions between each other and other constituents. In organisations of similar structure and operation, it is probable that the general findings of this research could be applied.

Mays and Pope (2000) indicate that generalisation could be enhanced by using a multi-site approach and by providing detailed reporting to allow readers to conclude whether the findings can be extended to other settings. This research endeavoured to increase generalisation by using a multi-site approach and by detailed reporting of the findings. The proposed framework for IT governance was contextualised based on the specific perspective of PSOs. With this in mind the tailored COBIT framework should be applicable to national and international PSOs.

#### **9.4 LIMITATIONS AND FUTURE RESEARCH**

As with all research projects, this research is subject to any number of limitations that might be explored in future research.

One of the primary limitations of this research was the relatively small and biased sample size relating to the number of respondents rather than organisations. However, this paucity of data is not unique to this research, as previous studies experienced similar small sample sizes (Lindsey, 2011). Although this is considered a weakness, Kirakowski (2003) stated that “once the sample size approaches 80, the gain in increased precision becomes very small” (p. 9); therefore, this small sample was not considered to have invalidated the research. In general, response rates are lower for online surveys than for mail or telephone surveys (Matsuo, McIntyre, Tomazic, & Katz, 2004). As is the case with smaller and biased samples, the results must be interpreted with caution. As this research elicited a smaller response set than was desired, future research approaches should focus on using a larger, less biased sample.

Although a mixed-methods approach was adopted in this research, data collection was only available through online questionnaires and, as a result, the ability to question the respondents to ascertain in more detail the exact nature of the responses was not possible. Although the limitations relating to questionnaire surveys can be minimised by undertaking post-questionnaire interviews, this was also not possible due to the availability of interviewees for a significant amount of time. Therefore, the choice of methodology for data analysis was limited. Consequently, extra care and caution is essential when interpreting questionnaire findings.

This research is among the first attempts to examine the capability level of IT processes among Australian PSOs. However, generalising the results of a convenience sample that stems from self-reporting data restricted to organisations in one Australian state must be undertaken with caution. Thus, the ability to generalise the results is limited to medium to large PSOs within Queensland, as the current sample cannot account for variation in practices in other states and jurisdictions. In general, the findings are consistent with similar studies. However, the modest sample and the “point-in-time” nature of the study also limit generalisation of the results.

One of the limitations of self-reported perception measures is that they are potentially imprecise reflections of reality; that is, over or under estimations are possible. It is also difficult to substantiate the claims of the respondents due to the different interpretation of IT processes and/or practices, which makes the findings difficult to generalise. Moreover, the results may have been influenced to some extent by measurement error in the analysis. Therefore, future research employing an independent evaluation instead of self-assessment is anticipated to be more objective.

During data acquisition, examining supporting documentation and in-depth enquiries on process capability levels to substantiate assigned scores was not possible, given the limited resources of the researcher and the lack of buy-in by heads of departments for such an activity. It was not feasible to independently validate the responses by inspection of each process work product, or more simply outcome, such as policies and procedures or through other techniques, for each individual score given. Further research could liaise with and seek authority from a state government audit office to undertake more thorough IT audits and use the outcomes to inform future IT audits in state PSOs.

For this research, efforts were made to select cases to provide a broad representation from the public sector. We propose future research work of a more qualitative nature involving interviews and/or longitudinal studies so as to broaden the applicability and representativeness of this research.

This research builds upon the COBIT 5 generic suite of IT processes, unlike previous studies based on previous versions of the framework (e.g., COBIT 4.1 or 4). A comparison between the evaluation results of COBIT 5 and previous versions of the framework are generally not advised. However, due to the lack of similar studies based on the new version of COBIT, this study attempted to compare IT capability scores for IT processes of the same nature. Future research could replicate this study and establish a baseline of process capabilities based on COBIT 5 within the public sector. Further academic research is needed to assess the effectiveness of other elements of COBIT or identify factors that could influence process capability levels within the public sector. Future work may extend this research to capture the extent of influence of factors on established process capability levels.

Focusing on specific individual practices that were discussed in this research would present another opportunity for future research. As indications were found that the COBIT framework was positioned at a higher level of abstraction, encompassing many other IT governance practices, specific attention should be given to verify whether COBIT indeed is a complete and effective framework for IT governance. The proposed research could be based on qualitative case study research and on more quantitative statistical correlation research. The outcomes of such research could help in building a considerable business case for COBIT that demonstrates the value of COBIT as an IT governance framework.

The majority of respondents indicated that they had implemented a customised ITGEF, drawing primarily on the standard approaches of COBIT, ITIL, and ISO; however, respondents did not take the opportunity to provide further insight into those customisations. Therefore, the nature and rationale for the selection of these frameworks and customisation mechanisms would be areas to explore in further research.

Although this research did not reliably support specific influences from the TOE framework, despite earlier studies indicating that this would be the case (Zhu et al., 2002), this may well be attributed to the narrow population surveyed and these

factors should not be discounted without a broader study. It is proposed that the paradigm of adoption takes into account management structure and culture, and enterprise size and style (Bruno, Marra, & Mangia, 2011). Similarly, “external factors such as system experience, level of education, and age may have a direct influence on system usage” (Chuttur, 2009, p. 16). Therefore, these factors remain areas for further research.

Large or well-resourced organisations are considered more capable of bearing the costs associated with the development of a custom framework, whereas smaller or limited organisations may lack the required resources to customise their own frameworks. Future research could explore the extent to which characteristics such as education and expertise of the IT leadership, or organisational size and value, have an impact and influence the adoption of contextualised IT governance frameworks.

A longitudinal approach to future research would allow for an exploration of the impact of intent on actual adoption, as well as on organisational maturity levels. This research intentionally limited the scope solely to the intent to adopt the framework. As prior research has linked organisational governance to the IT maturity model concept in that “as IT organizations integrate IT controls, their overall governance maturity increases and IT managers begin to find value in the benefits brought on by formalized and consistent IT practices” (Leih, 2009, p. 207), longitudinal exploration could also be used to investigate the extent to which organisational maturity influences the adoption of an ITGEF, which in turn impacts maturity, in a potentially recursive manner.

Further research could explore the various influences on IT governance in more depth. As indicated by Grewal (2006), “users in particular are the largest and most diverse group considered in this research” (p. 281). A deeper understanding of their interaction and influence on IT governance, beyond what was possible in this study, offers opportunities for future research. More complex theories that recognise the social nature of users could be considered to provide a richer insight in this area.

Further research could be pursued to explore the various influences on IT governance in more depth. Users in particular are the largest and most diverse group considered in this research. A deeper understanding of their interaction and influence on IT governance, beyond what was possible in this study, offers opportunities for

future research. More complex theories that recognise the social nature of users could be considered to provide a richer insight in this area.

The majority of PSOs examined in this research were in a state of instability due to the recent machinery of government (MoG) changes. Follow-up research into the challenges of IT governance evaluation and other issues related to IT governance frameworks would be complementary and extend the research of this study. In particular, it would overcome a limitation of this research by allowing a comparison of the findings of this research.

There are many prospects future research could explore. For example, what is the influence of other frameworks on process capability levels and IT governance in general? Another could be the relationship between higher process capability levels and achieving successful outcomes in the dimensions of IT governance. For example, do higher process capability levels lead to greater agility? Do they lead to cost reductions? What is the return on investment in improving process capability levels?

## 9.5 CONCLUSION

The primary objective of this research was to explore how best-practice frameworks, such as the COBIT model, can be adapted to conduct evaluations of IT governance within a public sector context, and to further explore the factors that influence the acceptance and adoption of the adapted framework. Four sub-research questions were answered and a research model proposed and supported in order to address the primary objective of the research.

Based on the results of the four research activities, the key findings of this research were: (i) arbitrarily adapted best-practice frameworks are perceived to reduce the efficiency and effectiveness of evaluating IT governance; (ii) an adapted ITGEF that is tailored to fit the specific needs of individual organisations or sectors could be methodologically derived from best-practice frameworks and models (e.g., COBIT); (iii) users' perceived usefulness and ease of use are important factors to the acceptance and adoption of adapted ITGEFs; and (iv) an adapted ITGEF is perceived to increase the ease of use, usefulness, and intent to adopt best-practice frameworks and models within a public sector context.

This research has met its objectives with respect to developing a mechanism in order to assist practitioners in adapting best-practice frameworks and models for

effective IT governance evaluation. In order to design the adapted ITGEF some criteria were decided for its success. The research aimed at developing an ITGEF that assists practitioners to focus the public sector's scarce resource on "what" to evaluate by means of establishing priorities. An examination of the IT governance literature, together with four empirical studies, led this research to design a specialised, cohesive, and comprehensive ITGEF that represents a new process view of IT governance evaluation within PSOs.

In this thesis, the development and evaluation mechanism of an adapted ITGEF was demonstrated. The results of the evaluation indicated that the ITGEF is not only significant in a theoretical sense but also supported in the real-world environment. Successful completion of the case study research demonstrated usefulness and ease of use of the ITGEF in the real-world environment within the public sector. The results supported that the proposed ITGEF is a valuable framework and has the potential to assist practitioners in adapting effective best-practice frameworks and models for evaluation initiatives.

The objective of exploring factors that influence adopting an adapted ITGEF is to summarise the TAM and TOE factors that play a positive or negative role in the evaluation of IT governance. In this research, six factors were identified from two data sets (literature and prior studies) that are generally considered critical to influencing the intent to adopt new innovations. Some of these factors were perceived as important to take into consideration when adapting best-practice frameworks and models because these factors are found to influence the intent to adopt the adapted best-practice frameworks and models.

The research findings reinforce the important role of frameworks in IT governance evaluation. Employing an approach based on innovation adoption theory enables the understanding of the factors related to acceptance of IT governance frameworks, providing practitioners with additional knowledge and thus enabling a better understanding, and hence influencing, the adoption of IT governance frameworks.

The research highlights to PSOs that they need to ensure user involvement in the design of the IT governance framework and its ongoing operation. Failure to understand and take into consideration the underlying drivers of innovation adoption can lead to abhorrent behaviour and adversely affect the IT governance evaluation

process. The research also supports the image of IT governance as a dynamic and ongoing process that needs to be monitored and proactively evaluated to maintain its effectiveness.

This study provides practical guidance to IT management and public sector executives on the importance of recognising the key influences on the design and operation of IT governance frameworks. The research model detailed in this study gives an informative guide to the critical user influences and their effect on the IT governance frameworks. The research has demonstrated that evaluating IT governance is a complex process and, to ensure its success, institutions should consider both the social and economic influences and impacts.

This research has addressed the gaps in the literature in two ways: (i) this research has developed an analytical model that identifies the key IT governance processes from the COBIT framework for a specific context; and (ii) this research has considered the IT governance frameworks in the context of innovation adoption theories. The consideration of innovation adoption theories has added to the understanding of the key influences on the IT governance frameworks.

In conclusion, taking into account the limitations identified, it is recommended that this research be extended to other organisations in both the private and public sectors. In addition, it is recommended that the research model be further developed to improve the quality of the findings and that more exploratory research be conducted on the relationship paths specified in the model.



# Bibliography

---

- Agarwal, R., & Prasad, J. (1997). The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences*, 28(3), 557-582.
- Ahuja, S. (2009). *Integration of COBIT, Balanced Scorecard and SSE-CMM as a strategic Information Security Management (ISM) framework*. (Unpublished Master's Thesis), College of Technology, Purdue University, West Lafayette.
- Ajgunma, S., Abdirahman, Z., & Raza, H. (2012). *Exploring the governance of IT in SMEs in Småland*. (Master's Thesis), Jönköping University, Jönköping, Sweden.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I. (1998). Models of Human Social Behavior and Their Application to Health Psychology. *Psychology and Health*, 13(4), 735-739.
- Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management*, 44(8), 681-691.
- Al-Khazrajy, M. (2011). *Risk based assessment of IT Control Frameworks: a case study*. (Master of Philosophy thesis), Auckland University of Technology, Auckland, NZ.
- Al Hosban, A. A. (2014). The Role of Regulations and Ethics Auditing to Cope with Information Technology Governance from Point View Internal Auditors. *International Journal of Economics and Finance*, 7(1), p167.
- Al Omari, L., & Barnes, P. H. (2014). IT governance stability in a political changing environment: exploring potential impacts in the public sector. *Journal of Information Technology Management*, 25(3), 41-55.
- Al Omari, L., Barnes, P. H., & Pitman, G. (2012a). *An Exploratory Study into Audit Challenges in IT Governance: A Delphi Approach*. Paper presented at the Symposium on IT Governance, Management & Audit (SIGMA2012), Kuala Lumpur, Malaysia.
- Al Omari, L., Barnes, P. H., & Pitman, G. (2012b). *Optimising COBIT 5 for IT Governance: Examples from the Public Sector*. Paper presented at the 2nd International Conference on Applied and Theoretical Information Systems Research, Taipei, Taiwan.
- Ali, S., & Green, P. (2006). *Effective Information Technology Governance Mechanisms in Public Sectors: An Australian Case*. Paper presented at the Tenth Pacific Asia Conference on Information Systems.
- Ali, S., & Green, P. (2007). IT governance mechanisms in public sector organisations: An Australian context. *Journal of Global Information Management*, 15(4), 41-63.
- ANAO. (2004). *The Auditor – General Audit Report No.30 2003–04 Performance Audit, Quality Internet Services for Government Clients—Monitoring and Evaluation by Government Agencies*. Australian National Audit Office.
- ANAO. (2009). *The Auditor – General Audit Report No.13 2008–09. Performance Audit, Government Agencies' Management of their Websites; Australian Bureau of Statistics, Department of Agriculture, Fisheries and Forestry, Department of Foreign Affairs and Trade*. Australian National Audit Office.

- Anderson, C., Al-Gahtani, S., & Hubona, G. (2012). The value of TAM antecedents in global IS development and research. *Journal of Organizational and End User Computing*, 23(1), 18-37.
- Anthes, G. H. (2004). Model Mania. *Computer World (US)*, 38(10), 41-44.
- Autry, C. W., Grawe, S. J., Daugherty, P. J., & Richey, R. G. (2010). The effects of technological turbulence and breadth on supply chain technology acceptance and adoption. *Journal of Operations Management*, 28(6), 522-536.
- Awa, H. O., Ukoha, O., Emecheta, C., & Nzogwu, S. (2012). *Integrating TAM and TOE frameworks and expanding their characteristics cinstructs for e-commerce adoption by SMEs*. Paper presented at the Informing Science & IT Education Conference (InSITE), Montreal, Canada.
- Axelsen, M., Coram, P., Green, P., & Ridley, G. (2011). *Examining The Role Of IS Audit In The Public Sector*. Paper presented at the Pacific Asia Conference on Information Systems.
- Baker, J. (2012). The technology–organization–environment framework. In Y. K. Dwivedi, M. R. Wade & S. L. Schneberger (Eds.), *Information Systems Theory* (Vol. 1, pp. 231-245): Springer.
- Barnes, D., & Hinton, M. (2012). Reconceptualising e-business performance measurement using an innovation adoption framework. *International Journal of Productivity and Performance Management*, 61(5), 502-517.
- Barrett, P. (2001). *Evaluation and Performance auditing: sharing the common ground*. Paper presented at the Australasian Evaluation Society - International Conference, Canberra.
- Bartens, Y., De Haes, S., Lamoen, Y., Schulte, F., & Voss, S. (2015). *On the Way to a Minimum Baseline in IT Governance: Using Expert Views for Selective Implementation of COBIT 5*. Paper presented at the 48th Hawaii International Conference on System Sciences (HICSS), Hawaii
- Bartholomew, D. (2007). 5 Smart Practices for IT Risk, Governance and Compliance. *CIO Insight*, 84. <http://www.cioinsight.com/>
- Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, 61(8), 1139-1160.
- Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, 13(4), 544-559.
- Beaumaster, S. (2002). *Local government IT implementation issues: a challenge for public administration*. Paper presented at the 35th Hawaii International Conference on System Sciences (HICSS), Hawaii.
- Benbasat, I., & Barki, H. (2007). Quo vadis TAM? *Journal of the association for information systems*, 8(4), 211-218.
- Bergk, V., Gasse, C., Schnell, R., & Haefeli, W. E. (2005). Mail surveys: Obsolescent model or valuable instrument in general practice research? *Swiss medical weekly*, 135(13-14), 189-191.
- Bhattacharjya, J., & Chang, V. (2006). *Adoption and implementation of IT governance: cases from Australian higher education*. Paper presented at the 17th Australasian Conference on Information Systems, Adelaide.
- Bhattacharjee, A. (1998). Managerial Influences on Intraorganizational Information Technology Use: A Principal Agent Model. *Decision Sciences*, 29(1), 139-162.
- Biffignandi, S., & Bethlehem, J. (2012). *Handbook of web surveys*. New York, NY: Wiley.

- Bodnar, G. H. (2006). What's New in CobiT 4.0. *Internal Auditing*, 21(4), 37.
- Borthick, A. F., Curtis, M. B., & Sriram, R. S. (2006). Accelerating the acquisition of knowledge structure to improve performance in internal control reviews. *Accounting, Organizations and Society*, 31(4), 323-342.
- Bradford, M., & Florin, J. (2003). Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. *International Journal of Accounting Information Systems*, 4(3), 205-225.
- Brady, J. W. (2010). *An investigation of factors that affect HIPAA security compliance in academic medical centers*. (Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Braga, G. (2015). COBIT 5 Applied to the Argentine Digital Accounting System. *COBIT Focus*, 1-4.
- Brazel, J. F., & Agoglia, C. P. (2007). An Examination of Auditor Planning Judgements in a Complex Accounting Information System Environment\*. *Contemporary Accounting Research*, 24(4), 1059-1083.
- Brown, A., & Grant, G. (2005). Framing the Frameworks: A Review of IT Governance Research. *Communications of the Association for Information Systems*, 15, 696-712.
- Brown, W., & Nasuti, F. (2005). What ERP systems can tell us about Sarbanes-Oxley. *Information Management and Computer Security*, 13(4), 311-327.
- Bruno, A., Marra, P., & Mangia, L. (2011). *The Enterprise 2.0 adoption process: a participatory design approach*. Paper presented at the 13th International Conference on Advanced Communication Technology (ICACT), Phoenix Park, South Korea.
- Buckby, S., Best, P., & Stewart, J. (2008). *The current state of information technology governance literature*. Hershey, PA: Information Science Reference (IGI Global).
- Buckby, S., Best, P. J., & Stewart, J. D. (2005). *The Role of Boards in Reviewing Information Technology Governance (ITG) as part of organizational control environment assessments*. Paper presented at the IT Governance International Conference, Auckland, New Zealand.
- Burda, D., & Teuteberg, F. (2013). *Towards Understanding an Employee's Retention Behavior: Antecedents and Implications for E-Mail Governance*. Paper presented at the 34th International Conference on Information Systems, Milan, Italy.
- Burnaby, P., & Hass, S. (2009). A summary of the global Common Body of Knowledge 2006 (CBOK) study in internal auditing. *Managerial Auditing Journal*, 24(9), 813-834.
- Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and Organisational Analysis*. London, UK: Heinemann Educational Books.
- Campbell, J., McDonald, C., & Sethibe, T. (2009). Public and private sector IT governance: Identifying contextual differences. *Australasian Journal of Information Systems*, 16(2), 5-18.
- Cecez-Kecmanovic, D. (2007). *Critical Research in Information Systems: The Question of Methodology*. Paper presented at the European Conference on Information Systems (ECIS), Geneva, Switzerland.
- Chan, H., & Teo, H. (2007). Evaluating the boundary conditions of the technology acceptance model: An exploratory investigation. *ACM Transactions on Computer-Human Interaction*, 14(2), 1-22.

- Chan, S. (2004). Sarbanes-Oxley: the IT dimension. *The Internal Auditor*, 61(1).
- Chanasuc, S., Praneetpolgrang, P., Suvachittanont, W., Jirapongsuwan, P., & Boonchai-Apisit, P. (2012). The acceptance model for adoption of information and communication technology in Thai public organizations. *International Journal of Computer Science Issues*, 9(4), 100-107.
- Chen, L., & Tan, J. (2004). Technology Adaptation in E-commerce: Key Determinants of Virtual Stores Acceptance. *European Management Journal*, 22(1), 74-86.
- Chen, R., Sun, C., Helms, M., & Jih, W. (2008). Aligning information technology and business strategy with a dynamic capabilities perspective: A longitudinal study of a Taiwanese Semiconductor Company. *International Journal of Information Management*, 28(5), 366-378.
- Chenoweth, T., Minch, R., & Tabor, S. (2007). *Expanding views of technology acceptance: seeking factors explaining security control adoption*. Paper presented at the 13th Americas Conference on Information Systems (AMCIS), Keystone, CO.
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information systems research*, 14(2), 189-217.
- Chircu, A., & Lee, D. (2003). *Understanding IT Investments in the Public Sector: The Case of E-Government*. Paper presented at the 9th Americas Conference on Information Systems (AMCIS), Tampa, FL.
- Chuttur, M. (2009). Overview of the technology acceptance model: Origins, developments and future directions. *Sprouts : Working Papers on Information Systems*, 9(37), 1-22.
- Clarke, M. (2011). *The Role of Self-Efficacy in Computer Security Behavior: Developing the Construct of Computer Security Self-Efficacy (CSSE)*. (Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Collis, J., Hussey, R., Crowther, D., Lancaster, G., Saunders, M., Lewis, P., . . . Gill, J. (2003). *Business Research Methods*. New York: Palgrave Macmillan.
- Cook, T., & Campbell, D. (1979). *Quasi-experimentation: design and analysis issues for field settings*. Chicago, IL, USA: Rand McNally.
- Cooper, D. R., & Schindler, P. S. (2003). *Business Research Methods* (8th ed.). New York: McGraw-Hill.
- Cornwell, A. (1995). Auditing: is there a need for great new ideas? *Managerial Auditing Journal*, 10(1), 4-6.
- Crawford, L., & Helm, J. (2009). Government and Governance: The Value of Project Management in the Public Sector. *Project Management Journal*, 40(1), 73-87.
- Crawford, L., Simpson, S., & Koll, W. (1999). *Managing by Projects: A Public Sector Approach*. Paper presented at the NORDNET'99, Helsinki, Finland.
- Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.
- Crotty, M. (2003). *The Foundation of Social Research: Meaning and Perspective in the Research Perspective*. London, UK: Sage.
- Curtis, M. B., Jenkins, J. G., Bedard, J. C., & Deis, D. R. (2009). Auditors' Training and Proficiency in Information Systems: A Research Synthesis. *Journal of Information Systems*, 23(1), 79-96.

- D'Onza, G., Lamboglia, R., & Verona, R. (2015). Do IT audits satisfy senior manager expectations? A qualitative study based on Italian banks. *Managerial Auditing Journal*, 30(4/5), 413-434.
- Dahlberg, T., & Kivijarvi, H. (2006). *An integrated framework for IT governance and the development and validation of an assessment instrument*. Paper presented at the 39th Annual Hawaii International Conference on System Sciences (HICSS), Hawaii, USA.
- Dalkey, N. C. (1969). *The Delphi method: An experimental study of group opinion*: RM-5888-PR. The Rand Corporation.
- Dalkey, N. C., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management science*, 9(3), 458-467.
- Danziger, J. N., & Andersen, K. V. (2002). The Impacts of Information Technology on Public Administration: An Analysis of Empirical Research from the 'Golden Age' of Transformation. *International Journal of Public Administration*, 25(5), 591-627. doi: 10.1081
- Davies, A. (2006). *Best practice in corporate governance: building reputation and sustainable success*. Hampshire, UK: Gower Publishing, Ltd.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International journal of man-machine studies*, 38(3), 475-487.
- Davis, F. D., & Venkatesh, V. (1996). A critical assessment of potential measurement biases in the technology acceptance model: three experiments. *International Journal of Human-Computer Studies*, 45(1), 19-45.
- De Haes, S. (2007). *The impact of IT governance practices on business/IT alignment in the Belgian financial services sector*. (Doctoral Dissertation), University of Antwerp, Antwerp, Belgium. ProQuest Dissertations & Theses Global database.
- De Haes, S., Debreceeny, R., & Van Grembergen, W. (2013). Understanding the Core Concepts in COBIT 5. *ISACA Journal*, 5, 1-8.
- De Haes, S., & Van Grembergen, W. (2004). IT Governance and its Mechanisms. *Information Systems Control Journal*, 1, 27-33.
- De Haes, S., & Van Grembergen, W. (2005). *IT Governance Structures, Processes and Relational Mechanisms: Achieving IT/Business Alignment in a Major Belgian Financial Group*. Paper presented at the 38th Annual Hawaii International Conference on System Sciences, Big Island, Hawaii
- De Haes, S., & Van Grembergen, W. (2008). An Exploratory Study into the Design of An IT Governance Minimum Baseline Through Delphi Research. *The Communications of the Association for Information Systems*, 22(24), 443-458.
- De Haes, S., & Van Grembergen, W. (2009). An Exploratory Study Into IT Governance Implementations and its Impact on Business/IT Alignment. *Information Systems Management*, 26(2), 123-137.
- De Haes, S., & Van Grembergen, W. (2012). An Academic Exploration into the Core Principles and Building Blocks of COBIT 5. *International Journal of IT/Business Alignment and Governance (IJITBAG)*, 3(2), 51-63.
- De Haes, S., & Van Grembergen, W. (2015). *Enterprise Governance of Information Technology: Achieving Alignment and Value, Featuring COBIT 5* (2nd ed.). New York, NY: Springer International Publishing.

- De Haes, S., Van Grembergen, W., & Debreceeny, R. S. (2013). COBIT 5 and enterprise governance of information technology: Building blocks and research opportunities. *Journal of Information Systems*, 27(1), 307-324.
- De Jong, G., & Nooteboom, B. (2000). *The Causal Structure of Long-Term Supply Relationships: An Empirical Test of a Generalized Transaction Cost Theory*: Springer US.
- Debreceeny, R., & Gray, G. L. (2009). *IT Governance and Process Maturity: A Field Study*. Paper presented at the 42nd Hawaii International Conference on System Sciences.
- Debreceeny, R., & Gray, G. L. (2013). IT Governance and Process Maturity: A Multinational Field Study. *Journal of Information Systems*, 27(1), 157-188.
- Dedrick, J., & West, J. (2003). *Why firms adopt open source platforms: A grounded theory of innovation and standards adoption*. Paper presented at the tandard Making: A Critical Research Frontier for Information Systems, Seattle, WA.
- Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning: A guide to nominal group and Delphi processes*. Glenview, Illinois: Scott, Foresman and Company.
- Denford, J. S., Dawson, G. S., & Desouza, K. C. (2015). *An Argument for Centralization of IT Governance in the Public Sector*. Paper presented at the 48th Hawaii International Conference on System Sciences (HICSS), Kauai, Hawaii
- Denscombe, M. (2014). *The Good Research Guide: For Small-scale Social Research Projects* (5th ed.). Berkshire, England: McGraw-Hill Education (UK).
- Denzin, N. K., & Lincoln, Y. S. (2000). Introduction: The discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 1-28). Thousand Oaks, CA: Sage Publications.
- Devos, J., & Van De Ginste, K. (2014). *A Quest for Theoretical Foundations of COBIT 5*. Paper presented at the European Conferen on Information Manangement and Evaluation (ECIME), Ghent, Belgium.
- Doyle, C., & Jayasinghe, U. (2014). Good governance practice in creating public entities: A Victorian perspective. *Governance Directions*, 66(2), 92-93.
- Dunkerley, K. D. (2011). *Developing an information systems security success model for organizational context*. (Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Ebner, K. (2014). *It's not fair! A Multilevel Conceptualisation of Strategic IT Benchmarking Success: The Role of Procedural Justice*. Paper presented at the 21 European Conference on Information Systems, Tel Aviv, Israel.
- Edwards, M., & Clough, R. (2005, January 2005). Corporate governance and performance: an exploration of the connection in a public sector context. Retrieved 18 March 2012, from <[http://www.canberra.edu.au/corpgov-aps/pub/IssuesPaperNo.1\\_GovernancePerformanceIssues.pdf](http://www.canberra.edu.au/corpgov-aps/pub/IssuesPaperNo.1_GovernancePerformanceIssues.pdf)>
- English, L., Guthrie, J., & Parker, L. D. (2005). Recent public sector financial management change in Australia. *International Public Financial Management Reform*, 23-54.
- Feltus, C., Petit, M., & Dubois, E. (2009). *Strengthening employee's responsibility to enhance governance of IT: COBIT RACI chart case study*. Paper presented at the 1st ACM workshop on Information Security Governance, New York, NY.

- Ferguson, C., Green, P., Vaswani, R., & Wu, G. H. (2012). Determinants of Effective Information Technology Governance. *International Journal of Auditing*. doi: 10.1111/j.1099-1123.2012.00458.x
- Filipek, R. (2007). IT Audit Skills Found Lacking. *Internal Auditor*, 64(3), 15-16.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Fleming, S., & McNamee, M. (2005). The ethics of corporate governance in public sector organizations. *Public Management Review*, 7(1), 135-144.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50.
- Forstner, E., Kamprath, N., & Röglinger, M. (2014). Capability Development With Process Maturity Models – Decision Framework and Economic Analysis. *Journal of Decision Systems*, 1-24.  
<http://dx.doi.org/10.1080/12460125.2014.865310>  
doi:10.1080/12460125.2014.865310
- Fowler, F. J. (2013). *Survey research methods* (5th ed.). Thousand Oaks, CA: Sage publications.
- Fox, N., Ward, K., & O'Rourke, A. (2006). A sociology of technology governance for the information age: the case of pharmaceuticals, consumer advertising and the Internet. *Sociology*, 40(2), 315.
- Fox, S. (2009). Applying critical realism to information and communication technologies: a case study. *Construction Management and Economics*, 27(5), 465-472.
- Fröhlich, M., Johannsen, W., & Wilop, K. (2010). IT-Assurance with CobiT. In N. Shi & G. Silvius (Eds.), *Enterprise IT Governance, Business Value and Performance Measurement* (pp. 77-86).
- Gallivan, M. J. (2001). Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of a New Framework. *Database for Advances in Information Systems*, 32(3), 51-85.
- Galloway, A. (2005). Non-probability sampling. In K. Kempf-Leonard (Ed.), *Encyclopaedia of social measurement* (pp. 859-864). New York, NY: Elsevier.
- Gangwar, H., Date, H., & Raoot, A. (2014). Review on IT adoption: insights from recent technologies. *Journal of Enterprise Information Management*, 27(4), 488-502.
- GAO. (2004a). *Information Technology Investment Management - A Framework for Assessing and Improving Process Maturity*. GAO-04-394G. United States Government Accountability Office.
- GAO. (2004b). *Information Technology Management - Governmentwide Strategic Planning, Performance Measurement, and Investment Management Can Be Further Improved*. GAO-04-49. (GAO-04-49). United States Government Accountability Office.
- GAO. (2009). *Federal Information System Controls Audit Manual (FISCAM)*. GAO-09-232G. United States Government Accountability Office.
- Gawaly, H. I. (2009). *Sarbanes-oxley and it security: an exploratory case study investigating the impact of section 404 on information security*. (Doctoral Dissertation), Capella University, Minneapolis, MN.
- Gephart, R. (1999). Paradigms and Research Methods. *Academy of Management Research Methods Forum*, 4, 1-12.



- Gerke, L., & Ridley, G. (2006). *Towards an abbreviated COBIT framework for use in an Australian State Public Sector*. Paper presented at the 17th Australasian Conference on Information Systems, Adelaide, Australia.
- Gerke, L., & Ridley, G. (2009). Tailoring COBIT for Public Sector IT Audit: An Australian Case Study. In A. Cater-Steel (Ed.), *Information Technology Governance and Service Management: Frameworks and Adaptations* (pp. 101-124). New York: IGI Global.
- Gheorghe, M. (2010). Audit Methodology for IT Governance. *Informatica Economica*, 14(1), 32-42.
- Ghezzi, A., Rangone, A., Balocco, R., & Renga, F. (2010). *A Strategy-Technology-Regulation-User-Context Model for Mobile Location-Based Services Market Activation Analysis*. Paper presented at the 9th International Conference on Mobile Business and 9th Global Mobility Roundtable (ICMB-GMR), Athens, Greece.
- Gillies, C., & Broadbent, M. (2005). *IT Governance: A Practical Guide for Company Directors and Corporate Executives*. Melbourne, Australia: CPA Australia.
- Givens, M. A. (2011). *The Impact of New Information Technology on Bureaucratic Organizational Culture*. (Doctoral Dissertation), Nova Southeastern University Florida, United States. ProQuest Dissertations & Theses Global database.
- Gomes, R., & Ribeiro, J. (2009a). *IT Governance using COBIT implemented in a High Public Educational Institution – A Case Study*. Paper presented at the 3rd International Conference on European Computing Conference (ECC), Portugal.
- Gomes, R., & Ribeiro, J. (2009b). *The Main Benefits of COBIT in a High Public Educational Institution - A Case Study*. Paper presented at the Pacific Asia Conference on Information Systems (PACIS), Hyderabad, India.
- Grant, G., Brown, A., Uruthirapathy, A., & McKnight, S. (2007). *An Extended Model of IT Governance: A Conceptual Proposal*. Paper presented at the Americas Conference on Information Systems (AMCIS), Keystone, Colorado.
- Gray, H. (2004). Is there a relationship between IT governance and corporate governance? What improvements (if any) would IT governance bring to the LSC: IT Governance Institute.
- Grewal, S. K. (2006). *Issues in IT governance and IT service management - a study of their adoption in Australian universities*. (Doctoral Dissertation), University of Canberra, Canberra, Australia.
- Grüttner, V., Pinheiro, F., & Itaborahy, A. (2010). *IT Governance Implementation-Case of a Brazilian Bank*. Paper presented at the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing Paradigms in Quantitative Research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 105-117). Thousand Oaks, CA: Sage Publications.
- Guldentops, E., Van Grembergen, W., & De Haes, S. (2002). Control and governance maturity survey: establishing a reference benchmark and a self assessment tool. *Information Systems Control Journal*, 6, 32-35.
- Guthrie, J. (1992). Critical Issues in Public Sector Auditing. *Managerial Auditing Journal*, 7(4), 27-32.
- Hadden, L. B. (2002). *An investigation of the audit committee and its role in monitoring information technology risks*. (Doctoral Dissertation), Nova



- Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Hair, J. F., Black, W. C., & Babin, B. J. (2009). *Multivariate Data Analysis: A Global Perspective* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks, CA: Sage Publications.
- Hancock, I., & Parakala, K. (2008). Risk Management: IT Governance-What Are Your Obligations? *Keeping Good Companies*, 60(11), 659-663.
- Hansen, K. (2002). Open to the public. *Australian CPA*, 72(7), 38-39.
- Hardy, G. (2006). Using IT governance and COBIT to deliver value with IT and respond to legal, regulatory and compliance challenges. *Information Security Technical Report*, 11(1), 55-61.
- Hardy, G. (2008). The role of the IT Auditor in IT Governance. *Information Systems Control Journal*, 1, 1-2.
- Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research: An International Journal*, 3(3), 118-126.
- Henseler, J., & Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In V. Esposito Vinzi, W. W. Chin, J. Henseler & H. Wang (Eds.), *Handbook of partial least squares: Concepts, methods and applications* (pp. 713-735). Berlin, Germany: Springer.
- Hester, A. J. (2010). *A Comparison of the Influence of Social Factors and Technological Factors on Adoption and Usage of Knowledge Management Systems*. Paper presented at the 43rd Hawaii International Conference on System Sciences (HICSS), Kauai, Hawaii.
- Hiererra, S. E. (2012). *Assessment of IT Governance Using COBIT 4.1 Framework Methodology: Case Study University IS Development in IT Directorate*. (Masters Thesis), BINUS University, Jakarta, Indonesia.
- Hoaglin, D. C., Mosteller, F., & Tukey, J. W. (2000). *Understanding robust and exploratory data analysis*: Wiley.
- Hong, S., Thong, J. Y., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems*, 42(3), 1819-1834.
- Howard, C., & Seth-Purdie, R. (2005). Governance issues for public sector boards. *Australian Journal of Public Administration*, 64(3), 56-68.
- Huang, R., Zmud, R., & Price, R. (2010a). Influencing the Effectiveness of IT Governance Practices Through Steering Committees and Communication Policies. *European Journal of Information Systems*, 19(3), 288-302.
- Huang, R., Zmud, R. W., & Price, R. L. (2010b). Influencing the effectiveness of IT governance practices through steering committees and communication policies. *European Journal of Information Systems*, 19(3), 288-302.
- Huang, S., & Han, W. (2006). Selection Priority of Process Areas Based on CMMI Continuous Representation. *Information & Management*, 43(3), 297-307.
- Huissoud, M. (2005). IT self-assessment project, current results and next steps, Presentation to EUROSAI IT working group. Cypress.
- Hunt, S. D. (1991). *Modern marketing theory: Critical issues in the philosophy of marketing science*. Cincinnati, OH: South-Western Publishing Company.
- Hunton, J. E., Bryant, S. M., & Bagranoff, N. A. (2004). *Core Concepts of Information Technology Auditing*: Wiley.

- Hunton, J. E., Wright, A. M., & Wright, S. (2004). Are financial auditors overconfident in their ability to assess risks associated with enterprise resource planning systems. *Journal of Information Systems*, 18(2), 7-28.
- Hussain, S. J., & Siddiqui, M. S. (2005). *Quantified model of COBIT for corporate IT governance*. Paper presented at the An information technology governance framework for the public sector, Washington, DC.
- IDC. (2015). Australia Government ICT 2014–2018 Forecast and Analysis. Framingham, MA: International Data Corporation.
- Ifinedo, P. (2006). Acceptance and continuance intention of web-based learning technologies (WLT) use among university students in a Baltic country. *The Electronic Journal of Information Systems in Developing Countries*, 23(6), 1-20.
- Intan Salwani, M., Marthandan, G., Daud Norzaidi, M., & Choy Chong, S. (2009). E-commerce usage and business performance in the Malaysian tourism sector: empirical analysis. *Information management & computer security*, 17(2), 166-185.
- ISACA. (2002). *IS Auditing Guideline IT Governance (G18)*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- ISACA. (2009). *IS Standards, Guidelines and Procedures for Auditing and Control Professionals*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- ISACA. (2012a). *COBIT 5: A Business Framework for the Governance and Management of Enterprise IT*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- ISACA. (2012b). *COBIT 5: Enabling Processes*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- ISACA. (2013a). *Process Assessment Model (PAM): Using COBIT5*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- ISACA. (2013b). *Self-assessment Guide: Using COBIT 5*. Rolling Meadows, IL: Information Systems Audit and Control Association.
- Ismail, N. (2008). Information technology governance, funding and structure. *Campus-Wide Information Systems*, 25(3), 145-160.
- Ismail, S., Alinda, R., Ibrahim, O., & Rahman, A. (2009). *High Level Control Objectives in the Malaysian Ministry of Education*. Paper presented at the Postgraduate Annual Research Seminar (PARS 2009), Kuala Lumpur, Malaysia.
- ISO. (2008). *ISO/IEC 38500:2008 Corporate Governance of Information Technology: International Organization for Standardization*.
- ITGI. (2003). *Board Briefing on IT Governance (2nd ed.)*. Rolling Meadow, IL: IT Governance Institute.
- ITGI. (2005a). *COBIT 4.0 – Control Objectives, Management Guidelines and Maturity Models*. <http://www.itgi.org>
- ITGI. (2005b). *IT Alignment: who is in charge?* Rolling Meadow, IL: IT Governance Institute.
- ITGI. (2007a). *COBIT Mapping Overview of International IT Guidance (2nd ed.)*. Rolling Meadows, IL: IT Governance Institute.
- ITGI. (2007b). *Control Objectives for Information and Related Technologies (COBIT) 4.1*. Rolling Meadows, IL: IT Governance Institute.
- ITGI. (2008). *IT Governance Global Status Report*. Rolling Meadows, IL: IT Governance Institute.

- ITGI. (2011). Global Status Report on the Governance of Enterprise IT (GEIT). Rolling Meadows, IL: IT Governance Institute.
- Janssen, M., & Esteve, E. (2013). Lean government and platform-based governance-- Doing more with less. *Government Information Quarterly*, 30(1), S1-S8. doi: 10.1016/j.giq.2012.11.003
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational researcher*, 33(7), 14-26.
- Jones, C., McCarthy, R., Halawi, L., & Mujtaba, B. (2010). Utilizing the technology acceptance model to assess the employee adoption of information systems security measures. *Issues in Information Systems*, 11(1), 9-16.
- Jordan, E., & Musson, D. (2006). Corporate Governance and IT Governance: Exploring the Board's Perspective. doi: <http://dx.doi.org/10.2139/ssrn.787346>
- Kallenbach, P., & Scanlon, L. (2007). 10 steps to an IT governance catastrophe. *Keeping Good Companies*, 59(4), 246-247.
- Kanapathy, K., & Khan, K. I. (2012). Assessing the relationship between ITIL implementation progress and firm size: evidence from Malaysia. *International Journal of Business and Management*, 7(2), 194-199.
- Kanellou, A., & Spathis, C. (2011). Auditing in enterprise system environment: a synthesis. *Journal of Enterprise Information Management*, 24(6), 494-519.
- Kaplan, B., & Duchon, D. (1988). Combining qualitative and quantitative methods in information systems research: a case study. *MIS Quarterly*, 12(4), 571-586.
- Keil, M., Tiwana, A., & Bush, A. (2002). Reconciling user and project manager perceptions of IT project risk: a Delphi study. *Information Systems Journal*, 12(2), 103-119. doi: 10.1046/j.1365-2575.2002.00121.x
- Kerr, D. S., & Murthy, U. S. (2013). The Importance of the CobiT Framework IT Processes For Effective Internal Control Over Financial Reporting in Organizations: An International Survey. *Information & Management*, 50(7), 590-597.
- Khalfan, A., & Gough, T. G. (2002). Comparative analysis between the public and private sectors on the IS/IT outsourcing practices in a developing country: a field study. *Logistics Information Management*, 15(3), 212-222.
- Khasawneh, A. M. (2008). Concepts and measurements of innovativeness: The case of information and communication technologies. *International Journal of Arab Culture, Management and Sustainable Development*, 1(1), 23-33.
- Kim, G. (2003). Sarbanes-Oxley, Fraud Prevention, and IMCA: A Framework for Effective Controls Assurance. *Computer Fraud & Security*, 2003(9), 12-16.
- King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management*, 43(6), 740-755.
- Kirakowski, J. (2003). The use of questionnaire methods for usability assessment. *Unpublished manuscript. Retrieved from* <http://www.ucc.ie/hfrg/questionnaires/sumi/sumipapp.html>.
- Kitchenham, B., & Pfleeger, S. (2002). Principles of survey research: part 3: constructing a survey instrument. *ACM SIGSOFT Software Engineering Notes*, 27(2), 20-24.
- Kotb, A., Sangster, A., & Henderson, D. (2014). E-business internal audit: the elephant is still in the room! *Journal of Applied Accounting Research*, 15(1), 43-63. doi: doi:10.1108/JAAR-10-2012-0072
- Koutoupis, A. G., & Tsamis, A. (2009). Risk based internal auditing within Greek banks: a case study approach. *Journal of Management and Governance*, 13(1), 101-130.

- Krey, M. (2010). *Information technology governance, risk and compliance in health care—a management approach*. Paper presented at the Developments in E-systems Engineering (DESE), London, UK.
- Kurilo, A., Miloslavskaya, N., & Tolstaya, S. (2009). *Ensuring information security controls for the Russian banking organizations*. Paper presented at the 2nd International Conference on Security of Information and Networks (SIN 2009), Gazimagusa, Cyprus.
- Kurti, I., Barrolli, E., & Sevrani, K. (2014). Effective IT Governance in the Albanian Public Sector—A Critical Success Factors Approach. *The Electronic Journal of Information Systems in Developing Countries*, 63(6), 1-22.
- Landeta, J. (2006). Current validity of the Delphi method in social sciences. *Technological Forecasting and Social Change*, 73(5), 467-482.
- Lane, J. E. (2000). *The Public Sector: Concepts, Models and Approaches* (3rd edition ed.). Thousand Oaks, CA: Sage Publications.
- Lapao, L. (2011). Organizational Challenges and Barriers to Implementing “IT Governance” in a Hospital. *The Electronic Journal Information Systems Evaluation*, 14(1), 37-45.
- Larsen, M. H., Pedersen, M. K., & Viborg Andersen, K. (2006). *IT governance: reviewing 17 IT governance tools and analysing the case of Novozymes A/S*. Paper presented at the 39th Annual Hawaii International Conference on System Sciences (HICSS), Hawaii, USA.
- Lawry, R., Waddell, D., & Singh, M. (2007). *Roles, Responsibilities and Futures of Chief Information Officers (CIOs) in the Public Sector*. Paper presented at the European and Mediterranean Conference on Information Systems (EMCIS), Spain.
- Lawton, R. (2007). Transitioning IT From a Compliance to a Value-driven Enterprise Using COBIT. *Information Systems Control Journal*, 6, 43.
- Le Grand, Charles H. (2012). Performing the IT General Controls Audit. *EDPACS*, 45(1), 1-13.
- Lee, T. H., & Ali, A. M. (2008). Audit Challenges in Malaysia Today. *Accountants Today*, 21(10), 24-26.
- Leech, N. L., Dellinger, A. B., Brannagan, K. B., & Tanaka, H. (2010). Evaluating mixed research studies: A mixed methods approach. *Journal of Mixed Methods Research*, 4(1), 17-31.
- Leedy, P. D., & Ormrod, J. E. (2009). *Practical research: Planning and design*. NJ.
- Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, 40(3), 191-204.
- Leih, M. J. (2009). *Regulatory impact on IT governance: A multiple case study on the Sarbanes-Oxley Act*. (Doctoral Dissertation), The Claremont Graduate University, Claremont, CL.
- Lewis-Beck, M., Bryman, A. E., & Liao, T. F. (2003). *The SAGE Encyclopedia of Social Science Research Methods*. Thousand Oaks, CA: Sage Publications.
- Lin, F., Chou, S., & Wang, W. (2011). IS practitioners’ views on core factors of effective IT governance for Taiwan SMEs. *International Journal of Technology Management*, 54(2), 252-269.
- Lin, F., Guan, L., & Fang, W. (2010). Critical Factors Affecting the Evaluation of Information Control Systems with the COBIT Framework. *Emerging Markets Finance and Trade*, 46(1), 42-55.

- Lin, H., Cefaratti, M., & Wallace, L. (2012). Enterprise Risk Management, COBIT, and ISO 27002: A Conceptual Analysis. *Internal Auditing*, 27(2), 3-12.
- Lindsey, W. H. (2011). *The relationship between personality type and software usability using the myers-briggs type indicator (MBTI) and the software usability measurement inventory (SUMI)*. (Doctoral dissertation), Nova Southeastern University, Florida, United States. Available from ProQuest Dissertations and Theses Database
- Linstone, H. A., & Turoff, M. (1975a). *The Delphi method: Techniques and applications*. London: Addison-Wesley.
- Linstone, H. A., & Turoff, M. (1975b). Eight basic pitfalls: A checklist. In H. Linstone & M. Turoff (Eds.), *The Delphi Method: Techniques and Applications* (pp. 573-586). Reading, MA: Addison-Wesley.
- Liu, Q., & Ridley, G. (2005). *IT Control in the Australian Public Sector: an International Comparison*. Paper presented at the European Conference on Information Systems, Germany.
- Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial Management & Data Systems*, 111(7), 1006-1023.
- Lu, H.-P., Hsu, C.-L., & Hsu, H.-Y. (2005). An empirical study of the effect of perceived risk upon intention to use online applications. *Information management & computer security*, 13(2), 106-120.
- Lubbad, R. R. (2014). *Towards An Abbreviated Model of IT governance for Palestinian government sector According to COBIT 5 framework*. (MBA Thesis), The Islamic University of Gaza, Business Administration Department.
- Maduka, S., Sedera, D., Srivastava, S., & Murphy, G. (2014). Intra-organizational information asymmetry in offshore ISD outsourcing. *The journal of information and knowledge management systems*, 44(1), 94-120.
- Majdalawieh, M., & Zaghloul, I. (2009). Paradigm shift in information systems auditing. *Managerial Auditing Journal*, 24(4), 352-367.
- Malakooti, M. V., Hashemi, S. M., & Tavakoli, N. (2014). *An Effective Solution for the Service Support of Virtual Banking Using the Key Performance Indices Based on Cobit-5 Architecture*. Paper presented at the The International Conference on Computing Technology and Information Management (ICCTIM2014), Dubai, UAE.
- Mallette, D., & Jain, M. (2005). IT Performance Improvement With CobiT and the SEI CMM. *Information Systems Control Journal*, 3, 46-50.
- Mangalaraj, G., Singh, A., & Taneja, A. (2014). *IT Governance Frameworks and COBIT-A Literature Review*. Paper presented at the 20th Americas Conference on Information Systems, Savannah, Georgia.
- Marrone, M., Gacenga, F., Cater-Steel, A., & Kolbe, L. (2014). IT service management: a cross-national study of ITIL adoption. *Communications of the Association for Information Systems*, 34(1), 865-892.
- Marrone, M., Hoffmann, L., & Kolbe, L. M. (2010). *IT Executives' Perception of CobiT: Satisfaction, Business-IT Alignment and Benefits*. Paper presented at the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru.
- Marshall, M. (1996). Sampling for Qualitative Research. *Family practice*, 13(6), 522-526.

- Marshall, P., & McKay, J. (2004). Strategic IT planning, evaluation and benefits management: the basis for effective IT governance. *Australasian Journal of Information Systems*, 11(2), 14-26.
- Matsuo, H., McIntyre, K. P., Tomazic, T., & Katz, B. (2004). *The online survey: its contributions and potential problems*. Paper presented at the American Statistical Association.
- Maxwell, J. (1992). Understanding and validity in qualitative research. *Harvard educational review*, 62(3), 279-301.
- Mays, N., & Pope, C. (2000). Qualitative research in health care: Assessing quality in qualitative research. *British Medical Journal*, 320(7226), 50.
- McEvoy, P., & Richards, D. (2006). A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of Research in Nursing*, 11(1), 66-78.
- Meredith, J. R., Raturi, A., Amoako-Gyampah, K., & Kaplan, B. (1989). Alternative research paradigms in operations. *Journal of Operations Management*, 8(4), 297-326.
- Merhout, J. W., & Havelka, D. (2008). Information technology auditing: A value-added IT governance partnership between IT management and audit. *Communications of the Association for Information Systems*, 23(1), 464-482.
- Mingay, S. (2005). COBIT 4.0 is a good step forward. *Gartner Group, Research Report*.
- Mingers, J. (2001). Combining IS research methods: towards a pluralist methodology. *Information systems research*, 12(3), 240-259.
- Miville, N. D. (2005). *Factors influencing the diffusion of innovation and managerial adoption of new technology*. (3163513 Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Mligo, E. S. (2013). *Doing Effective Fieldwork: A Textbook for Students of Qualitative Field Research in Higher-Learning Institutions*: Wipf and Stock Publishers.
- Moeller, R. R. (2011). *COSO Enterprise Risk Management: Establishing Effective Governance, Risk, and Compliance (GRC) Processes* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Montgomery, B. (2011). *The impact of the user interface on simulation usability and solution quality*. (Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures* (4th ed.). Walnut Creek, CA: Left Coast Press.
- Musawa, M. S., & Wahab, E. (2012). The adoption of electronic data interchange (EDI) technology by Nigerian SMEs: A conceptual framework. *E3 Journal of Business Management and Economics*, 3(2), 55-68.
- Myers, M. D., & Klein, H. K. (2011). A Set of Principles for Conducting Critical Research in Information Systems. *MIS Quarterly*, 35(1), 17-36.
- Nabiollahi, A., & bin Sahibuddin, S. (2008). *Considering Service Strategy in ITIL V3 as a Framework for IT Governance*. Paper presented at the International Symposium on Information Technology (ITSim), Kuala Lumpur, Malaysia.
- NAO. (2005). *Public Service Broadcasting: the BBC's Performance Measurement Framework*. National Audit Office.
- National Computing Centre. (2005). *IT Governance: Developing a successful governance strategy*. Manchester, UK: National Computing Centre.

- Neto, J. S., de Luca Ribeiro, C. H., & Santos, D. (2014). Is COBIT 5 Process Implementation a Wicked Problem? *COBIT Focus*, 2, 8-10.
- Neuman, W. L. (2005). *Social Research Methods: Quantitative and Qualitative Approaches* (6th ed.). Boston: Allyn and Bacon.
- Nfuka, E. N., & Rusu, L. (2010). *IT Governance Maturity in the Public Sector Organizations in a Developing Country: The Case of Tanzania*. Paper presented at the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru.
- Nfuka, E. N., & Rusu, L. (2011). The Effect of Critical Success Factors on IT Governance Performance. *Industrial Management & Data Systems*, 111(9), 1418-1448.
- Nfuka, E. N., & Rusu, L. (2013). Critical Success Framework for Implementing Effective IT Governance in Tanzanian Public Sector Organizations. *Journal of Global Information Technology Management*, 16(3), 53-77.
- Nicho, M., & Cusack, B. (2007, Jan. 2007). *A Metrics Generation Model for Measuring the Control Objectives of Information Systems Audit*. Paper presented at the 40th Annual Hawaii International Conference on System Science.
- Nicoll, P. (2005). *Audit in a Democracy: The Australian Model of Public Sector Audit and its Application to Emerging Markets*. Burlington, VT: Ashgate.
- Nolan, R., & McFarlan, F. W. (2005). Information technology and the board of directors. *Harvard Business Review*, 83(10), 96.
- Noor, K. B. M. (2008). Case study: A strategic research methodology. *American journal of applied sciences*, 5(11), 1602-1604.
- Norton, D. P., & Kaplan, R. S. (1996). *The Balanced Scorecard: Translating Strategy into Action*: Harvard Business School Press Books.
- Nugroho, H. (2014). Conceptual Model of IT Governance for Higher Education Based on COBIT 5 Framework. *Journal of Theoretical and Applied Information Technology*, 60(2), 216-221.
- OCAGI. (2002). *Survey Questionnaire for IT Applications*. Office of the Comptroller and Auditor General of India.
- Oliveira, T., & Martins, M. F. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems*, 110(9), 1337-1354.
- Oliver, D., & Lainhart, J. (2012). COBIT 5: Adding Value Through Effective Geit. *EDPACS*, 46(3), 1-12.
- Onwuegbuzie, A. J., & Collins, K. M. (2007). A typology of mixed methods sampling designs in social science research. *The qualitative report*, 12(2), 281-316.
- Othman, M. F. I., Chan, T., Foo, E., Nelson, K. J., & Timbrell, G. T. (2011). *Barriers to information technology governance adoption: a preliminary empirical investigation*. Paper presented at the 15th International Business Information Management Association Conference, Cairo, Egypt.
- Otto, B. (2010). *IT Governance and Organizational Transformation: Findings From an Action Research Study*. Paper presented at the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru.
- Padilla, R. (2005). Learn how IT governance can benefit your organisation. Retrieved 20 May 2011, from <http://www.zdnet.com.au/learn-how-it-governance-can-benefit-your-organisation-139204102.htm>



- Pang, M.-S. (2014). IT Governance and Business Value in the Public Sector Organizations - The Role of Elected Representatives in IT Governance and Its Impact on IT Value in U.S. State Governments. *Decision Support Systems*, 59(1), 274-285. doi: 10.1016/j.dss.2013.12.006
- Parker, S. L. (2013). *An Exploration of the Factors Influencing the Adoption of an IS Governance Framework*. (Doctoral Dissertation), Nova Southeastern University, Florida, United States. ProQuest Dissertations & Theses Global database.
- Patel, N. V. (2004). *An emerging strategy for e-business IT Governance*: IGI Global.
- Pearl, J. (2003). Causality: models, reasoning, and inference. *Econometric Theory*, 19, 675-685.
- Perry, C., Alizadeh, Y., & Riege, A. (1997). *Qualitative methods in entrepreneurship research*. Paper presented at the The Annual Conference of the Small Enterprise Association Australia and New Zealand, Coffs Harbour, NSW.
- Peterson, R. (2004). Crafting information technology governance. *Information Systems Management*, 21(4), 7-22.
- Pickard, A. (2012). *Research methods in information* (2nd ed.). London, UK: Facet Publishing.
- Pitt, S.-A. (2014). *Internal Audit Quality: Developing a Quality Assurance and Improvement Program*. Hoboken, NJ: John Wiley & Sons.
- Posthumus, S., Von Solms, R., & King, M. (2010). The board and IT governance: The what, who and how. *South African Journal of Business Management*, 41(3), 23-32.
- Prasad, A., Heales, J., & Green, P. (2009). *Towards a deeper understanding of information technology governance effectiveness: A capabilities-based approach*. Paper presented at the International Conference on Information Systems (ICIS).
- Prasad, A., Heales, J., & Green, P. (2010). A capabilities-based approach to obtaining a deeper understanding of information technology governance effectiveness: Evidence from IT steering committees. *International Journal of Accounting Information Systems*, 11(3), 214-232.
- Preittigun, A., Chantatub, W., & Vatanasakdakul, S. (2012). A Comparison between IT governance research and concepts in COBIT 5. *International Journal of Research in Management & Technology*, 2(6), 581-590.
- Proenca, D., Vieira, R., Antunes, G., da Silva, M. M., Borbinha, J., Becker, C., & Kulovits, H. (2013). *Evaluating a process for developing a capability maturity model*. Paper presented at the 28th Annual ACM Symposium on Applied Computing, Coimbra, Portugal.
- Public Service Commission. (2014). *Characteristics of the Queensland Public Service workforce 2013-14*. Queensland Government Retrieved from <http://www.psc.qld.gov.au/publications/workforce-statistics/workforce-statistics.aspx>.
- Punch, K. F. (2013). *Introduction to Social Research: Quantitative and Qualitative Approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Quaddus, M., & Xu, J. (2005). Adoption and diffusion of knowledge management systems: field studies of factors and variables. *Knowledge-Based Systems*, 18(2), 107-115.
- Queensland Audit Office. (2009). Report to Parliament No. 4 for 2009. from [https://www.qao.qld.gov.au/files/file/Reports/2009\\_Report\\_No.4.pdf](https://www.qao.qld.gov.au/files/file/Reports/2009_Report_No.4.pdf)



- Queensland Government Chief Information Office. (2011). Information Security (IS18). Retrieved 18/10/2012, from <http://qgcio.qld.gov.au/>
- Raaum, R. B., & Campbell, R. (2006). Challenges in Performance Auditing: How a State Auditor with Intriguing New Performance Auditing Authority is Meeting Them. *The Journal of Government Financial Management*, 55(4), 26-30.
- Radovanovic, D., Radojevic, T., Lucic, D., & Sarac, M. (2010). *IT audit in accordance with Cobit standard*. Paper presented at the MIPRO, Opatija, Croatia.
- Raghupathi, W. (2007). Corporate governance of IT: a framework for development. *Communications of the ACM*, 50(8), 99.
- Ramos, E., Santoro, F., & Baiao, F. (2013). Watch Out and Improve IT: Adapting COBIT 5.0 Framework Based on External Context Discovery. In A. Fred, J. G. Dietz, K. Liu & J. Filipe (Eds.), *Knowledge Discovery, Knowledge Engineering and Knowledge Management* (Vol. 415, pp. 426-439): Springer Berlin Heidelberg.
- Ramos, M. (2006). *How to comply with Sarbanes-Oxley section 404: assessing the effectiveness of internal control* (2 ed.). Hoboken, NJ: John Wiley & Sons.
- Raup-Kounovsky, A., Canestraro, D. S., Pardo, T. A., & Hrdinová, J. (2010). *IT Governance to Fit Your Context: Two US Case Studies*. Paper presented at the 4th International Conference on Theory and Practice of Electronic Governance (ICEGOV2010), Beijing, China.
- Rebouças, R., Sauvé, J., Moura, A., Bartolini, C., & Trastour, D. (2007). *A decision support tool to optimize scheduling of IT changes*. Paper presented at the 10th IFIP/IEEE International Symposium on Integrated Network Management, Munich, Germany.
- Renken, J. (2004). *Developing an IS/ICT management capability maturity framework*. Paper presented at the 2004 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries (SAICSIT), Stellenbosch, South Africa.
- Ribbers, P. M. A., Peterson, R. R., & Parker, M. M. (2002). *Designing information technology governance processes: diagnosing contemporary practices and competing theories*. Paper presented at the Proceedings of the 35th Annual Hawaii International Conference on System Sciences (HICSS), Hawaii
- Ridley, G., Young, J., & Carroll, P. (2004). *COBIT and its Utilization: A framework from the literature*. Paper presented at the 37th Hawaii International Conference on System Sciences (HICSS), Hawaii.
- Ridley, G., Young, J., & Carroll, P. (2008). Studies to Evaluate COBIT's Contribution to Organisations: Opportunities from the Literature, 2003–06. *Australian Accounting Review*, 18(4), 334-342.
- Ringle, C., Sarstedt, M., & Hair, J. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Journal of Long Range Planning*, 46(1), 1-12.
- Robinson, N. (2005). IT excellence starts with governance. *Journal of Investment Compliance*, 6(3), 45-49.
- Robson, C. (1993). *Real world research: A resource for social scientists and practitioners-researchers*. Oxford, UK: Blackwell.
- Rogers, E. (1983). *Diffusion of Innovations* (1st ed.). New York, NY: The Free Press.

- Rogers, E. (2010). *Diffusion of Innovations* (4th ed.). New York, NY: Simon and Schuster Inc.
- Rogers, P. (2009). The role of maturity models in IT Governance: A Comparison of the major models and their potential benefits to the enterprise *Information Technology Governance and Service Management: Frameworks and Adaptations*. Hershey, PA: IGI Global.
- Rouyet-Ruiz, J. (2008). COBIT as a Tool for IT Governance: between Auditing and IT Governance. *The European Journal for the Informatics Professional*, 9(1), 40-43.
- Rowlands, B., Haes, S. D., & Grembergen, W. V. (2014). *Exploring and Developing an IT Governance Culture Framework*. Paper presented at the 35th International Conference on Information Systems (ICIS), Auckland, NZ.
- Rubino, M., & Vitolla, F. (2014). Corporate governance and the information system: how a framework for IT governance supports ERM. *Corporate Governance*, 14(3), 320-338.
- Saint-Germain, R. (2005). Information security management best practice based on ISO/IEC 17799. *Information Management Journal*, 39(4), 60-66.
- Salim, S., Sedera, D., & Sawang, S. (2014). *Technology adoption as a multi-stage process*. Paper presented at the 25th Australasian Conference on Information Systems, Auckland, New Zealand.
- Sambamurthy, V., & Zmud, R. W. (1999). Arrangements for information technology governance: a theory of multiple contingencies. *MIS Quarterly*, 23(2), 261-290.
- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students* (3rd edition ed.). Harlow, England: Pearson Education Limited.
- Schillewaert, N., Ahearne, M. J., Frambach, R. T., & Moenaert, R. K. (2005). The adoption of information technology in the sales force. *Industrial Marketing Management*, 34(4), 323-336.
- Schmidt, R. C. (1997). Managing Delphi Surveys Using Nonparametric Statistical Techniques. *Decision Sciences*, 28(3), 763-774.
- Schubert, K. D. (2004). *CIO survival guide: The roles and responsibilities of the chief information officer*. Hoboken, NJ: John Wiley & Sons.
- Schwalbe, K. (2013). *Information Technology Project Management, Revised* (7th ed.). Boston, MA: Cengage Learning.
- Scott, W. R. (2014). *Institutions and organizations: ideas, interests and identities* (4th ed.). Thousand Oaks, CA: SAGE.
- Selig, G. J. (2008). *Implementing IT Governance-A Practical Guide to Global Best Practices in IT Management*. Amersfoort, NL: Van Haren Publishing.
- Sethibe, T., Campbell, J., & McDonald, C. (2007). *IT Governance in Public and Private Sector Organisations: Examining the Differences and Defining Future Research Directions*. Paper presented at the 18th Australasian Conference on Information Systems, Toowoomba, Australia.
- Shaikh, G., Marri, H., Shaikh, N., Shaikh, A., & Khumbhati, K. (2007). *Impact of Information Systems on the Performance and Improvement of an Enterprises*. Paper presented at the European and Mediterranean Conference on Information Systems, Spain.
- Sharifi, A., Beheshtizad, M. A., Sharifi, H., Nourollahi, A., Sharifi, J., & Asadi, R. (2015). Designing an Information Technology Model for Audit in Banks. *IJCER*, 4(1), 17-22.

- Short, J., & Gerrard, M. (2009). IT Governance Must Be Driven by Corporate Governance. *Gartner-Research*, ID(G00172463).
- Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50(1), 20-24.
- Silverman, D. (2006). *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. Los Angeles, CA: Sage.
- Simonsson, M., & Johnson, P. (2006). *Assessment of IT Governance-A Prioritization of Cobit*. Paper presented at the Proceedings of the Conference on Systems Engineering Research, Los Angeles, USA.
- Simonsson, M., & Johnson, P. (2008). *The IT organization modeling and assessment tool: Correlating IT governance maturity with the effect of IT*. Paper presented at the 41st Hawaii International Conference on System Sciences (HICSS), Hawaii
- Simonsson, M., Johnson, P., & Ekstedt, M. (2010). The effect of IT governance maturity on IT governance performance. *Information Systems Management*, 27(1), 10-24.
- Simonsson, M., Johnson, P., & Wijkstrm, H. (2007). *Model-based IT governance maturity assessments with COBIT*. Paper presented at the European Conference on Information Systems (ECIS), St. Gallen, Switzerland.
- Singh, H. (2010). *Selecting IT Control Objectives and Measuring IT Control Capital*. Paper presented at the 21st Australasian Conference on Information Systems, Brisbane, Australia.
- Smits, D., & van Hillegersberg, J. (2015). *IT Governance Maturity: Developing a Maturity Model using the Delphi Method*. Paper presented at the 48th Hawaii International Conference on System Sciences (HICSS), Kauai, Hawaii.
- Sobh, R., & Perry, C. (2006). Research design and data analysis in realism research. *European Journal of marketing*, 40(11/12), 1194-1209.
- Sohal, A. S., & Fitzpatrick, P. (2002). IT governance and management in large Australian organisations. *International Journal of Production Economics*, 75(1-2), 97-112.
- Sorgenfrei, C., Ebner, K., Smolnik, S., & Jennex, M. E. (2014). *From Acceptance to Outcome: Towards an Integrative framework for Information Technology Adoption*. Paper presented at the Twenty Second European Conference on Information Systems, Tel Aviv, Israel.
- Spacey, R., Goulding, A., & Murray, I. (2004). Exploring the attitudes of public library staff to the Internet using the TAM. *Journal of Documentation*, 60(5), 550-564.
- Spremic, M. (2009). IT governance mechanisms in managing IT business value. *WSEAS Transactions on Information Science and Applications*, 6(6), 906-915.
- Spremic, M. (2011, July 6 - 8, 2011). *Standards and Frameworks for Information System Security Auditing and Assurance*. Paper presented at the World Congress on Engineering, London, UK.
- Standards Australia. (2005). *Corporate Governance of Information and Communication Technology AS 8015-2005*. Sydney, Australia: Standards Australia.
- Stewart-Rattray, J. (2012). The state of play with information security governance. *InFinance*, 126(3), 44.

- Stewart, J., & Subramaniam, N. (2010). Internal audit independence and objectivity: emerging research opportunities. *Managerial Auditing Journal*, 25(4), 328-360.
- Stoel, D., Havelka, D., & Merhout, J. W. (2012). An Analysis of Attributes that Impact Information Technology Audit Quality: A Study of IT and Financial Audit Practitioners. *International Journal of Accounting Information Systems*, 13(1), 60-79. doi: 10.1016/j.accinf.2011.11.001
- Taylor-Powell, E. (2002). Quick tips collecting group data: Delphi technique. Retrieved 27 July 2011, from <http://www.uwex.edu/ces/pdande/resources/pdf/Tipsheet4.pdf>
- Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information systems research*, 6(2), 144-176.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage Publications.
- Tellis, W. M. (1997). Application of a Case Study Methodology. *The qualitative report*, 3(3), 1-19.
- Teo, W., Manaf, A., & Choong, P. (2013). Information Technology Governance: Applying the Theory of Planned Behaviour. *Journal of Organizational Management Studies*, Vol. 2013, 1-15.
- Teo, W., & Tan, K. (2010). Adoption of information technology governance in the electronics manufacturing sector in Malaysia. In N. S. Shi & G. Silvius (Eds.), *Enterprise IT Governance, Business Value and Performance Measurement* (pp. 41-60). Hershey, NY: IGI Global.
- Terry, J., & Standing, C. (2004). The value of user participation in e-commerce systems development. *Informing Science: The International Journal of an Emerging Transdiscipline (InformingSciJ)*, 7, 31-45.
- The Australian Bureau of Statistics. (1998, June 1998). Paid Work: Public Sector Employment. Retrieved 21 January, 2013, from <http://www.abs.gov.au>
- Tornatzky, L. G., & Fleischer, M. (1990). *The Processes of Technological Innovation*. Lexington, MA: Lexington Books.
- Tornatzky, L. G., & Klein, K. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management*, 29, 28-45.
- Trautman, L., & Altenbaumer-Price, K. (2011). The Board's Responsibility for Information Technology Governance. *John Marshall Journal of Computer & Information Law*, 29, 313.
- Trites, G. (2004). Director responsibility for IT governance. *International Journal of Accounting Information Systems*, 5(2), 89-99.
- Trochim, W., & Donnelly, J. (2007). *The Research Methods Knowledge Base*. Ohio, IL: Thomson.
- Trotman, A. J. (2013). *Internal Audit Quality: A Multi-Stakeholder Analysis*. (Doctoral Dissertation), Bond University, Brisbane, Australia.
- Tsang, E. W., & Kwan, K.-M. (1999). Replication and theory development in organizational science: A critical realist perspective. *Academy of Management Review*, 24(4), 759-780.
- Tsoukas, H. (1989). The validity of idiographic research explanations. *Academy of Management Review*, 14(4), 551-561.
- Tugas, F. C. (2010). Assessing the level of Information Technology (IT) Processes Performance and Capability Maturity in the Philippine Food, Beverage, and

- Tobacco (FBT) Industry using the COBIT Framework. *Academy of Information and Management Sciences Journal*, 13(1), 45-68.
- Ula, M., Ismail, Z., & Sidek, Z. (2011). A Framework for the governance of information security in banking system. *Journal of Information Assurance & Cyber Security*, 1-12.
- Van der Nest, D., Thornhill, C., & De Jager, J. (2008). Audit committees and accountability in the South African public sector. *Journal of Public Administration*, 43(4), 545-558.
- Van Grembergen, W. (2003). *Strategies for information technology governance*. Hershey, PA: Idea Group Publishing.
- Van Grembergen, W., De Haes, S., & Guldentops, E. (2004). Structures, processes and relational mechanisms for IT governance. In Van Grembergen W (Ed.), *Strategies for information technology governance* (pp. 1-36): Hershey: Idea Group Publishing.
- Vannoy, S. A., & Palvia, P. (2010). The social influence model of technology adoption. *Communications of the ACM*, 53(6), 149-153.
- Veal, A. J., & Ticehurst, B. (2005). *Business Research Methods: A Managerial Approach* (2nd ed.). Canada: Pearson Education.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 46(2), 186-204.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.
- Vinten, G. (2002). Public Sector Corporate Governance-the Turnbull Report. *Credit Control*, 23(1), 27-30.
- Walker, A. J., McBride, T., Basson, G., & Oakley, R. (2012). ISO/IEC 15504 measurement applied to COBIT process maturity. *Benchmarking: An International Journal*, 19(2), 159-176.
- Wallhoff, J. (2004). Combining ITIL with COBIT and ISO/IEC 17799:2000 *Scillani Information AB*.
- Wang, H., Meng, J., & Tenenhaus, M. (2010). Regression modelling analysis on compositional data. In V. Vinzi, W. Chin, J. Henseler & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 381-406). Berlin, Germany: Springer-Verlag.
- Wang, Y., & King, G. (2000). *Software engineering processes: principles and applications*. Florida: CRC Press.
- Wang, Y., & Yang, Y. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting and Social Change*, 77(5), 803-815.
- Warland, C., & Ridley, G. (2005). *Awareness of IT control frameworks in an Australian state government: A qualitative case study*. Paper presented at the 38th Hawaii International Conference on System Sciences, Hawaii.
- Warshaw, P. R., & Davis, F. D. (1985). Disentangling behavioral intention and behavioral expectation. *Journal of experimental social psychology*, 21(3), 213-228.
- Weaver, K., & Olson, J. K. (2006). Understanding paradigms used for nursing research. *Journal of advanced nursing*, 53(4), 459-469.

- Webb, P., Pollard, C., & Ridley, G. (2006). *Attempting to Define IT Governance: Wisdom or Folly?* Paper presented at the 39th Annual Hawaii International Conference on System Sciences, Hawaii, USA.
- Weber, L. (2014). *Addressing the incremental risks associated with adopting a Bring Your Own Device program by using the COBIT 5 framework to identify key controls.* (Masters Thesis), Stellenbosch University, Stellenbosch, South Africa.
- Weill, P., & Ross, J. (2005). A matrixed approach to designing IT governance. *MIT Sloan Management Review*, 46(2), 26-34.
- Weill, P., & Ross, J. W. (2004). *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results.* Boston, MA: Harvard Business School Press.
- Wen, K., & Chen, Y. (2010). E-business value creation in Small and Medium Enterprises: a US study using the TOE framework. *International Journal of Electronic Business*, 8(1), 80-100.
- Wessels, E., & Loggerenberg, J. (2006). *IT governance: theory and practice.* Paper presented at the Proceedings of the Conference on Information Technology in Tertiary Education, , South Africa: Pretoria.
- Williams, M., Dwivedi, Y., Lal, B., & Schwarz, A. (2009). Contemporary trends and issues in IT adoption and diffusion research. *Journal of Information technology*, 24(1), 1-10.
- Williams, P. (2006). A helping hand with IT governance. *Computer Weekly*, 19, 26-27.
- Willson, P., & Pollard, C. (2009). Exploring IT governance in theory and practice in a large multi-national organisation in Australia. *Information Systems Management*, 26(2), 98-109.
- Winter, G. (2000). A comparative discussion of the notion of validity in qualitative and quantitative research. *The qualitative report*, 4(3), 4.
- Wood, D. J. (2010). *Assessing IT Governance Maturity: The Case of San Marcos, Texas.* (Masters Thesis), Texas State University, San Marcos, TX. (345)
- Wu, W.-W. (2011). Developing an explorative model for SaaS adoption. *Expert systems with applications*, 38(12), 15057-15064.
- Y. Jo, J. Lee, & J. Kim. (2010). Influential Factors for COBIT Adoption Intention: An Empirical Analysis. *International Journal of Contents*, 6(4), 79-89.
- Yin, R. K. (2013). *Case Study Research: Design and Methods* (5th ed.). Thousand Oaks, CA: Sage Publications.
- Zhu, K., Kraemer, K. L., & Xu, S. (2002). *A cross-country study of electronic business adoption using the technology-organization-environment framework.* Paper presented at the 23rd International Conference on Information Systems (ICIS 2002), Barcelona, Spain.

# Appendices

---

- Appendix A Delphi Research documents
- Appendix B Survey Research documents
- Appendix C Case Study Research documents
- Appendix D Survey II Research documents

## Appendix A


### Delphi Research Documents

#### 1. Letter Form Invitation proforma email to potential respondents


<b>Subject:</b>	<b>Invitation to Participate in a Delphi Research</b>
<b>Topic:</b>	<b>I.T. Governance: An Australian Public Sector tailored COBIT Framework</b>
<p>Dear participant</p> <p>It gives me great pleasure to invite you to participate in a Delphi research as an expert panellist to investigate IT Governance evaluation challenges in the Queensland public sector.</p> <p>It is no secret that Australian public sector is often required to operate under growing time and resource constraints. Under such circumstances, it could be deemed infeasible to implement an IT governance evaluation framework the size of the Control Objectives for Information and Related Technology (COBIT) in its entirety. This puts doubt in the mind of decision-makers having to allocate funding and resources to the implementation of IT governance.</p> <p>To overcome this perceived challenge, public sector organisations have in the past resorted to 'cherry picking' IT processes from the COBIT framework in an effort to reduce the size of evaluation programmes. This would lead to creating dissimilar sets of evaluation tools and objectives. As a result, the findings of these evaluation programmes would without a doubt be inconsistent across the public sector.</p> <p>The research team affiliated with the Information Security Institute (ISI) at the Queensland University Technology is performing a study that seeks to address the problem of IT Governance evaluation in the Australian public sector.</p> <p>Considering the professional commitment of IT professionals in the public sector to this topic, we believe that your participation in this study will prove to be interesting and rewarding. Therefore, we would encourage you to participate in this effort. We will, of course, provide you with feedback from the results when the project is completed. Any information you provide as part of this study will remain confidential in accordance with the QUT Ethics guidelines.</p> <p>Please view the attached information sheet for further details on the study and how to participate. Please note that this study has been approved by the QUT Human Research Ethics Committee (approval number 1100001017).</p> <p>We would appreciate you providing a base level of information even though you may decide not to participate in this study. This would allow us to compute the response rate and avoid duplicate invitations. This data will also remain confidential and will be deleted after computing the response rate.</p> <p>Thank you for considering this request.</p> <p><b>Mr Loaj Al Omari</b> Principal Researcher, PhD Student, Phone: +61450291666</p> <p><b>Dr Adrian McCullagh</b> Adjunct Professor at the Queensland University of Technology</p> <p><b>Dr Paul Barnes</b> Deputy Director, Information Security Institute at the Queensland University of Technology</p> <p><b>Dr Grant Pitman</b> Adjunct Professor at the Queensland University of Technology</p>	




## 2. Participant Information Sheet and Consent.

	<b>PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT</b> – Delphi Research –		
<b>IT Governance: An Australian Public Sector tailored COBIT Framework</b> QUT Ethics Approval Number 110001017			
<p>You are invited to participate in a research project entitled "IT Governance: An Australian Public Sector tailored COBIT Framework." It is essential that you carefully read this form, feel free to contact Loai Al Omari of the research team prior to beginning the study should you require further clarification.</p>			
<b>RESEARCH TEAM</b> <b>Faculty of Science and Technology – Queensland University of Technology (QUT)</b> Principal Researcher: Loai Al Omari – PhD student Research Supervisors: Dr Adrian McCullagh, Dr Paul Barnes and Dr Grant Pitman, QUT			
<b>DESCRIPTION</b> The purpose of this project is to identify and capture the current issues and challenges when conducting IT Governance evaluation in the Queensland Public Sector. The project will also evaluate the potential to use an optimised sub-set (or self-evaluation tool) based on a concentrated version of the Control Objectives for Information and Related Technology (COBIT) framework as the basis for IT governance evaluation in the public sector. You are invited to participate in this project as an expert panellist because you have been identified as a proficient Information Technology professional in the Queensland public sector.			
<b>PARTICIPATION</b> Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Any identifiable information already obtained from you will be destroyed at your request. Your decision to participate or not to participate will in no way impact upon your current or future relationship with QUT. The Delphi research consists of three questionnaires. The first questionnaire will seek your opinion on the perceived IT Governance evaluation challenges and issues. The second questionnaire presents you with a consolidated list from the previous questionnaire and asks your opinion about what you think is important. The third and last questionnaire seeks to reach consensus on top challenges as perceived by the panel. It is expected that each questionnaire would take no more than 30 minutes to complete. Total estimated time to participate in this study includes approximately 90 – 120 minutes over the next three to six months. <i>This questionnaire doesn't seek departmental or official views, but only your own personal views.</i> If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering. However, your commitment in completing all three questionnaires would be highly appreciated.			
<b>EXPECTED BENEFITS</b> By participating in the study, you will not necessarily receive any direct benefits. From a professional knowledge perspective you are assisting in better understanding of IT Governance evaluation and the types of challenges confronting Information Technology professionals. We will provide you with a summary of our findings once data collection has completed and analysed.			
<b>RISKS</b> There are no risks beyond normal day-to-day living associated with your participation in this project.			
<b>PRIVACY AND CONFIDENTIALITY</b> All information obtained in connection with this study and that can be associated with you will be treated confidentially and will not be disclosed to other persons without your permission, or except as required by law. It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that you cannot be identified. The data published will only be the aggregated results of the research and in no way identifies any specific individuals in the project.			
<b>CONSENT TO PARTICIPATE</b> The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.			
<b>QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT</b> If have any questions or require any further information please contact one of the research team members below.			
Mr Loai Al Omari Principal Researcher PhD Student Email: <a href="mailto:loai.alomari@student.qut.edu.au">loai.alomari@student.qut.edu.au</a> Phone: 3138 9554 SMS: 0450 291 666	Dr Adrian McCullagh Project Supervisor Adjunct Professor Email: <a href="mailto:amccullagh@qut.edu.au">amccullagh@qut.edu.au</a> Phone: 3138 9554	Dr Paul Barnes Project Associate Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 9019	Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:pitman.grant@police.qld.gov.au">pitman.grant@police.qld.gov.au</a>
<b>CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT</b> QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 3138 5123 or <a href="mailto:ethicscontact@qut.edu.au">ethicscontact@qut.edu.au</a> . The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner. <p style="text-align: center;"><b><i>Thank you for helping with this research project. Please keep this sheet for your information.</i></b></p>			

### 3. Round 1 Questionnaire.

 <b>I.T. GOVERNANCE: AN AUSTRALIAN PUBLIC SECTOR TAILORED COBIT FRAMEWORK</b> – Round 1 Questionnaire –		
<b>STEP 1</b> Demographic data	<p><i>Instruction:</i> Please do provide some personal data about your organisation, background and years of experiences. This information will only be used by the researcher in order to better understand and interpret the results.</p>	
Full Name	<input type="text"/>	
Organisation	<input type="text"/>	
Title (Please check one)	<input type="checkbox"/> CIO/CEO/CTO <input type="checkbox"/> Manager – IT/IS <input type="checkbox"/> Officer – IT/IS <input type="checkbox"/> Deputy CIO/CEO/CTO <input type="checkbox"/> Manager – IT/IS Audit <input type="checkbox"/> Auditor – IT/IS <input type="checkbox"/> Director – IT/IS <input type="checkbox"/> Manager – Assurance / Risk <input type="checkbox"/> Other (please specify) <input type="text"/>	
Background and experience (Please check one)	<input type="checkbox"/> Internal Audit <input type="checkbox"/> Information Technology <input type="checkbox"/> Legal <input type="checkbox"/> Business Management <input type="checkbox"/> Information Security <input type="checkbox"/> Other (please specify) <input type="text"/> <input type="checkbox"/> Accounting & Finance <input type="checkbox"/> Public Administration	
Years of experience (Please check one)	<input type="checkbox"/> < 1 year <input type="checkbox"/> 3 - 5 years <input type="checkbox"/> 7 - 10 years <input type="checkbox"/> 1 - 3 years <input type="checkbox"/> 5 - 7 years <input type="checkbox"/> > 10 years	
<b>STEP 2</b> IT governance evaluation challenges	<p><i>Instruction:</i> The list below provides IT governance evaluation challenges (based on literature) that may confront public sector organisations, categorised in three domains: Internal, External, and Organisational challenges. <b>Review the list</b> of proposed IT governance evaluation challenges for <b>completeness</b> and add, if needed, additional challenges or issues in one of the three categories. Include a definition if possible.</p> <p><b>IMPORTANT NOTE</b> An IT governance evaluation is the “process of collecting and evaluating evidence to determine whether information systems safeguards assets, maintains data integrity, achieves organisational goals effectively and consumes resources efficiently.” When the word “evaluation(ing)” is mentioned in this questionnaire it should be assumed to have the meaning defined above, regardless of any other interpretations to be found in other publications and professional or opinion forums.</p>	
Internal	N1	Lack of necessary skills and competencies to undertake effective IT governance evaluations.
	N2	Audit team's inadequate evaluation and testing of the effectiveness of IT governance processes.
	N3	Lack of developed methodologies and tools to keep pace with changes occurring in the auditing field.
	N4	Lack of or inconsistent rules to determine what aspects of evaluation best fit the relevant organisation.
	N5	Poor training arrangements for public sector auditors.
	N6	Failure of an audit team to appropriately apply required substantive evaluation procedures.
	N7	(Add new if required)
	N8	(Add new if required)
	N9	(Add new if required)
External	E1	Inconsistent execution of evaluation methodology across public sector organisations.
	E2	Limited knowledge within the audit team of emerging risk exposures related specifically to the organisation.
	E3	Evaluated public sector organisation lack of necessary skills or some reticence to co-operate.
	E4	Pressure to prematurely sign-off on evaluation reports whilst not following specific legislative requirements.
	E5	Weak auditee and auditor relationship in the public sector.
	E6	Expectation gap between public sector perceptions of ITG evaluation and actual ITG evaluation practices.
	E7	(Add new if required)
	E8	(Add new if required)
	E9	(Add new if required)
Organisational	O1	Difficulty to recruit and retain experienced IT governance auditors in the public sector.
	O2	Tendency to focus on mere compliance with legislation rather than quality.
	O3	Lack of executive support for extensive IT governance evaluation programs.
	O4	Reduced influence of audit committees and ill-established internal audit units.
	O5	Loss of continuity (evaluation cycle) due to mandatory audit rotation.
	O6	(Add new if required)
	O7	(Add new if required)
	O8	(Add new if required)
<b>STEP 3</b> Feedback	<p><i>Instruction:</i> Provide any additional feedback / comments.</p> <div style="border: 1px solid black; height: 30px; width: 100%; background-color: #f4a460;"></div> <p style="text-align: center;"><b>Thank you for assisting with this research project.</b></p>	

4. Round 2 Questionnaire.



		<b>I.T. GOVERNANCE: AN AUSTRALIAN PUBLIC SECTOR TAILORED COBIT FRAMEWORK</b> – Round II Questionnaire –				
<b>STEP 1</b> Input on IT governance evaluation challenges		<i>Instruction 1:</i> Rate the 'perceived impact' of each challenge on ITG evaluation using a score between 0 (no impact) and 5 (high impact)	<i>Instruction 2:</i> Rate the 'perceived effort' each ITG evaluation challenge using a score between 0 (no effort) and 5 (high effort)	<i>Instruction 3:</i> Taken the previous attributes (impact – effort to address) and your experience, provide your personal view of the top 10 ITG evaluation challenges in the QLD public sector. Give the most important challenge score 1, the second most important score 2 ... the 10th most important score 10.		
	Internal	N1	Insufficient skills and competencies to undertake effective ITG evaluations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N2	Inadequate evaluation of the effectiveness of ITG controls with the purpose of providing a "value-added" service to the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N3	Lack of developed methodologies and tools to keep pace with changes occurring in the auditing and technology field.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N4	Lack of or Inadequate understanding of the business context to determine what aspects of evaluation best fit the relevant organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N5	Poor training arrangements for public sector auditors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N6	Failure of an audit team to appropriately apply required substantive evaluation procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N7	Poor scope management due to cross-agency service models resulting in imbalanced or incomplete perspective.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N8	Subsequent lack of objectivity in conducting evaluations due to familiarity with staff or fear of exposure of management weaknesses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N9	Lack of specific legislative or mandatory framework to ensure a consistent evaluation approach.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		N10	Inadequate appreciation of risk management in the application of controls or in considering ITG control weakness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	External	E1	Inconsistent execution of evaluation methodology across public sector organisations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E2	Limited knowledge within the audit team of emerging risk exposures related specifically to the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E3	Evaluated public sector organisation lack of necessary skills or displaying reticence to co-operate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E4	Pressure to prematurely sign-off on evaluation reports whilst not following specific legislative requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E5	Weak auditee and auditor relationship in the public sector.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E6	Expectation gap between public sector perceptions of ITG evaluation and actual ITG evaluation practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E7	Insufficient evidence of ITG implementation (methodology, practices and processes).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E8	ITG evaluation could be subjective or bias towards "more positive" findings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E9	Discovery may be slow or non-existent if information is masked, inconsistent, unusable, or made unavailable by the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		E10	Repetition of evaluation activity in place of identification of systemic control failures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Organisational	O1	Difficulty to recruit and retain experienced ITG auditors in the public sector.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O2	Tendency to focus on mere compliance with legislation rather than quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O3	Lack of executive support for, resource allocation to and understanding of extensive ITG evaluation programs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O4	Reduced influence of audit committees and ill-established internal audit units.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O5	Loss of continuity (evaluation cycle) due to mandatory audit rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O6	Perceived low value of ITG evaluations in comparison to other evaluations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O7	Lack of executive management ITG ownership and accountability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O8	Lack of communication between business units.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		O9	Public administration tendency to deny/conceal systemic ITG problems which prevents identification and remediation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O10		Organisational changes impacting roles, responsibilities and stability of the ITG model, both internally and externally driven.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>STEP 2</b> Feedback	<i>Instruction:</i> Provide any additional feedback / comments.					
<i>Thank you for assisting with this research project</i>						

5. Round 3 Questionnaire.

		<b>I.T. GOVERNANCE: AN AUSTRALIAN PUBLIC SECTOR TAILORED COBIT FRAMEWORK</b> – Round III Questionnaire –															
<b>STEP 1</b> Input on IT governance evaluation challenges		<b>General Instruction:</b> You do not need to change all the ratings below. You may choose to change none. Only the challenges you are reconsidering in relation to the 'group's average' will need to be re-evaluated and the 'New Rating' box changed.				<b>Instruction 1:</b> Considering the group's average, re-evaluate your rating for the 'perceived impact' of each challenge on IT governance evaluation using a score between 0 (no impact) and 5 (high impact)				<b>Instruction 2:</b> Considering the group's average, re-evaluate your rating for the 'perceived treatment effort' of each challenge on IT governance evaluation using a score between 0 (no effort) and 5 (high effort)				<b>Instruction 3:</b> Considering the group's average, re-evaluate your ranking of the top 10 IT governance evaluation challenges in the QLD public sector for each challenge. Give the most important challenge score 1, the second most important score 2 ... the 10 <sup>th</sup> most important score 10			
<b>Internal</b>	N1	Insufficient skills and competencies to undertake effective ITG evaluations.				Your Rating	Group's average	Delta	New Rating	Your Rating	Group's average	Delta	New Rating	Your Rating	Group's average	Delta	New Rating
	N2	Inadequate evaluation of the effectiveness of ITG controls with the purpose of providing a "value-added" service to the organisation.				4.2			<input type="text"/>	3.4			<input type="text"/>	1			<input type="text"/>
	N3	Lack of developed methodologies and tools to keep pace with changes occurring in the auditing and technology field.				3.8			<input type="text"/>	3.3			<input type="text"/>	2			<input type="text"/>
	N4	Lack of or inadequate understanding of the business context to determine what aspects of evaluation best fit the relevant organisation.				3.7			<input type="text"/>	3.4			<input type="text"/>	4			<input type="text"/>
	N5	Poor training arrangements for public sector auditors.				3.5			<input type="text"/>	2.8			<input type="text"/>	5			<input type="text"/>
	N6	Failure of an audit team to appropriately apply required substantive evaluation procedures.				3.2			<input type="text"/>	2.5			<input type="text"/>	7			<input type="text"/>
	N7	Poor scope management due to cross-agency service models resulting in imbalanced or incomplete perspective.				3.7			<input type="text"/>	2.5			<input type="text"/>	6			<input type="text"/>
	N8	Subsequent lack of objectivity in conducting evaluations due to familiarity with staff or fear of exposure of management weaknesses.				3.5			<input type="text"/>	3.2			<input type="text"/>	9			<input type="text"/>
	N9	Lack of specific legislative or mandatory framework to ensure a consistent evaluation approach.				3			<input type="text"/>	2.7			<input type="text"/>	10			<input type="text"/>
	N10	Inadequate appreciation of risk management in the application of controls or in considering ITG control weakness.				3			<input type="text"/>	3.0			<input type="text"/>	8			<input type="text"/>
<b>External</b>	E1	Inconsistent execution of evaluation methodology across public sector organisations.				4.0			<input type="text"/>	3.3			<input type="text"/>	3			<input type="text"/>
	E2	Limited knowledge within the audit team of emerging risk exposures related specifically to the organisation.				3.0			<input type="text"/>	2.9			<input type="text"/>	7			<input type="text"/>
	E3	Evaluated public sector organisation lack of necessary skills or displaying reticence to co-operate.				3.7			<input type="text"/>	3.3			<input type="text"/>	1			<input type="text"/>
	E4	Pressure to prematurely sign-off on evaluation reports whilst not following specific legislative requirements.				3.7			<input type="text"/>	3.6			<input type="text"/>	3			<input type="text"/>
	E5	Weak auditee and auditor relationship in the public sector.				3.1			<input type="text"/>	2.8			<input type="text"/>	10			<input type="text"/>
	E6	Expectation gap between public sector perceptions of ITG evaluation and actual ITG evaluation practices.				3.4			<input type="text"/>	2.9			<input type="text"/>	4			<input type="text"/>
	E7	Insufficient evidence of ITG implementation (methodology, practices and processes).				3.4			<input type="text"/>	3.2			<input type="text"/>	6			<input type="text"/>
	E8	ITG evaluation could be subjective or bias towards "more positive" findings.				3.7			<input type="text"/>	3.2			<input type="text"/>	5			<input type="text"/>
	E9	Discovery may be slow or non-existent if information is masked, inconsistent, unusable, or made unavailable by the organisation.				3.2			<input type="text"/>	2.7			<input type="text"/>	9			<input type="text"/>
	E10	Repetition of evaluation activity in place of identification of systemic control failures.				3.4			<input type="text"/>	3.3			<input type="text"/>	8			<input type="text"/>
<b>Organisational</b>	O1	Difficulty to recruit and retain experienced ITG auditors in the public sector.				3.4			<input type="text"/>	2.9			<input type="text"/>	2			<input type="text"/>
	O2	Tendency to focus on mere compliance with legislation rather than quality.				4.0			<input type="text"/>	3.8			<input type="text"/>	3			<input type="text"/>
	O3	Lack of executive support for, resource allocation to and understanding of extensive ITG evaluation programs.				4.0			<input type="text"/>	3.3			<input type="text"/>	2			<input type="text"/>
	O4	Reduced influence of audit committees and ill-established internal audit units.				3.9			<input type="text"/>	3.3			<input type="text"/>	4			<input type="text"/>
	O5	Loss of continuity (evaluation cycle) due to mandatory audit rotation.				3.7			<input type="text"/>	3.5			<input type="text"/>	5			<input type="text"/>
	O6	Perceived low value of ITG evaluations in comparison to other evaluations.				3.0			<input type="text"/>	2.8			<input type="text"/>	10			<input type="text"/>
	O7	Lack of executive management ITG ownership and accountability.				3.3			<input type="text"/>	2.8			<input type="text"/>	8			<input type="text"/>
	O8	Lack of communication between business units.				4.2			<input type="text"/>	4.0			<input type="text"/>	1			<input type="text"/>
	O9	Public administration tendency to deny/conceal systemic ITG problems which prevents identification and remediation.				3.6			<input type="text"/>	3.2			<input type="text"/>	9			<input type="text"/>
	O10	Organisational changes impacting roles, responsibilities and stability of the ITG model, both internally and externally driven.				3.8			<input type="text"/>	3.6			<input type="text"/>	6			<input type="text"/>
<b>STEP 2</b> Feedback		<b>Instruction:</b> Provide any additional feedback / comments.															
		Thank you for assisting with this research project															

## Appendix B Survey Research Documents

### 1. Copyright Permission Letter for use of COBIT


	3701 Algonquin Road, Suite 1010 Rolling Meadows, Illinois 60008-3105, USA Web Site: <a href="http://www.isaca.org">www.isaca.org</a>	Telephone: +1.847.253.1545 Facsimile: +1.847.253.1443 E-mail: <a href="mailto:info@isaca.org">info@isaca.org</a>
<p>11 April 2012</p> <p>LOAI AL OMARI, CISM, CGEIT, CRISC          Principal Researcher, PhD Student          Information Security Institute Queensland University of Technology</p> <p>Dear Loia,</p> <p>Thank you for your inquiry requesting permission to use COBIT 5 (“Content”) in your research project affiliated with the Information Security Institute (ISI) at the Queensland University Technology (QUT) to address perceived challenges of IT Governance audit in the Australian public sector. Permission is granted for your research, specifically as the basis for a questionnaire instrument for data collection and analysis.</p> <p>Permission is granted subject to the following limitations:</p> <ol style="list-style-type: none"> <li>1. Use is granted solely for research purposes as defined above.</li> <li>2. Permission does not include the right to grant others permission to photocopy or otherwise reproduce, redistribute or sell this material.</li> <li>3. Content may not be offered for sale alone or as part of another document.</li> <li>4. The following attribution must be displayed in every context where the Content is used:             <ol style="list-style-type: none"> <li>a. Source: “COBIT 5 © 2012 ISACA. All rights reserved. Used by permission.</li> </ol> </li> <li>6. Should any of the above limitations be breached, this permission will be automatically revoked as of the date of the breach.</li> </ol> <p>We appreciate your support of ISACA and thank you for your contribution. If you have any questions regarding permissions, please call me at 847.660.5557 or contact me by e-mail <a href="mailto:jfullerton@isaca.org">jfullerton@isaca.org</a>.</p> <p>Sincerely,</p>  <p>Julia Fullerton          Director, Intellectual Property</p>		

## 2. Letter Form Invitation proforma email to potential respondents

<p><b>Subject:</b> I.T. Governance: An Australian Public Sector tailored COBIT Framework</p> <p>Dear participant</p> <p>You are invited to participate in an anonymous survey investigating the potential to use an optimised sub-set (also referred to as self-evaluation tool) based on a version of the Control Objectives for Information and Related Technology (COBIT 5) framework as the basis for IT governance evaluation in the Queensland public sector.</p> <p>It is no secret that Australian public sector is often required to operate under significant time and resource constraints. Under such circumstances, it could be deemed infeasible to implement an IT governance evaluation framework the size of COBIT in its entirety. This situation could be seen as a challenge for decision-makers having to allocate funding and resources for the evaluation of IT governance. To overcome this challenge, public sector organisations have in the past resorted to '<i>cherry picking</i>' controls from the COBIT framework in an effort to reduce the size of evaluation programs. This could lead to creating dissimilar sets of evaluation tools and objectives with the potential for resulting evaluation findings to be inconsistent across the public sector.</p> <p>The research team affiliated with the Information Security Institute (ISI) at the Queensland University Technology is performing a study that seeks to address this perceived challenge of IT Governance evaluation in the Australian public sector.</p> <p>Considering the professional commitment of IT professionals in the public sector to this topic, we believe that your participation in this study will prove to be interesting and rewarding. Therefore, we would encourage you to participate in this effort. We will, of course, provide you with feedback from the results when the project is completed. This survey does not collect any personal information; however, any information you provide as part of this study will remain confidential in accordance with the QUT Ethics guidelines.</p> <p>Please click on the link {Link to online questionnaire} to view the information sheet and participate. Please note that this study has been approved by the QUT Human Research Ethics Committee (approval number 1100001017).</p> <p>Thank you for assisting in this research project.</p> <p><b>Loai Al Omari</b> Principal Researcher, PhD Candidate</p> <p><b>Dr Adrian McCullagh</b> Adjunct Professor at the Queensland University of Technology</p> <p><b>Dr Paul Barnes</b> Deputy Director, Information Security Institute at the Queensland University of Technology</p> <p><b>Dr Grant Pitman</b> Adjunct Professor at the Queensland University of Technology</p>
--



### 3. Participant Information Sheet and Consent.

	<b>PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT</b> – Survey Research –
<b>IT Governance: An Australian Public Sector tailored COBIT Framework</b> QUT Ethics Approval Number 1100001017	
<p>You are invited to participate in a research project entitled "IT Governance: An Australian Public Sector tailored COBIT Framework." It is essential that you carefully read this form, feel free to contact <a href="mailto:Loai.AlOmari@qut.edu.au">Loai Al Omari</a> of the research team prior to beginning the study should you require further clarification.</p>	
<b>RESEARCH TEAM</b> Faculty of Science and Technology – Queensland University of Technology (QUT) Principal Researcher: <a href="mailto:Loai.AlOmari@qut.edu.au">Loai Al Omari</a> – PhD student Research Supervisors: Dr Adrian McCullagh, Dr Paul Barnes and Dr Grant Pitman, QUT	
<b>DESCRIPTION</b> The first phase of this project has been completed, which resulted in the identification of the top ten IT governance evaluation challenges in the Queensland Public Sector. As a result, the second phase will evaluate the potential to use an optimised sub-set (or self-evaluation tool) based on a concentrated version of the Control Objectives for Information and Related Technology (COBIT 5) framework as the basis for IT governance evaluation in the public sector. You are invited to participate in this project because you have been identified as a proficient Information Technology professional in the Queensland public sector.	
<b>PARTICIPATION</b> Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Any identifiable information already obtained from you will be destroyed at your request. Your decision to participate or not to participate will in no way impact upon your current or future relationship with QUT. The survey consists of one questionnaire. First part of the questionnaire collects information about you, the respondent, and your organisation. The second part gathers your opinion on the 37 controls to compile a set of high-level IT processes from the COBIT 5 framework that are perceived as the most relevant to public sector organisations within Queensland. This will then be used as the basis for a comparison with studies done both globally and also in Australia. It is expected that the questionnaire would take no more than 30 minutes to complete. <i>This survey doesn't seek departmental or official views, but only your own personal views.</i> If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering. However, your commitment in completing all parts of the questionnaire would be highly appreciated.	
<b>EXPECTED BENEFITS</b> By participating in the study, you will not necessarily receive any direct benefits. From a professional knowledge perspective you are assisting in better understanding of IT Governance evaluation frameworks and methodologies utilised by Information Technology professionals. We will provide you with a summary of our findings once this survey has been completed and the data analysed.	
<b>RISKS</b> There are no risks beyond normal day-to-day living associated with your participation in this project.	
<b>PRIVACY AND CONFIDENTIALITY</b> All information obtained in connection with this study and that can be associated with you will be treated confidentially and will not be disclosed to other persons without your permission, or except as required by law. It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that you cannot be identified. The data published will only be the aggregated results of the survey and in no way identifies any specific individuals in the project.	
<b>CONSENT TO PARTICIPATE</b> The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.	
<b>QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT</b> If have any questions or require any further information please contact one of the research team members below.	
Mr <a href="mailto:Loai.AlOmari@qut.edu.au">Loai Al Omari</a> Principal Researcher PhD Student Email: <a href="mailto:loai.alomari@student.qut.edu.au">loai.alomari@student.qut.edu.au</a> Phone: 3138 9554 SMS: 0450 291 666	Dr Adrian McCullagh Project Supervisor Adjunct Professor Email: <a href="mailto:a.mccullagh@qut.edu.au">a.mccullagh@qut.edu.au</a> Phone: 3138 9554
Dr Paul Barnes Project Associate Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 9019	Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:pitman.grant@police.qld.gov.au">pitman.grant@police.qld.gov.au</a>
<b>CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT</b> QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 3138 5123 or <a href="mailto:ethicscontact@qut.edu.au">ethicscontact@qut.edu.au</a> . The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.	
<b>Thank you for helping with this research project. Please keep this sheet for your information.</b>	
<i>Includes excerpts from "COBIT 5 © 2012 ISACA. All rights reserved. Use by permission.</i>	

## 4. Survey Data Collection Instrument (Questionnaire).

Queensland University of Technology  
Brisbane Australia

a university for the **real** world<sup>®</sup>

## COBIT 5 Survey

**Part I Demographic Details**

**Which of the following best describes the function of your organisation in the public sector?**

Government Department (Example Department of Education)

Government Agency (Example Queensland State Archives)

Government-owned Corporation (Example Queensland Investment Corporation)

Other

**What is your position level in the organisation?**

C-suite (CIO/CEO/CTO)

Director (IT/IS/Business/Audit)

Manager (IT/IS/Business/Audit)

Senior Officer (IT/IS/Business/Audit)

Officer (IT/IS/Business/Audit)

Back

Next

Page 2 of 8

**Part II: Processes for Governance of Enterprise IT**

**With respect to their importance to your organisation, please rate the following 37 high level processes on the scale below. The processes cover five domains: Evaluate, Direct and Monitor; Align, Plan and Organise; Build, Acquire and Implement; Deliver, Service and Support; and Monitor, Evaluate and Assess.**

**Evaluate, Direct and Monitor (EDM)**

	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important
<b>EDM01. Ensure Governance Framework Setting and Maintenance:</b> analyse and articulate the requirements for the governance of enterprise IT.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>EDM02. Ensure Benefits Delivery:</b> optimise the value contribution to the business from investments made by IT.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>EDM03. Ensure Risk Optimisation:</b> ensure that risk to enterprise value related to the use of IT is identified and managed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>EDM04. Ensure Resource Optimisation:</b> ensure that adequate and sufficient IT-related capabilities are available to support enterprise objectives effectively.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>EDM05. Ensure Stakeholder Transparency:</b> ensure that enterprise IT performance and conformance measurement and reporting are transparent, with stakeholders approving the goals and metrics and the necessary remedial actions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Back

Next

Page 3 of 8



Queensland University of Technology  
Brisbane Australia

a university for the **real** world™

## COBIT 5 Survey

**Part II: Processes for Governance of Enterprise IT**

**With respect to their importance to your organisation, please rate the following 37 high level processes on the scale below. The processes cover five domains: Evaluate, Direct and Monitor; Align, Plan and Organise; Build, Acquire and Implement; Deliver, Service and Support; and Monitor, Evaluate and Assess.**

**Align, Plan and Organise (APO)**

	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important
<p><b>APO01. Manage the IT Management Framework:</b> implement and maintain mechanisms and authorities to manage the use of IT in the enterprise in support of governance objectives.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO02. Manage Strategy:</b> provide a holistic view of the current business and IT environment, the future direction, and the initiatives required to migrate to the desired future environment.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO03. Manage Enterprise Architecture:</b> establish a common architecture layers for effectively and efficiently realising enterprise and IT strategies.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO04. Manage Innovation:</b> plan how to benefit from IT and related services innovation in relation to business needs.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO05. Manage Portfolio:</b> execute the strategic direction set for investments based on the alignment with strategic objective.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO06. Manage Budget and Costs:</b> manage the IT-related financial activities in both the business and IT functions through the use of formal budgeting practices.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO07. Manage Human Resources:</b> provide a structured approach to ensure optimal structuring of human resources. This includes communicating the defined roles and responsibilities.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO08. Manage Relationships:</b> manage the relationship between the business and IT in a formalised and transparent way that ensures a focus on achieving a common and shared goal.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO09. Manage Service Agreements:</b> align IT-enabled services and service levels with enterprise needs and expectations.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO10. Manage Suppliers:</b> manage IT-related services provided by all types of suppliers to meet enterprise requirements.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO11. Manage Quality:</b> define and communicate quality requirements in all processes, procedures and the related enterprise outcomes.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO12. Manage Risk:</b> continually identify, assess and reduce IT-related risk within levels of tolerance set by enterprise executive management.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>APO13. Manage Security:</b> define, operate and monitor a system for information security management.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Back

Next

Page 4 of 8

QUT Queensland University of Technology Brisbane Australia		a university for the <b>real</b> world <sup>®</sup>				
COBIT 5 Survey						
Part II: Processes for Governance of Enterprise IT						
With respect to their importance to your organisation, please rate the following 37 high level processes on the scale below. The processes cover five domains: Evaluate, Direct and Monitor; Align, Plan and Organise; Build, Acquire and Implement; Deliver, Service and Support; and Monitor, Evaluate and Assess.						
Build, Acquire and Implement (BAI)						
	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important	
<b>BAI01. Manage Programmes and Projects:</b> manage all programmes and projects from the investment portfolio in alignment with enterprise strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI02. Manage Requirements Definition:</b> identify solutions and analyse requirements before acquisition or creation to ensure that they are in line with enterprise strategic requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI03. Manage Solutions Identification and Build:</b> establish and maintain identified solutions in line with enterprise requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI04. Manage Availability and Capacity:</b> balance current and future needs for availability, performance and capacity with cost-effective service provision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI05. Manage Organisational Change Enablement:</b> maximise the likelihood of successfully implementing sustainable enterprise-wide organisational change quickly and with reduced risk.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI06. Manage Changes:</b> manage all changes in a controlled manner, including changes relating to business processes, applications and infrastructure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI07. Manage Change Acceptance and Transitioning:</b> formally accept and make operational new solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI08. Manage Knowledge:</b> maintain the availability of knowledge to support all process activities and to facilitate decision making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI09. Manage Assets:</b> manage IT assets through their life cycle to make sure that their use delivers value.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>BAI10. Manage Configuration:</b> define and maintain descriptions and relationships between key resources and capabilities required to deliver IT-enabled services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<a href="#">Back</a>		<a href="#">Next</a>		
Page 5 of 8						
Part II: Processes for Governance of Enterprise IT						
With respect to their importance to your organisation, please rate the following 37 high level processes on the scale below. The processes cover five domains: Evaluate, Direct and Monitor; Align, Plan and Organise; Build, Acquire and Implement; Deliver, Service and Support; and Monitor, Evaluate and Assess.						
Deliver, Service and Support (DSS)						
	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important	
<b>DSS01. Manage Operations:</b> co-ordinate and execute the activities and operational procedures required to deliver IT services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>DSS02. Manage Service Requests and Incidents:</b> provide timely and effective response to user requests and resolution of all types of incidents.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>DSS03. Manage Problems:</b> identify and classify problems and their root causes and provide timely resolution to prevent recurring incidents.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>DSS04. Manage Continuity:</b> establish and maintain a plan to enable the business and IT to respond to incidents and disruptions in order to continue operation of critical business processes and required IT services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>DSS05. Manage Security Services:</b> protect enterprise information to maintain the level of information security risk acceptable to the enterprise in accordance with the security policy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>DSS06. Manage Business Process Controls:</b> define and maintain appropriate business process controls to ensure that information satisfies all relevant information control requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<a href="#">Back</a>		<a href="#">Next</a>		
Page 6 of 8						

Queensland University of Technology  
Brisbane Australia

a university for the **real** world<sup>®</sup>

## COBIT 5 Survey

**Part II: Processes for Governance of Enterprise IT**

**With respect to their importance to your organisation, please rate the following 37 high level processes on the scale below. The processes cover five domains: Evaluate, Direct and Monitor; Align, Plan and Organise; Build, Acquire and Implement; Deliver, Service and Support; and Monitor, Evaluate and Assess.**

**Monitor, Evaluate and Assess (MEA)**

	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important
<b>MEA01. Monitor, Evaluate and Assess Performance and Conformance:</b> collect, validate and evaluate business, IT and process goals and metrics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>MEA02. Monitor, Evaluate and Assess the System of Internal Control:</b> continuously monitor and evaluate the control environment, including self-assessments and independent assurance reviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>MEA03. Monitor, Evaluate and Assess Compliance with External Requirements:</b> evaluate that IT processes and IT-supported business processes are compliant with laws, regulations and contractual requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Back

Next

Page 7 of 8

**Please click on the Submit button below to send your answers.**

Back

Submit

Page 8 of 8

## Appendix C

### Case Study Research Documents

1. Letter of Invitation to Chief Information Officer (CIO) of selected public sector organisations seeking permission for the organisation to participate in the study.

 <p style="margin-top: 20px;">{Date}</p> <p>{Chief Information Officer's Name}          {Chief Information Officer's Name}          {Address 1}          {Address 2}          {Address 3}</p> <p>Dear {Chief Information Officer's Name}</p> <p><b>Invitation to participate in Research Study: <i>The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector.</i></b></p> <p>It is no secret that Australian public sector is often required to operate under growing time and resource constraints. Under such circumstances, it may be inefficient to implement an IT Governance evaluation framework the size of the Control Objectives for Information and Related Technology (COBIT 5) in its entirety. As a result, the research team affiliated with the Information Security Institute (ISI) at the Queensland University Technology (QUT) are undertaking a research project that seeks to address perceived challenges of IT Governance evaluation in the Australian public sector.</p> <p>As a Ph.D. Candidate, I need your permission to contact key personnel from the {Organisation's Name} to participate in this research. My aim is to gain a deeper understanding of current capability and maturity levels of IT Governance processes in the Queensland Public Sector. Since I am particularly interested in IT governance evaluation practices, I envisage two to three participants mainly from the Information Systems Audit, Information Management, or ICT Governance teams will be sufficient. Participants will be invited to provide their 'personal' views only, not any 'official' or 'departmental' views that represent {Organisation's Name}.</p> <p>All information obtained in connection with this research, including participants' and organisations' information, will be treated in the strictest confidence in accordance with the QUT <i>Ethics guidelines</i> and will not be disclosed to other persons without your permission, or except as required by law. The only person who will have access to the data will be the Principal Researcher. The electronic form of the data will be encrypted to prevent unauthorised access and stored on a secure server within the ISI.</p> <p>It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that participants and organisations cannot be identified. The data published will be the aggregated results of the research and in no way will identify any specific individuals or organisations in the research.</p> <p>Please view the attached information sheet for further details. Please note that this research has been approved by the QUT <i>Human Research Ethics Committee</i> (approval number 1100001017).</p> <p>I thank you for your time in considering my request and would be grateful for an electronic response (E-mail) if possible by {Date} containing contact details (name, phone number, and email address) of the nominated staff members to participate in this research. Should you have any questions or require further information, please do not hesitate to contact me on 0450 291 666 or the project supervisor, Dr Paul Barnes on 0439 545 551.</p> <p>Yours sincerely,</p> <p>Mr <u>Loai Al Omari</u>, Ph.D. Candidate          Principal Researcher  <a href="mailto:LOAI.ALOMARI@STUDENT.QUT.EDU.AU">LOAI.ALOMARI@STUDENT.QUT.EDU.AU</a></p> <p>Attachments: (1) Research Information Sheet and consent form</p>	<p><b>Information Security Institute</b>          126 Margaret St, Brisbane, QLD 4000          GPO Box 2434, Brisbane, QLD 4001          Australia          Phone +61 7 3138 1948          Email <a href="mailto:info@isi.qut.edu.au">info@isi.qut.edu.au</a>  <a href="http://www.isi.qut.edu.au">www.isi.qut.edu.au</a></p>
---	---

2. Form Invitation proforma email to potential respondents.

**Subject:       The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector**

Dear {Respondent's Name}

You are invited to participate in an anonymous survey to investigate the feasibility of undertaking an evaluation of IT Governance processes, from the COBIT 5 framework, that were perceived by the majority of public sector organisations to be the most important. This will assess the potential to use an optimised sub-set of the conventional version of the COBIT 5 framework as the basis for IT Governance evaluation in the Australian public sector. This survey doesn't seek departmental or official views, but only your own personal views.

The research team affiliated with the Information Security Institute (ISI) at the Queensland University Technology is performing a study that seeks to address the lack of developed IT Governance evaluation methodologies and tools to keep pace with changes occurring in the auditing and technology field in the Australian public sector.

All information obtained in connection with this study that can be associated with you or the organisation you represent will be treated in the strictest confidence in accordance with the QUT *Ethics guidelines* and will not be disclosed to other persons without your permission, or except as required by law. The only person who will have access to the questionnaires will be the Principal Researcher. The electronic form of the data will be stored on a secured server within the Information Security Institute and will be password protected to prevent unauthorised access.

Please click on the {Link} to view the information sheet and participate. Please note that this study has been approved by the QUT Human Research Ethics Committee (approval number 1100001017).


We kindly ask you to return your responses before {Date}.|

Thank you for assisting in this research project.

**Loai Al Omari**  
Principal Researcher, Ph.D. Candidate  
Phone: +61450291666

**Dr Paul Barnes**  
Deputy Director, Information Security Institute at the Queensland University of Technology  
Phone: 07 3138 1948

### 3. Participant Information Sheet and Consent.

	<b>PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT</b> – Case Study –	
<b>IT Governance: An Australian Public Sector tailored COBIT Framework</b> QUT Ethics Approval Number 1100001017		
<p>You are invited to participate in a research project entitled "IT Governance: An Australian Public Sector tailored COBIT Framework." It is essential that you carefully read this form, feel free to contact Loai Al Omari of the research team prior to beginning the study should you require further clarification.</p>		
<b>RESEARCH TEAM</b>		
Faculty of Science and Technology – Queensland University of Technology (QUT)		
Principal Researcher:	Loai Al Omari – Ph.D. Candidate	
Research Supervisors:	Dr Paul Barnes and Dr Grant Pitman, QUT	
<b>PRIVACY AND CONFIDENTIALITY</b>		
<p>All information obtained in connection with this study that can be associated with you or the organisation you represent will be treated in the strictest confidence and will not be disclosed to other persons without your permission, or except as required by law. The only person who will have access to the questionnaires will be the Principal Researcher. The electronic form of the data will be stored on a secured server within the Information Security Institute and will be password protected to prevent unauthorised access. This questionnaire doesn't seek departmental or official views, but only your own personal views.</p>		
<p>It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that you and the organisation you represent cannot be identified. The data published will only be the aggregated results of the questionnaire and in no way identifies any specific individuals or organisations in the project.</p>		
<b>DESCRIPTION</b>		
<p>The objective of this last phase of the study is to investigate the feasibility of undertaking an evaluation of IT Governance processes, from the COBIT 5 framework, that were perceived by the majority of public sector organisations be the most important. This phase will assess the potential to use the optimised sub-set of the conventional version of the COBIT 5 framework as the basis for IT governance evaluation and in the Australian public sector.</p>		
<b>PARTICIPATION</b>		
<p>The questionnaire consists of three sections. The first part of the questionnaire collects information about you, the respondent, and the organisation you represent. The second part gathers your perception on the maturity level of (10) IT Governance processes from the COBIT 5 framework that were perceived as the most important to public sector organisations within Queensland. This will then be used as the basis for a comparison with studies done internationally and also in Australia. The third part gathers your opinion on the 17 Enterprise Goals and 17 IT-related Goals from the COBIT 5 framework that are perceived as the most relevant to public sector organisations within Queensland. It is expected that the questionnaire would take no more than 20-30 minutes to complete.</p>		
<p>Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Any identifiable information already obtained from you will be destroyed at your request. Your decision to participate or not to participate will in no way impact upon your current or future relationship with QUT. If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering. However, your commitment in completing all parts of the questionnaire would be highly appreciated.</p>		
<b>EXPECTED BENEFITS</b>		
<p>By participating in the study, you will not necessarily receive any direct benefits. From a professional knowledge perspective you are assisting in better understanding of IT Governance evaluation frameworks and methodologies utilised by Information Technology professionals. A summary of our findings will be publicised once data collection has completed and the data analysed.</p>		
<b>RISKS</b>		
<p>There are no risks beyond normal day-to-day living associated with your participation in this project.</p>		
<b>CONSENT TO PARTICIPATE</b>		
<p>The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.</p>		
<b>QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT</b>		
<p>If have any questions or require any further information please contact one of the research team members below.</p>		
Mr Loai Al Omari Principal Researcher Ph.D. Candidate Email: <a href="mailto:loai_alomari@student.qut.edu.au">loai_alomari@student.qut.edu.au</a> SMS: 0450 291 666	Dr Paul Barnes Project Associate Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 5612	Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:pitman.grant@police.qld.gov.au">pitman.grant@police.qld.gov.au</a>
<b>CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT</b>		
<p>QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 3138 5123 or <a href="mailto:ethicscontact@qut.edu.au">ethicscontact@qut.edu.au</a>. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.</p>		
<p>Thank you for helping with this research project. Please keep this sheet for your information.</p>		



## 4. Sample: Case Study Data Collection Instrument (Questionnaire).

<b>QUT</b>	<b>Queensland University of Technology</b> Brisbane Australia	a university for the <b>real</b> world <sup>®</sup>			
<b>The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector</b>					
QUT Ethics Approval Number 1100001017					
<b>RESEARCH TEAM</b>					
Faculty of Science and Technology – Queensland University of Technology (QUT)					
Principal Researcher:	Loai Al Omari – Ph.D. Candidate				
Research Supervisors:	Dr Paul Barnes and Dr Grant Pitman, QUT				
<b>PRIVACY &amp; CONFIDENTIALITY</b>					
<p>All information obtained in connection with this study that can be associated with you or the organisation you represent will be treated in the strictest confidence and will not be disclosed to other persons without your permission, or except as required by law. The only person who will have access to the questionnaires will be the Principal Researcher. The electronic form of the data will be stored on a secured server within the Information Security Institute and will be password protected to prevent unauthorised access. This questionnaire doesn't seek departmental or official views, but only your own personal views.</p> <p>It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that you and the organisation you represent cannot be identified. The data published will only be the aggregated results of the questionnaire and in no way identifies any specific individuals or organisations in the project.</p>					
<b>DESCRIPTION</b>					
<p>The objective of this last phase of the study is to investigate the feasibility of undertaking an evaluation of IT Governance processes, from the COBIT 5 framework, that were perceived by the majority of public sector organisations to be the most important. This phase will assess the potential to use the optimised sub-set of the conventional version of the COBIT 5 framework as the basis for IT governance evaluation in the Australian public sector.</p>					
<b>PARTICIPATION</b>					
<p>The questionnaire consists of three sections. The first part of the questionnaire collects information about you, the respondent, and the organisation you represent. The second part gathers your perception on the maturity level of (10) IT Governance processes from the COBIT 5 framework that were perceived as the most important to public sector organisations within Queensland. This will then be used as the basis for a comparison with studies done internationally and also in Australia. The third part gathers your opinion on the 17 Enterprise Goals and 17 IT-related Goals from the COBIT 5 framework that are perceived as the most relevant to public sector organisations within Queensland. It is expected that the questionnaire would take no more than 20-30 minutes to complete.</p> <p>Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Any identifiable information already obtained from you will be destroyed at your request. Your decision to participate or not to participate will in no way impact upon your current or future relationship with QUT. If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering. However, your commitment in completing all parts of the questionnaire would be highly appreciated.</p>					
<b>EXPECTED BENEFITS</b>					
<p>By participating in the study, you will not necessarily receive any direct benefits. From a professional knowledge perspective you are assisting in better understanding of IT Governance evaluation frameworks and methodologies utilised by Information Technology professionals. A summary of our findings will be publicised once data collection has completed and the data analysed.</p>					
<b>RISKS</b>					
<p>There are no risks beyond normal day-to-day living associated with your participation in this project.</p>					
<b>CONSENT TO PARTICIPATE</b>					
<p>The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.</p>					
<b>QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT</b>					
<p>If have any questions or require any further information please contact one of the research team members below.</p> <table border="0"> <tr> <td>Mr Loai Al Omari Principal Researcher PhD Candidate Email: <a href="mailto:loai.alomari@student.qut.edu.au">loai.alomari@student.qut.edu.au</a> SMS: 0450 291 666</td> <td>Dr Paul Barnes Principle Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 5612</td> <td>Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:grant.pitman@qut.edu.au">grant.pitman@qut.edu.au</a></td> </tr> </table>			Mr Loai Al Omari Principal Researcher PhD Candidate Email: <a href="mailto:loai.alomari@student.qut.edu.au">loai.alomari@student.qut.edu.au</a> SMS: 0450 291 666	Dr Paul Barnes Principle Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 5612	Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:grant.pitman@qut.edu.au">grant.pitman@qut.edu.au</a>
Mr Loai Al Omari Principal Researcher PhD Candidate Email: <a href="mailto:loai.alomari@student.qut.edu.au">loai.alomari@student.qut.edu.au</a> SMS: 0450 291 666	Dr Paul Barnes Principle Supervisor ISI Deputy Director Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 5612	Dr Grant Pitman Project Associate Supervisor Adjunct Professor Email: <a href="mailto:grant.pitman@qut.edu.au">grant.pitman@qut.edu.au</a>			
<b>CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT</b>					
<p>QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 3138 5123 or <a href="mailto:ethicscontact@qut.edu.au">ethicscontact@qut.edu.au</a>. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.</p> <p style="text-align: center;"><i>Thank you for helping with this research project. Please keep this sheet for your information.</i></p> <p style="text-align: center;"><small>Includes excerpts from "COBIT 5" © 2012 ISACA. All rights reserved. Use by permission.</small></p>					
<b>Next</b>					

**QUT** Queensland University of Technology  
Brisbane Australia

a university for the **real** world<sup>®</sup>

## The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector

### Part I Demographic Details

**Which of the following best describes the function of your organisation in the public sector?**

- Brisbane City Council
- Department of Agriculture, Fisheries and Forestry
- Department of Communities, Child Safety and Disability Services
- Department of Community Safety
- Department of Education, Training and Employment
- Department of Energy and Water Supply
- Department of Environment and Heritage Protection
- Department of Housing and Public Works
- Department of Justice and Attorney-General
- Department of Local Government, Community Recovery and Resilience
- Department of Natural Resources and Mines
- Department of Science, Information Technology, Innovation and the Arts
- Department of State Development, Infrastructure and Planning
- Department of the Premier and Cabinet
- Department of Transport and Main Roads
- Gold Coast City Council
- Ipswich City Council
- Queensland Health
- Queensland Police Service
- Queensland Treasury and Trade
- Other, please specify

Page 2 of 13

**QUT** Queensland University of Technology  
Brisbane Australia

a university for the **real** world<sup>®</sup>

## The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector

**Process Name: EDM02. Ensure Benefits Delivery**

**Process Purpose: Optimise the value contribution to the business from IT services resulting from investments made by IT.**

**Expected Process Work Products (outcomes):**  
 - Perform regular evaluation of strategic alignment.  
 - Establish requirements for stage-gate reviews

**Level 0 (Incomplete).**

**Is the process implemented, or does it achieve/partially achieve its process purpose at the {Organisation's Name}?**

Yes  
 No

**Level 1 (Performed): The implemented process achieves its process purpose.**

**Please assess whether the following outcomes are achieved.**

	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
The enterprise is securing optimal value from its portfolio of approved IT-enabled initiatives, services and assets.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimum value is derived from IT investment through effective value management practices in the enterprise.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Individual IT-enabled investments contribute optimal value.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Level 2.1 (Performance Management): A measure of the extent to which the performance of the process is managed.**

**Please assess whether the following outcomes are achieved.**

	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Objectives for the performance of the process are identified.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance of the process is planned and monitored.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance of the process is adjusted to meet plans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibilities and authorities for performing the process are defined, assigned and communicated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources and information necessary for performing the process are identified, made available, allocated and used.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interfaces between the involved parties are managed to ensure both effective communication and also clear assignment of responsibility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



<b>Level 2.2 (Work Product Management): A measure of the extent to which a standard process is maintained to support the deployment of the defined process.</b>				
<b>Please assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Interfaces between the involved parties are managed to ensure both effective communication and also clear assignment of responsibility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirements for the work products of the process are defined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirements for documentation and control of the work products are defined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work products are appropriately identified, documented, and controlled.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work products are reviewed in accordance with planned arrangements and adjusted as necessary to meet requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 3.1 (Process Definition): A measure of the extent to which a standard process is maintained to support the deployment of the defined process.</b>				
<b>Assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
A standard process, including appropriate tailoring guidelines, is defined that describes the fundamental elements that must be incorporated into a defined process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The sequence and interaction of the standard process with other processes is determined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required competencies and roles for performing a process are identified as part of the standard process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required infrastructure and work environment for performing a process are identified as part of the standard process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suitable methods for monitoring the effectiveness and suitability of the process are determined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 3.2 (Process Deployment): A measure of the extent to which the standard process is effectively deployed as a defined process to achieve its process.</b>				
<b>Assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
A defined process is deployed based upon an appropriately selected and/or tailored standard process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required roles, responsibilities and authorities for performing the defined process are assigned and communicated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personnel performing the defined process are competent on the basis of appropriate education, training, and experience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required resources and information necessary for performing the defined process are made available, allocated and used.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required infrastructure and work environment for performing the defined process are made available, managed and maintained.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appropriate data are collected and analysed as a basis for understanding the behaviour of, and to demonstrate the suitability and effectiveness of the process, and to evaluate where continuous improvement of the process can be made.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 4.1 (Process Measurement): A measure of the extent to which measurement results are used to ensure that performance of the process supports the achievement of relevant process performance objectives in support of defined business goals.</b>				
<b>Please assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Process information needs in support of relevant defined business goals are established.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Process measurement objectives are derived from process information needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quantitative objectives for process performance in support of relevant business goals are established.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measures and frequency of measurement are identified and defined in line with process measurement objectives and quantitative objectives for process performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Results of measurement are collected, analysed and reported in order to monitor the extent to which the quantitative objectives for process performance are met.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measurement results are used to characterise process performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 4.2 (Process Control): A measure of the extent to which the process is quantitatively managed to produce a process that is stable, capable and predictable within defined limits.</b>				
<b>Please assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Analysis and control techniques are determined and applied where applicable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Control limits of variation are established for normal process performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measurement data are analysed for special causes of variation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corrective actions are taken to address special causes of variation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Control limits are re-established (as necessary) following corrective action.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 5.1 (Process Innovation): A measure of the extent to which changes to the process are identified from analysis of common causes of variation in performance, and from investigations of innovative approaches to the definition and deployment of the process.</b>				
<b>Please assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Process improvement objectives for the process are defined that support the relevant business goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appropriate data are analysed to identify common causes of variations in process performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appropriate data are analysed to identify opportunities for best practice and innovation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improvement opportunities derived from new technologies and process concepts are identified.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An implementation strategy is established to achieve the process improvement objectives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Level 5.2 (Process Optimisation): A measure of the extent to which changes to the definition, management and performance of the process result in effective impact that achieves the relevant process improvement objectives.</b>				
<b>Please assess whether the following outcomes are achieved.</b>				
	Not achieved (0-15%)	Partially Achieved (15% -50%)	Largely Achieved (50% - 85%)	Fully Achieved (85-100%)
Impact of all proposed changes is assessed against the objectives of the defined process and standard process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implementation of all agreed changes is managed to ensure that any disruption to the process performance is understood and acted upon.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Based on actual performance, effectiveness of process change is evaluated against the defined product requirements and process objectives to determine whether results are due to common or special causes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Back      Next

QUT Queensland University of Technology Brisbane Australia		a university for the real world <sup>®</sup>			
<b>The Application of an Optimised COBIT 5 Framework in the Queensland Public Sector</b>					
<b>Mapping Enterprise Goals to IT-related Goals in the {Organisation's Name}.</b>					
<b>In your opinion, how important are the following Enterprise Goals of IT Governance?</b>					
	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important
Stakeholder value of business investments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portfolio of competitive products and services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed business risk (safeguarding of assets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compliance with external laws and regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial transparency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer-oriented service culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business service continuity and availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agile responses to a changing business environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information-based strategic decision making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimisation of service delivery costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimisation of business process functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimisation of business process costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed business change programmes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operational and staff productivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compliance with internal policies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skilled and motivated people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product and business innovation culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>In your opinion, how important are the following IT-related Goals of IT Governance?</b>					
	Very unimportant	Unimportant	Neither important nor unimportant	Important	Very important
Alignment of IT and business strategy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IT compliance and support for business compliance with external laws and regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Commitment of executive management for making IT-related decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed IT-related business risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Realised benefits from IT-enabled investments and services portfolio	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency of IT costs, benefits and risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Delivery of IT services in line with business requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adequate use of applications, information and technology solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IT agility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Security of information, processing infrastructure and applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimisation of IT assets, resources and capabilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enablement and support of business processes by integrating applications and technology into business processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Delivery of programmes delivering benefits, on time, on budget, and meeting requirements and quality standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of reliable and useful information for decision making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IT compliance with internal policies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competent and motivated business and IT personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge, expertise and initiatives for business innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Please provide any comments below:</b>					
<input type="text"/>					
<b>Please click on the Submit button below to send your answers.</b>					
<input type="button" value="Back"/>		<input type="button" value="Submit"/>			

## 5. IT Governance processes work products.

<b>Work Product No.</b>	<b>Work Product</b>
<b>DSS05 Manage Security Services</b>	
DSS05-WP3	Security policy
DSS05-WP5	Security policies for endpoint devices
<b>EDM03 Ensure Risk Optimisation</b>	
EDM03-WP2	Approved risk tolerance levels
EDM03-WP4	Risk management policies
<b>APO13 Manage Security</b>	
APO13-WP1	ISMS policy
APO13-WP2	ISMS scope statement
<b>DSS04 Manage Continuity</b>	
DSS04-WP1	Policy and objectives for business continuity
DSS04-WP6	Approved strategic plans
<b>EDM02 Ensure Benefits Delivery</b>	
EDM02-WP1	Evaluation of strategic alignment
EDM02-WP4	Requirements for stage-gate reviews
<b>APO12 Manage Risk</b>	
APO12-WP13	Risk-related incident response plans
APO12-WP14	Risk impact communications plan
<b>BAI06 Manage Changes</b>	
BAI06-WP3	Change plan and schedule
BAI06-WP6	Change documentation
<b>APO02 Manage Strategy</b>	
APO02-WP5	High-level IT-related goals
APO02-WP12	Strategic road map
<b>DSS03 Manage Problems</b>	
DSS03-WP3	Problem register
DSS03-WP8	Closed problem records
<b>DSS02 Manage Service Requests and Incidents</b>	
DSS02-WP2	Rules for incident escalation
DSS02-WP3	Criteria for problem registration

## 6. IT Governance processes key practices evaluation.

Key practices		Capability Evaluation*				
		N/A	N	P	L	F
<b>DSS05. Manage Security Services</b>		0				
DSS05-01	Networks and communications security meet business needs.		0	5	14	6
DSS05-02	Information processed on, stored on and transmitted by endpoint devices is protected.		1	5	11	8
DSS05-03	All users are uniquely identifiable and have access rights in accordance with their business role.		0	2	15	8
DSS05-04	Physical measures to protect information from unauthorised access, damage and interference when being processed, stored or transmitted have been implemented.		0	3	13	9
DSS05-05	Electronic information is properly secured when stored, transmitted or destroyed.		0	6	11	8
<b>EDM03. Ensure Risk Optimisation</b>		2				
EDM03-01	Risk thresholds are defined and communicated and key IT-related risks are known.		2	3	13	5
EDM03-02	The enterprise is managing critical IT-related enterprise risks effectively and efficiently.		0	4	14	5
EDM03-03	IT-related enterprise risks do not exceed risk appetite and the impact of IT risk to enterprise value is identified and managed.		0	7	11	5
<b>APO13. Manage Security</b>		0				
APO13-01	A system is in place that considers and effectively addresses enterprise information security requirements.		0	4	12	9
APO13-02	A security plan has been established, accepted and communicated throughout the enterprise.		1	8	9	7
APO13-03	Information security solutions are implemented and operated consistently throughout the enterprise.		1	4	15	5
<b>DSS04. Manage Continuity</b>		1				
DSS04-01	Business critical information is available to the business in line with minimum required service levels.		0	3	15	6
DSS04-02	Sufficient resilience is in place for critical services.		0	4	14	6
DSS04-03	Service continuity tests have verified the effectiveness of the plan.		3	9	8	4
DSS04-04	An up to date continuity plan reflects current business requirements.		2	5	11	6
DSS04-05	Internal and external parties have been trained in the Continuity Plan.		2	10	9	3
<b>EDM02. Ensure Benefits Delivery</b>		6				
EDM02-01	The enterprise is securing optimal value from its portfolio of approved IT-enabled initiatives, services and assets.		1	7	10	1
EDM02-02	Optimum value is derived from IT investment through effective value management practices in the enterprise.		2	10	4	3
EDM02-03	Individual IT-enabled investments contribute optimal value.		0	7	11	1

Key practices		Capability Evaluation*				
		N/A	N	P	L	F
<b>APO12. Manage Risk</b>		1				
APO12-01	Relevant data are identified and captured to enable effective IT-related risk identification, analysis, management and reporting.	0	6	13	5	
APO12-02	A current and complete risk profile exists.	3	6	10	4	
APO12-03	Risk management actions are managed as a portfolio of significant incidents not identified and included in the risk management portfolio.	4	9	9	2	
APO12-04	Effective measures for seizing opportunities or limiting the magnitude of loss are launched in a timely manner.	2	12	8	2	
<b>BAI06. Manage Change</b>		0				
BAI06-01	Authorised changes are made in a timely manner and with minimal errors.	0	2	17	6	
BAI06-02	Impact assessments reveal the effect of the change on all affected components.	0	4	10	11	
BAI06-03	All emergency changes are reviewed and authorised after the change.	0	1	14	10	
BAI06-04	Key stakeholders are kept informed of all aspects of the change.	0	4	12	9	
<b>APO02. Manage Strategy</b>		1				
APO02-01	All aspects of the information technology strategy are aligned with the enterprise strategy.	0	5	16	3	
APO02-02	The information technology strategy is cost-effective, appropriate, realistic, achievable, enterprise-focused and balanced.	1	7	14	2	
APO02-03	Clear and concrete short-term goals can be derived from and traced back to specific long-term initiatives, and can then be translated into operational plans.	3	8	8	5	
APO02-04	IT is a value driver for the enterprise.	2	7	11	4	
APO02-05	There is awareness of the IT strategy and a clear assignment of accountability for delivery.	2	9	9	4	
<b>DSS03. Manage Problems</b>		1				
DSS03-01	A process is in place to be able to identify & classify problems.	0	5	11	8	
DSS03-02	A proactive problem management system allows for the resolution & closing of problems.	0	6	12	6	
DSS03-03	Known Errors are effectively investigated & diagnosed.	1	5	11	7	
DSS03-04	Problems and resulting incidents are reduced.	3	3	13	5	
<b>DSS02. Manage Service Requests and Incidents</b>		0				
DSS02-01	IT-related services are available for use.	0	0	14	11	
DSS02-02	Incidents are resolved according to agreed-on service levels.	0	3	13	9	
DSS02-03	Service requests are dealt with according to agreed-on service levels and to the satisfaction of users.	1	1	15	8	
*Rating scale:	N/A: Process is not implemented or doesn't achieve its purpose	N: Not Achieved (0-15%)	P: Partially Achieved (15%-50%)	L: Largely Achieved (50%-85%)	F: Fully Achieved (85%-100%)	

## Appendix D


### Survey II Research Documents

#### 1. Survey Questions and Derivations.

Factor	Question	Construct	Survey	Variable Name
<b>Technology Acceptance Model (TAM)</b>				
PU1	Following the governance framework will enable me to complete tasks more quickly	Perceived Usefulness	4	Quickly
PU2	Following the Governance Framework will increase my productivity	Perceived Usefulness	14	Productivity
PU3	Using the framework will increase my job performance	Perceived Usefulness	7	IncPerformance
PU4	I will find following the framework useful in my job.	Perceived Usefulness	11	Useful
PU5	Using the framework will increase the organization's effectiveness	Perceived Usefulness	8	OrgEffective
PEU1	I will find the framework easy to use	Perceived Ease of Use	6	EasyUse
PEU2	I find following the framework clear and understandable	Perceived Ease of Use	13	ClearUnderstanding
PEU3	Using the Governance Framework would often be frustrating	Perceived Ease of Use	17	Frustrating
PEU4	Learning the Governance Framework will be easy for me	Perceived Ease of Use	9	LearnEasy
I1	I intend to use the Governance Framework	Intention to Use	10	IntendUse
I2	I will use the framework on a regular basis	Intention to Use	18	WillUseReg
I3	I would advocate the use of the governance framework	Intention to Use	5	AmAdvocate
I4	I will use the governance framework because it is mandated in my organization	Intention to Use	3	UseMandated
SN1	The organization encourages the use of the Governance Framework	Subjective Norm	16	OrgUse
SN2	Decision makers at my organisation think I should use the framework	Subjective Norm	15	ImportantThink


<b>Factor</b>	<b>Question</b>	<b>Construct</b>	<b>Survey</b>	<b>Variable Name</b>
SN3	My peers think I should use the Governance Framework.	Subjective Norm	12	PeersThink
SN4	Management at my organization is concerned about ITG.	Subjective Norm	1	MgmtConcern
SN5	I want to do what management thinks I should do	Subjective Norm	2	DoMgtWant
<b>Technology-Organisation-Environment Framework (TOE)</b>				
T1	IT Policies	Technology	Q12.1	Policy
T2	IT Steering or similar committee	Technology	Q12.3	Steering
T3	Standards and Procedures	Technology	Q12.2	StdProcedures
O1	How many people are in your organisation's IT Department?	Organisation	Q9	People
O2	What is the annual budget of your organisation?	Organisation	Q10	OrgValue
O3	Is your organization complex?	Organisation	Q8	Complex
E1	Is the organization in a highly regulated environment?	Environment	Q6	HiReg
E2	The senior leadership in my organisation	Environment	Q7	StratLeadship

## 2. Participant Information Sheet and Consent.

	<b>PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT</b> – Survey Research–	
<b>IT Governance: An Australian Public Sector tailored COBIT Framework</b> QUT Ethics Approval Number 1100001017		
<p>You are invited to participate in a research project entitled "IT Governance: An Australian Public Sector tailored COBIT Framework." It is essential that you carefully read this form, feel free to contact Loai Al Omari of the research team prior to beginning the study should you require further clarification.</p>		
<b>RESEARCH TEAM</b>		
Faculty of Science and Technology – Queensland University of Technology (QUT)		
Principal Researcher:	Loai Al Omari – Ph.D. Candidate, QUT	
Research Supervisors:	Dr Paul Barnes – Principle Supervisor; Associate Professor Richi Nayak – Associate Supervisor, QUT	
<b>PRIVACY AND CONFIDENTIALITY</b>		
<p>All information obtained in connection with this study that can be associated with you or the organisation you represent will be treated in the strictest confidence and will not be disclosed to other persons without your permission, or except as required by law. The only person who will have access to the data will be the Principal Researcher. The electronic form of the data will be stored on a secured server within the University and will be password protected to prevent unauthorised access. This survey doesn't seek departmental or official views, but only your own personal views.</p> <p>It is anticipated that the results of the project will be published in respected scientific journals. In any publication, information will be provided in such a way that you and the organisation you represent cannot be identified. The data published will only be the aggregated results of the survey and in no way identifies any specific individuals or organisations in the project.</p>		
<b>DESCRIPTION</b>		
<p>The objective of this last phase of the research is to explore factors influencing the adoption of an IT governance framework with a focus on the Technology Acceptance Model (TAM) and the utilisation of Technology-Organisation-Environment (TOE) related factors. This study will examine intentions and considerations of potential adopters (or rejecters) of an optimised sub-set of the conventional version of the COBIT 5 framework as the basis for IT governance evaluation in the Australian public sector.</p> <p>You are invited to participate in this project because you have been identified as a proficient Information Technology professional in the Queensland public sector.</p>		
<b>PARTICIPATION</b>		
<p>The questionnaire consists of three sections. The first part of the questionnaire collects information about you, the respondent. The second section gathers information about the organisation you represent. The third section gathers your perception on IT governance practices and on factors influencing the adoption of the optimised sub-set of the conventional version of the COBIT 5 framework as the basis for IT governance evaluation in the Australian public sector. The optimised sub-set will be provided in the questionnaire.</p> <p>Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Any identifiable information already obtained from you will be destroyed at your request. Your decision to participate or not to participate will in no way impact upon your current or future relationship with QUT. If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering.</p>		
<b>EXPECTED BENEFITS</b>		
<p>By participating in the study, you will not necessarily receive any direct benefits. From a professional knowledge perspective you are assisting in better understanding of IT Governance evaluation frameworks and methodologies utilised by Information Technology professionals.</p>		
<b>RISKS</b>		
<p>There are no risks beyond normal day-to-day living associated with your participation in this project.</p>		
<b>CONSENT TO PARTICIPATE</b>		
<p>The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.</p>		
<b>QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT</b>		
<p>If have any questions or require any further information please contact one of the research team members below.</p>		
Mr Loai Al Omari (Ph.D. Candidate) Principal Researcher Email: <a href="mailto:loai.alomari@hdr.qut.edu.au">loai.alomari@hdr.qut.edu.au</a> Phone: 0450 291 666	Dr Paul Barnes Principal Supervisor Email: <a href="mailto:p.barnes@qut.edu.au">p.barnes@qut.edu.au</a> Phone: 3138 5612	Dr Richi Nayak Associate Supervisor Email: <a href="mailto:r.nayak@qut.edu.au">r.nayak@qut.edu.au</a> Phone: 3138 1976
<b>CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT</b>		
<p>QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 3138 5123 or <a href="mailto:ethicscontact@qut.edu.au">ethicscontact@qut.edu.au</a>. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.</p>		
<p><b>Thank you for helping with this research project. Please keep this sheet for your information.</b></p>		



### 3. Survey Research Data Collection Instrument (Questionnaire).

	<b>SURVEY RESEARCH</b> –Questionnaire–											
<b>IT Governance: An Australian Public Sector tailored COBIT Framework</b> QUT Ethics Approval Number 1100001017												
<b>INTRODUCTION</b>												
<p>My name is Loaj Al Omari, and I am a Ph.D. candidate within the Faculty of Science and Technology at the Queensland University of Technology (QUT). I am undertaking a project on IT Governance Frameworks within the Australian Public Sector.</p> <p>This survey aims to help the research team better understand factors influencing the adoption of an IT governance evaluation framework with a focus on the Technology Acceptance Model (TAM) and the utilisation of Technology Organisation Environment (TOE) related factors within Public Sector Organisations.</p>												
<b>BACKGROUND</b>												
<p>This research has previously defined an optimised sub-set of the COBIT 5 framework suitable for the evaluation of IT Governance in the Australian public sector. The optimised sub-set was based on prioritising high-level IT-processes by public sector professionals making it more relevant and focused on the issues routinely encountered by public sector organisations to deliver the most desired governance objectives.</p> <p>The optimised sub-set comprised of 10 high-level ITG Processes from COBIT 5 as follows:</p> <table border="0"> <tr> <td>1) DSS05. Manage Security Services</td> <td>6) APO12. Manage Risk</td> </tr> <tr> <td>2) EDM03. Ensure Risk Optimisation</td> <td>7) BAI06. Manage Change</td> </tr> <tr> <td>3) APO13. Manage Security</td> <td>8) APO02. Manage Strategy</td> </tr> <tr> <td>4) DSS04. Manage Continuity</td> <td>9) DSS03. Manage Problems</td> </tr> <tr> <td>5) EDM02. Ensure Benefits Delivery</td> <td>10) DSS02. Manage Service Requests and Incidents</td> </tr> </table>			1) DSS05. Manage Security Services	6) APO12. Manage Risk	2) EDM03. Ensure Risk Optimisation	7) BAI06. Manage Change	3) APO13. Manage Security	8) APO02. Manage Strategy	4) DSS04. Manage Continuity	9) DSS03. Manage Problems	5) EDM02. Ensure Benefits Delivery	10) DSS02. Manage Service Requests and Incidents
1) DSS05. Manage Security Services	6) APO12. Manage Risk											
2) EDM03. Ensure Risk Optimisation	7) BAI06. Manage Change											
3) APO13. Manage Security	8) APO02. Manage Strategy											
4) DSS04. Manage Continuity	9) DSS03. Manage Problems											
5) EDM02. Ensure Benefits Delivery	10) DSS02. Manage Service Requests and Incidents											
<b>INTERVIEW QUESTIONS: PART I – DEMOGRAPHIC DETAILS</b>												
<b>Q1. What is your position/level in the organisation?</b>												
<input type="checkbox"/> C-suite (CIO/CEO/CTO)	<input type="checkbox"/> Director (IT/IS/Business/Audit)	<input type="checkbox"/> Manager (IT/IS/Business/Audit)										
<input type="checkbox"/> Senior Officer (IT/IS/Business/Audit)	<input type="checkbox"/> Officer (IT/IS/Business/Audit)											
<b>Q2. What is your Academic education level?</b>												
<input type="checkbox"/> Certificate or similar	<input type="checkbox"/> Undergraduate degree	<input type="checkbox"/> Postgraduate certificate										
<input type="checkbox"/> Post-Graduate degree	<input type="checkbox"/> Other											
<b>Q3. Do you hold an industry certification, such as PMP, CISA, CISSP, etc.?</b>												
<input type="checkbox"/> None	<input type="checkbox"/> One	<input type="checkbox"/> Two										
<input type="checkbox"/> Three or more												
<b>Q4. How many years have you been in an Information Technology related field?</b>												
<input type="checkbox"/> Up to 2 years	<input type="checkbox"/> 2 – 6 years	<input type="checkbox"/> 7 – 10 years										
<input type="checkbox"/> More than 10 years	<input type="checkbox"/> Other – not in IT; prefer not to disclose, etc.											
<b>Q5. What do you consider a Framework to be?</b>												
<input type="checkbox"/> Best Practice (Optional)	<input type="checkbox"/> Benchmark	<input type="checkbox"/> Standard (Requirement)										
<input type="checkbox"/> Other – including 'not sure'												
<b>INTERVIEW QUESTIONS: PART II – ORGANISATIONAL DETAILS</b>												
<b>Q6. Is your organisation in a highly regulated environment?</b>												
<input type="checkbox"/> No	<input type="checkbox"/> Somewhat	<input type="checkbox"/> Very										
<input type="checkbox"/> Other – including 'not sure'												
<b>Q7. The senior leadership in my organisation ...</b>												
<input type="checkbox"/> Generally promotes the expansion of the organisation's technology capabilities												
<input type="checkbox"/> Are generally neutral on the subject of expanding the organisation's technology capabilities												
<input type="checkbox"/> Generally opposes the expansion of the organisation's technology capabilities												
<input type="checkbox"/> Other – including 'not sure'												

**Q8. Is your organisation complex?**

No  Somewhat  Very  
 Other – including ‘not sure’

**Q9. What is the current size of your organisation’s IT Department staff (including consultants, contractors and others)?**

Less than 100  100 – 500  501 – 1000  
 1001 – 5000  more than 5000  Other – including ‘not sure’

**Q10. What is the size of your organisation’s annual IT budget (in AUS dollars)?**

Less than \$10 million  \$10 million – \$100 million  \$101 million – \$1 billion  
 more than \$1 billion  Other – including ‘not sure’

**INTERVIEW QUESTIONS: PART III – IT GOVERNANCE DETAILS**

**Q11. What type of IT Governance Framework (COBIT, ITIL, ISO, etc.) implementation is in your organisation?**

Standard implementation  Customised/Influenced by  Non-existent  
 Other – including ‘not sure’

**Q12. To what extent these elements exist in your organisation:**

	None	In Progress throughout	Established in some areas	Established throughout	Not Sure
IT Policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standards & Procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT Steering Committee or similar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Q13. Please indicate the extent to which you agree with the following statements:**

	Disagree					Agree
	1	2	3	4	5	
Management at my organisation is concerned about IT Governance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I want to do what management thinks I should do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I will use a governance framework because it is mandated in my organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Following the governance framework will enable me to complete tasks more quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I would advocate the use of the governance framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I find the governance framework easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Using the governance framework will increase my job performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Using the governance framework will increase the organisation’s effectiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Learning the governance framework will be easy for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I intend to use the governance framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I will find following the governance framework useful in my job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
My peers think I should use a governance framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I find following the governance framework clear and understandable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Following the governance framework will increase my productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Decision makers at my organisation think I should use a governance framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The organisation encourages the use of a governance framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Using the governance framework would often be frustrating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I will use the governance framework on a regular basis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Thank you for helping with this research project.**