IMPROVING E-GOVERNMENT PERFORMANCE THROUGH ENTERPRISE ARCHITECTURE IN DEVELOPING COUNTRIES: THE CASE OF THE INDONESIAN TREASURY

By

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CERTIFICATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed Dated

Mochamad Ali Hanafiah 31 July 2015

Table of Contents

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study investigated ways of improving e-Government performance in developing countries. Developing countries were selected as they have significant barriers to the development of sustainable e-Government systems. A review of the literature found that improving e-Government performance requires more than just technology solutions. Instead, a holistic view of e-Government is needed. This can be achieved through Enterprise Architecture (EA).

EA is defined as "a blueprint that documents the information systems within the enterprise, their relationships, and how they interact to fulfil the enterprise's mission" (Langenberg & Wegmann, 2004, p. 2). While governments of developed countries have used EA, it has not yet been fully utilised by developing countries. Despite recent, growing interest in EA from developing countries, empirical data to show the effect of EA adoption on e-Government performance is limited.

This study builds on the EA Benefit Model (EABM) from Tamm, Seddon, Shanks, and Reynolds (2011) and extends it by using SERVQUAL to measure e-Government performance. This modified EABM is tested in a case study of a developing country, Indonesia, and validated in the context of other developing countries. As a result of this analysis, this study offers valuable examples of policy implications for assisting developing countries, in general, and the Indonesian government in particular. This is vital for Indonesia in order to address concerns identified in the United Nations e-Government readiness reports since 2003.

This study employed mixed methods with two different groups of respondents. A quantitative approach, involving a survey of 561 respondents, was used to collect data from respondents working at operational levels. A qualitative phase involving

fifteen semi-structured interviews was conducted with high-level officials who have the ability to influence the strategic decisions relating to e-Government systems development. In addition, documentary evidence and observations were used to capture a more comprehensive picture of the Indonesian Treasury e-Government systems.

Using Structural Equation Modelling (SEM) in Amos version 22, the modified EABM and the collected data supports all hypotheses made in this study. The findings revealed that EA has the potential to improve e-Government system performance in Indonesia. Also, the study developed the SERVQUAL measures further to address instability problems (Jiang et al., 2002; Landrum et al., 2009; Myerscough, 2002) resulting in a validated and stable measure.

Therefore, this study provides an important theoretical contribution to the e-Government literature in advancing understanding of the critical role of Enterprise Architecture in improving the quality of e-Government systems and in measuring e-Government performance in developing countries.

PUBLICATIONS SINCE PHD ENROLMENT

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LIST OF ABBREVIATIONS

AGA	The Australian Government Architecture
CFA	Confirmatory Factor Analysis
CIO	Chief Information Officer
CMMI	Capability Maturity Model Integration
COBIT	Control Objectives for Information and Related Technology
COTS	Commercial off-the shelf
DG	Directorate General
DTS	Directorate of Treasury Systems
DTT	Directorate of Treasury Transformation
EA	Enterprise Architecture
EABM	The EA Benefit Model
EAP	Enterprise Architecture Planning
EFA	Exploratory Factor Analysis
EFQM	The European Foundation for Quality Management
FEAF	Federal Enterprise Architecture Framework
GOF	The Goodness-of-Fit
ICT	Information and Communication Technology
IFMIS	Integrated Financial Management Information Systems
IS	Information Systems
ISO	The International Organization for Standardization
ITIL	The Information Technology Infrastructure Library
ITU	The International Telecommunication Union
LAN	Local Area Network
MoF	The Indonesian Ministry of Finance
NPM	New Public Management
OECD	Organisation for Economic Co-operation and Development
OS	Operating System
PEM	Public Expenditure Management
SDLC	Software Development Life Cycle
SEM	Structural Equation Modelling
SGEA	Singapore Government Enterprise Architecture
SPAN	*Sistem Perbendaharaan dan Anggaran Negara* or State Budget and Treasury Systems
TAM	Technology Acceptance Model
TOE	The Technology-Organisation-Environment
TOGAF	The Open Group Architecture Framework
TRA	Theory of Reason Action
TRO	The Indonesian Treasury Regional Office (*KANWIL*)
TSO	The Indonesian Treasury Service Office (*KPPN*)
UN	United Nations
UTAUT	The Unified Theory of Acceptance and Use of Technology
WAN	Wide Area Network

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Chapter 1
INTRODUCTION

1.1 Overview

This study explores e-Government in developing countries and enterprise architecture (EA). This chapter begins, in Section 1.2, by describing the background of this study. It is followed by Section 1.3 discussing the problem motivating this study. Section 1.4 provides the research aim and objective and also introduces the research questions. Section 1.5 highlights the research methodology used in the study. Section 1.6 proposes the significance of this study. The outline of this thesis is available in Section 1.7. Section 1.8 summarises this chapter.

1.2 Research Background

Governments require reliable information to improve public services. The information should be provided through a secure channel in a timely manner to remain useful. Thus, the presence of Information and Communication Technology (ICT) to provide reliable information systems is indispensable. *"The use of ICT in government"* is defined as e-Government (OECD, 2003, p. 23). The OECD further states that e-Government *"encompasses all aspects of government activity"*.

Unlike some governments of developed countries who are able to make the most of e-Government, most governments of developing countries are still struggling to implement proper e-Government systems. Heeks (2003, 2008) argues that only 15% of e-Government projects in developing or transitional countries were considered successful. Ebrahim and Irani (2005) suggest that to make e-Government successful, government should not rely solely on the ICT.

With the rapid development of ICT, a successful information system such as e-Government system entails strong and continuous support from all stakeholders (Irani, 2002). A collaborative environment is also needed in the government. In order to provide such an environment, interoperability of data exchange is necessary. Therefore, governments require an instrument that can be used by various stakeholders to communicate in the same logical construct and to cope with the changes in the ICT. Zachman (1997) argues that EA could be used for such circumstances.

EA is defined as a *"blueprint that documents all the information systems within the enterprise, their relationships, and how they interact to fulfil the enterprise's mission"* (Langenberg & Wegmann, 2004, p. 2). Governments are considered to be the most complex enterprises in the world (Saha, 2010a). Therefore, some governments of developed countries have started to adopt EA in their e-Government initiatives. The first effort came from the United States government (CIO Council, 1999).

The number of countries adopting EA as part of their e-Government strategies is growing. Yet, this study could not find any developing countries trailing such initiatives. Therefore, this study aims to discover whether the presence of EA would enhance the e-Government performance in developing countries such as Indonesia. Indonesia is one of the lowest scoring countries in the United Nations' e-Government readiness survey (The United Nations, 2012). In particular, Indonesian e-Government systems are considered to be lacking in their support for financial transactions (The United Nations, 2012, 2014).

The Indonesian Treasury e-Government system is the host for government financial related transactions such as expenditure, revenue, and accounting. Layne and

Lee (2001, p. 125) argue that *"the critical benefits of implementing e-Government are actually derived from the integration of underlying processes"*. Hence, an in-depth analysis of the Indonesian Treasury e-Government systems is deemed important as it can enrich the e-Government field of research (Walsham & Sahay, 2006).

1.3 Statement of the problem

Developing countries are considered to have difficulties in promoting transparency in their fiscal information (Kopits & Craig, 1998). E-Government is considered to be a major contributor in improving transparency (Bertot et al., 2010; Ciborra, 2005; OECD, 2003). In Indonesia, fiscal information is managed in the Ministry of Finance with the Indonesian Treasury at the heart of its process (Achmad, 2012). This leads the Indonesian Treasury e-Government system to be critical for the country. Together with other governments such as Mongolia, Turkey, Guatemala, and Pakistan, Indonesia was part of World Bank projects to enhance their treasury e-Government systems (Dener et al., 2010).

Despite assistance from international donors such as the World Bank, the Indonesian Treasury received ongoing recommendations regarding its e-Government systems from the Indonesian supreme audit board: *Badan Pemeriksa Keuangan* (BPK)[1]. In their reports from 2005 to 2013, it was suggested that the Indonesian Treasury should have a consistent architectural framework from which its e-Government systems are developed (Badan Pemeriksa Keuangan, 2009, 2014). BPK argued that the system was not developed upon relevant information system

[1] The Indonesian supreme audit board is called Badan Pemeriksa Keuangan (BPK) in the Indonesian language.

architectural patterns. This resulted in lack of assurance in the quality and reliability of the Indonesian government financial report.

An architectural pattern like EA could be used for the Indonesian Treasury e-Government systems. As a core government agency in public financial management, the Indonesian Treasury needs to ensure that its systems are interoperable with other agencies. This is required so that business and technology personnel can communicate meaningfully in the same "language". Referring to other mature industries such as airlines and construction, Zachman and Sowa (1992) argue that EA can capture all the processes for ICT development. Hence, using EA allows all parties, including business and technology staff, involved in developing information systems to refer to the same resource.

The Indonesian Treasury e-Government system is used to serve the Indonesian government spending units through 177 Treasury Service Offices (TROs) and 30 Treasury Regional Offices (TROs) nationwide. The locations of the spending units are widely dispersed. They are located in main cities, rural areas and some in remote areas. Some of them are also located in foreign countries, such as embassies and consulates. To achieve its complete role, the Indonesian Treasury needs to gather information from all these, and other, sources in a timely manner.

To date, the Indonesian Treasury e-Government system is represented by more than twenty system applications that are used for Treasury services, both in the Indonesian Treasury and the government spending units. The number of system applications and other software is still growing. The growth follows its user's needs. These systems are internally developed by more than fifty system developers with various skills within the Indonesian Treasury. The system applications implement

services such as budget allotment, disbursement, cash management, accounting and reporting. Each of the applications has more than five different sub-system applications.

The large number of system applications leads to an increase in the complexity of development (Basili & Perricone, 1984) and maintenance (Banker et al., 1993). Furthermore, the Indonesian Treasury e-Government systems are developed using multiple platforms. Most of them are developed by using Microsoft Visual FoxPro. Each of the system applications can be run either on a stand-alone computer or used in a client-server configuration over a Local Area Network (LAN).

The need for system applications to be installed on each client computer means that data integrity is vitally important. The Indonesian Treasury's business processes are interdependent and data integration is managed through a periodic synchronisation process. As such, each system application is equipped with a data transfer feature. This feature is run regularly both manually and semi-automatically.

As such, the Indonesian Treasury has faced difficulties in their e-Government initiative. The state of the Indonesian Treasury e-Government systems is similar to what Peristeras and Tarabanis (2000), cited in Hjort-Madsen (2006, p. 2), described:

> *The existence of isolated, overlapping, highly fragmented, and unrelated computerized applications within the same organization has resulted in major interoperability problems and 'isolated islands of technology'.*

Therefore, one of the Treasury missions, i.e., to have an integrated, transparent, accurate and real time information system (The Indonesian Treasury, 2007), is yet to be achieved.

Investigations are needed on the Indonesian Treasury in order to find out whether design has an impact on its e-Government system performance (Dada, 2006). The

design should be viewed as a combination of technological and business perspectives. Hence, this study should be able to discover the main problems and how a sustainable solution is formulated. Additionally, such a study would be greatly useful for donor organisations such as the World Bank in their relentless efforts to assist developing countries (Dener et al., 2010).

1.4 Research Aims and Questions

The aim of this study is to investigate ways to improve e-Government performance in developing countries. This required a thorough analysis of government documents such as laws and regulations. Accessing government documents in developing countries, according to Poulin (2004), is considered difficult. However, the researcher's background as a member of the staff in the Indonesian Treasury helped in accessing information that is not publicly available. Additionally, to the best of the researcher's knowledge, no similar study has been undertaken.

In order to achieve the aims of this study, relevant instrumentation is needed to measure how the e-Government systems perform and how they could be improved. The e-Government system performance cannot simply be measured by adoption of the latest available technology. Also required are the views of the Indonesian Treasury employees' satisfaction regarding the current e-Government systems. The study also needs to find out how the Indonesian Treasury developed its e-Government systems. The presence of alignment between technology and business in the Indonesian Treasury is also examined.

EA aims for alignment of technology and business. EA has gained attention not only in private enterprise but also government enterprises. Governments have been starting to adopt EA for their e-Government programs. Although EA is recognized as

an instrument that has a holistic approach, studies that show how EA impacts e-Government performance are still in their infancy. Thus, this research begins by developing a model to illustrate the relationship between EA and e-Government system performance. This allows this study to respond to its focal question: to what extent can EA be used to improve the Indonesian Treasury e-Government system performance? The following questions were used to lead into this focal question:

a. Internationally, has EA implementation demonstrated benefits to e-Government performance?
b. How can the quality or the process of EA development affect the e-Government performance?
c. What is the current state of the Indonesian Treasury e-Government systems? How can it be improved?
d. How can EA be used to improve the quality of the Indonesian Treasury e-Government systems?

1.5 Methodology

In developing the framework, this study mainly referred to e-Government and Enterprise Architecture theories. The study modified the EA Benefit Model (EABM) from Tamm et al. (2011) to depict the correlation between the maturity of EA and the e-Government system performance. The EABM was developed through a rigorous literature review in the EA field. The quality of EA in the EABM is represented by the maturity of EA and e-Government system performance represents the benefit gained by the government. The research questions were answered by validating the research framework using a single case study approach.

The case study is the Indonesian Treasury. In order to increase the quality of the findings from the one case study, this study adopted a mixed method approach (Garson, 2013a). The Indonesian Treasury's employee views at various levels in the organisational structure were captured. Therefore, relevant and valid data with low bias was available for analysis.

The use of mixed methods in this study was also relevant to the nature of EA development. It requires sound strategies and vision from high level officials (Cullen, 2012; Finkelstein, 2006; Gregor et al., 2007; National Information Society Agency, 2011). Thus, high level officials' perspectives from Echelon three[2] and above were captured through semi-structured interviews.

Lankhorst (2004) argues that a top-down approach will most likely be lacking in detail. Subsequently, Reithhofer and Naeger (1997) and Lankhorst (2004) argue that in developing EA via the bottom-up approach should also be used to get a complete picture. Therefore, this study gathered views at the operational level of the Indonesian Treasury through quantitative research using questionnaires. As a result the study collected adequate information to formulate a sustainable solution for the Indonesian Treasury e-Government system transformation. Further details of the research methodology are presented in Chapter 4.

1.6 Research significance

With a central role in managing public expenditure (Achmad, 2012), the performance of the Indonesian Treasury e-Government has a significant impact on Indonesian public services. Additionally, the Indonesian Treasury was one of the

[2] Echelon three is upper level manager who is directly supervised by a director or head of a Treasury Regional Office.

pioneers for reform initiatives in Indonesia (Nasution, 2003; The Indonesian Ministry of Finance, 2011). Therefore, a study of the Indonesian Treasury e-Government system could improve public services in Indonesia. Findings in this study could also be of benefit to international donors who continuously support e-Government in developing countries.

The future of e-Government research should be in relation to improving channels to help government interact with its stakeholders (Löfstedt, 2005). Löfstedt (2005) mostly refers to e-Government in developed countries in her study. Recent e-Government studies followed this direction by using both a technological adoption perspective (Carter & Bélanger, 2005; Kavanaugh et al., 2012; Reddick & Norris, 2013; Sharif, Davidson, & Troshani, 2013; Susanto, 2012; Susanto & Goodwin, 2013) and an e-readiness perspective (Alghamdi et al., 2011, 2014; Koh et al., 2008).

However, very little research has examined the effect of holistic design approaches, such as enterprise architecture (EA), on e-Government studies. Developing countries are considered to have significant gaps between design and implementation (Dada, 2006; Heeks, 2002, 2003) in their e-Government system development. Hence, more work is needed in e-Government research from an EA perspective to improve areas such as interoperability of data (Pardo, Nam, & Burke, 2012), cost efficiencies (Finkelstein, 2006; Lankhorst, 2009; Ross et al., 2006), and business agilities (Op't Land et al., 2009; Saha, 2010b).

The number of research papers demonstrating the use of EA in e-Government is growing (Bellman & Rausch, 2004; Chief Information Officer, 2005; Hald, 2006; Mikaelian et al., 2011; National Information Society Agency, 2011; Østergaard Jensen, 2010; Pardo et al., 2012; Pheng & Boon, 2007; Seppanen et al., 2009).

However, very few use empirical evidence that demonstrates the correlation between the two. The aim of this study was to understand the effect of EA on e-Government in developing countries. The study begins with the development of its research framework by combining theories from both e-Government and EA.

This study uses data from the Indonesian Treasury as its empirical evidence. The Indonesian Treasury has a role in both the front and back office in relation to Indonesian public expenditure. According to Indonesian financial laws, the Indonesian Treasury has a responsibility to authorise payment orders from spending units, book keeping all revenue transactions, maintaining the asset management records and generating both semester and annual government financial reports.

With the roles and responsibilities that the Indonesian Treasury has, its e-Government system can be considered to be representative of the complexity in analysing e-Government systems within the country, as Dawes (2008, p. 104) says:

> *Most information-intensive work actually takes place behind the scenes of public web sites, in the "back offices" of government agencies. Here is where the necessary policies and strategies are developed and the associated processes, systems, and data resources are devised, managed, and used. In this work, information technology is intertwined with public policy and management concerns*.

Consequently, this study is significant, because it:

1. Identifies the development of EA in developed countries' governments. To achieve this objective, this research provides in-depth analysis, mainly based on secondary data from different governments. This then is used to extrapolate the impact of EA on e-Government. The analysis also demonstrates the importance of EA for other countries. Learning from other countries' experiences helps in understanding the value of EA. Thus, this

then gives stronger arguments about the importance of EA for the governments of developing countries.

2. Investigates the relationship between EA and e-Government performance. To do so, this research analyses currently available models to depict the effect of EA on organisations in both public and private sectors. The study modified the EA Benefit Model (EABM) to make it relevant in portraying the relationship between EA and e-Government.
3. Assesses e-Government initiative in a major developing country. The Indonesian Treasury is one major government institution that could have a big impact on the Indonesian government. The result of this evaluation may give a better view of how e-Government initiatives in developing countries could be improved.
4. Discovers how EA can foster the Indonesian Treasury e-Government system transformation. Extensive fieldwork is used to gather data and to find out what is missing in the Treasury's system transformation process and how that process could be enhanced. The result of this could lead to an understanding of how EA impacts e-Government in developing countries. Thus, sustainable and continuous e-Government system improvement by aligning business and technology could be facilitated.

1.7 Thesis outline

The outline of this thesis is illustrated in Figure 1.1 and described below.

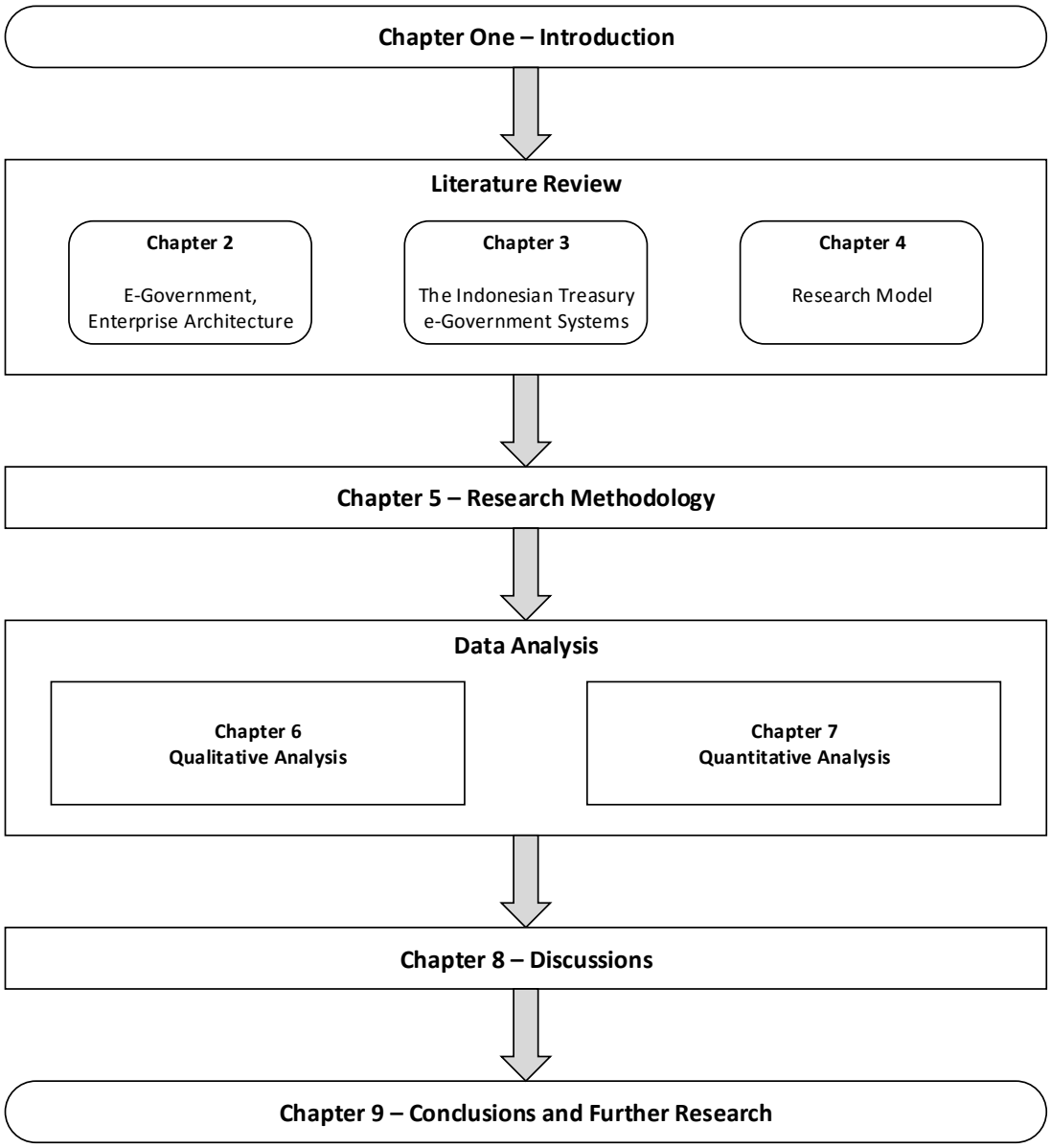


Figure 1.1. The Structure of The Thesis

Chapter 1 introduces the research, the aims of this study and the research questions. This chapter also defines the limitations of the study and briefly describes the methodology to be used.

Chapter 2 reviews theories relevant to addressing the identified research questions. Chapter 5 presents the Indonesian Treasury e-Government as the context of this study. Chapter 3 develops the model to act as a research framework. The

framework is used to generate research instruments such as a list of questions for interview and survey questionnaires.

Chapter 4 explains the methodology used in collecting the data and also discusses the reasons for selecting the methods and techniques. Chapter 6 to Chapter 8 presents and discusses the findings of this study. Chapter 9 concludes the study and outlines further research opportunities.

1.8 Conclusion and Summary

This study investigates the role of EA in improving e-Government performance in developing countries. It focuses on the Indonesian Treasury e-Government systems. The Indonesian Treasury is considered to be the core of the Indonesian public finance systems. The system caters for revenue and expenditure data, national and regional budgets and assets and government financial reports. Findings from this study may be adopted by other government agencies in Indonesia and other developing countries. Further, international donors, such as the World Bank may also benefit from this study. Reviews of literature in the field of e-Government and EA are presented in Chapter 2.

Chapter 2
LITERATURE REVIEW

2.1 Overview

This chapter reviews literature in the fields of e-Government and Enterprise Architecture (EA). It begins with a literature review of the e-Government field in Section 2.2. Section 2.3 reviews EA, an instrument that could be used to ensure alignment between technology and business, and continuous development. Section 2.4 demonstrates the benefit of EA on e-Government by examining what developed countries have achieved after adopting EA in their e-Government systems. The presence of characteristics of EA in developing countries is presented in Section 2.5 and 2.6. This chapter is summarised in Section 2.7.

2.2 E-Government

Although implementation of ICT is meant to help improve the way governments work (Ebrahim & Irani, 2005), governments are considered to be slow in adopting proper technology to improve their public services (Marche & McNiven, 2003). The use of ICT in supporting government work is called e-Government. E-Government was first introduced in 1997 (Relyea, 2002). Gupta and Jana (2003) argue that e-Government has become essential to improve national governance.

2.2.1 The evolution of e-Government

In order to give a sufficient view of e-Government evolution, it is important to review how governments ran their business before ICT was used.

2.2.1.1 Antecedents to the evolution of e-Government

Government are considered to be complex enterprises (Fountain, 2001; Saha, 2010a). Governments also need to obey the laws and regulations in delivering its

public services, including providing information to the people (Fountain & Osorio-Urzua, 2001). Furthermore, they are also typically more hesitant to change and to adopt new initiatives than private companies (Marche and McNiven, 2003 in Davison et al., 2005).

Weber introduced bureaucracy to deal with this complex role of government (Fountain, 2001, pp. 44-45). Bureaucracy, referring to government officials who run the public administration, is often interpreted as complicated with inefficient processes resulting in dysfunctional division and lack of responsiveness (Duivenboden and Lips, 2005 in Homburg, 2008).

The nature of Weberian bureaucracies is very systematic, based on rules, and with hierarchical authorisation systems designed to implement government policies and programs (Rainey, 2009; Welch & Pandey, 2007). Paper is used as the medium of government work. The paper is sent back and forth to gain approvals according to the hierarchy in the government organisation (Hughes, 2003). This complexity in ensuring accountability and responsiveness results in bureaucracy being synonymous with red tape (Welch & Pandey, 2007). Furthermore, bureaucracy causes negative impacts to government administration such as corruption (Hillman, 2004; Rauch & Evans, 2000; Van Rijckeghem & Weder, 2001) and incongruity between bureaucracy and society (Haque, 1997).

In order to overcome performance related issues in delivering public services, governments reformed their public management (Keating, 1998). Implementation of New Public Management (NPM) became common including in Asian governments (Samaratunge et al., 2008; Schick, 1998). The main objective of the NPM was to

increase efficiency and effectiveness of organizations in the public sector (Keating, 1998).

The objectives of NPM are considered to be a fit with the use of ICT in government (Homburg, 2004; Torres et al., 2005). If used properly, a robust ICT investment (Irani, 2002) may be able to simultaneously enhance effectiveness (Carter & Bélanger, 2005; Pardo et al., 2012; Shim & Eom, 2008), sustain accountability (Welch & Pandey, 2007), transparency (Ciborra, 2005), and eradicate corruption (Cho & Choi, 2004; Shim & Eom, 2008).

2.2.1.2 Theoretical bases for the Evolution of e-Government

The use of ICT in government can be traced back to the 1970s (Danziger & Andersen, 2002). They define ICT as instruments that are used to digitally manage data and information. Adopting ICT in government should not simply be defined as being online (Curtin et al., 2003). As a system, e-Government involves various entities such as technological, socio-political, and governmental (Homburg, 2008). As such e-Government development should not be seen as an easy process.

E-Government is used to modernise public administration (Lenk, 2002). Kofi Annan (2001, p. 1), former UN Secretary General, stated that:

> *"ICT is not a magic formula that is going to solve all our problems. But it is a powerful tool with diverse applications. Our challenge is to put that power at the service of all humankind".*

By optimising the use of ICTs, the OECD believes that governments will be able to enhance their organisational structures, focus further on citizens' needs and improve their performance (OECD, 2003).

2.2.2 Definition of e-Government

E-Government is considered to be a relatively new field of research (Curtin et al., 2003; Grönlund, 2008; Reece, 2006). To date there is no single, universal definition of e-Government. E-Government is not simply defined as providing information through a website on the Internet (Curtin et al., 2003). This limited view of the Internet being the main, or sole, indicator for the presence of e-Government may restrict what is possible with ICT in government (Yildiz, 2007).

To date there are several definitions of e-Government. The World Bank (2011, p. 1) defines e-Government as:

> *the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government.*

According to Siskos, Askounis, and Psarras (2014, p. 1), e-Government refers to:

> *the use of information and communication technologies (ICT) by governments to provide digital services to citizens and businesses over the Internet, at local, national or international level.*

Another definition of e-Government comes from Guo (2010, p. 1):

> *a way for governments to use the most innovative information and communication technologies, particularly web-based Internet applications, to provide citizens and businesses with more convenient access to government information and service.*

Joon (2009, p. 2) defines e-Government as:

> *the government's efforts to transform both internal and external governmental relationships through the use of information technology such as the Internet.*

The OECD (2003) refers to the following e-Government definition:

> *the use of Information and Communication Technologies (ICT) and, particularly, the Internet as a tool to achieve better government*

Before coming to a general definition, the OECD (2003, p. 23) classifies e-Government into three definitions:

1. *e-Government is defined as Internet (online) service delivery and other Internet-based activity such as e-consultation.*
2. *e-Government is equated to the use of ICT in government. While the focus is generally on the delivery of services and processing, the broadest definition encompasses all aspects of government activity.*
3. *e-Government is defined as a capacity to transform public administration through the use of ICT or indeed is used to describe a new form of government built around ICT. This aspect is usually linked to Internet use.*

Since the aim of this study is to investigate how well the Indonesian Treasury e-Government system performs, this study makes use of the second definition of e-Government from the OECD.

2.2.3 Implication of e-Government

The implementation of e-Government can affect public organisations' business processes, technologies and human resources (Silcock, 2001). Therefore governments need to analyse advantages and disadvantages before developing and deploying e-Government systems (Bock, 2005). Thus, the government should be prepared for any unforeseen surprises as a result of e-Government implementation (Reece, 2006).

e-Government is critical in transforming public administration (Finger & Pécoud, 2003; Torres et al., 2005; Ebrahim & Irani, 2005), to provide convenient and accessible public services (Carter & Bélanger, 2005), to improve accountability (Carter & Bélanger, 2005; Gil-Garcia & Martinez-Moyano, 2007; Wong & Welch, 2004) and to enhance transparency (Bertot et al., 2010; Ciborra, 2005; Jaeger & Bertot, 2010; Kim et al., 2009; McDermott, 2010). To date, then ICT improvement has forced government to adjust their technology usage and/or business functions (Dener et al., 2010).

The implementation of e-Government would therefore change how government operates (Ebrahim & Irani, 2005). Tat-Kei Ho (2002) argues that e-Government implementation changes government perspectives in many ways, such as shifting from bureaucratic views to a stakeholder oriented mindset. He further mentions that there are eight criteria that would change, i.e., orientation, process organisation, leadership style, internal communication, external communication, mode of service delivery, and principles of service deliveries as seen in Table 2.1.

Table 2.1. Shifting from bureaucracy to e-Government (Tat-Kei Ho, 2002)

Criteria	***Bureaucratic***	***e-Government***
Orientation	Production cost-efficiency	User satisfaction and control, flexibility
Process organization	Functional rationality, departmentalization, vertical hierarchy of control	Horizontal hierarchy, network organization, information sharing
Management principle	Management by rule and mandate	Flexible management, interdepartmental team work with central coordination
Leadership style	Command and control	Facilitation and coordination, innovative entrepreneurship
Internal communication	Top-down, hierarchical	Multidirectional network with central coordination, direct communication
External communication	Centralized, formal, limited channels	Formal and informal, direct and fast feedback, multiple channels
Mode of service delivery	Documentary mode, and interpersonal interaction	Electronic exchange, non-face-to-face interaction
Principles of service delivery	Standardization, impartiality, equity	User customization, personalization

The changes are considered to be apparent in developed countries with more users satisfied with e-Government deliverables (Reddick & Roy, 2012; Verdegem & Verleye, 2009). However, governments in developing countries are still struggling in making the most of their e-Government initiatives (Alghamdi et al., 2014; Dada, 2006; Heeks, 2003; Rokhman, 2011).

2.2.4 e-Government in Developing Countries

E-Government has not yet reached its potential in developing countries. Several reasons for this are that governments have not been keen to redefine their business and remain slow in adopting proper technology to support their objectives (Ndou, 2004). This situation leads to complications in e-Government implementation. Despite these complications, governments are keeping their e-Government projects running (Sandeep & Ravishankar, 2014).

The risk in developing e-Government implementation remains high (Ndou, 2004). Therefore, adopting established studies for the area of e-Government research is needed. The technology adoption perspective has received significant attention for e-Government research in developing countries (Alzahrani, 2014; Carter & Bélanger, 2005; Mirchandani et al., 2008; Susanto & Goodwin, 2013).

2.2.5 Technology Adoption Perspective of e-Government

2.2.5.1 Technology Adoption Model (TAM)

The Technology Adoption Model (TAM) is considered to be the most popular model used to validate e-Government studies from a technology adoption perspective (Susanto, 2012). Within a decade from when it was introduced in 1989, TAM had become a robust model to predict user acceptance of technology (Venkatesh & Davis, 2000). TAM was built on the Theory of Reasoned Action (TRA) (Davis et al., 1989).

TAM, illustrated in Figure 2.1, proposes *external variables* such as training, anxiety, computer related support and experience, all affect cognitive responses that manifest as *perceived usefulness* and *perceieved ease of use*. Both cognitive responses may influence *attitude toward using. Attitude toward using* together with *perceived usefulness* may affect *behavioural intention* before, finally, being reflected in *actual behaviour*.

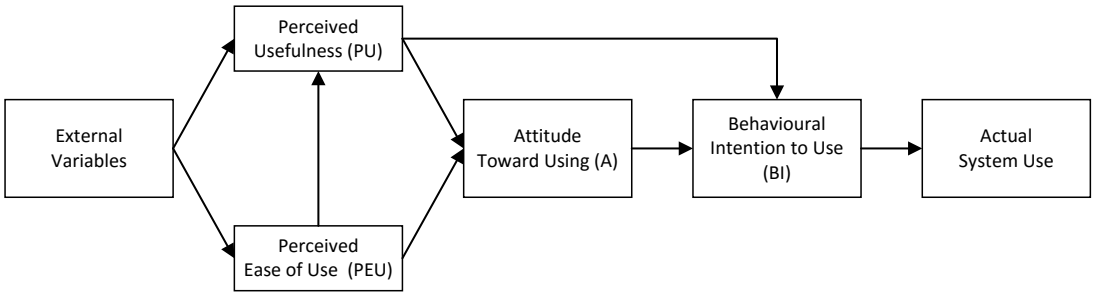


Figure 2.1. Technology Acceptance Model (TAM) (Davis et al., 1989, p. 985)

TAM has been used extensively in e-Government studies. Mirchandani et al. (2008) used TAM to conduct multigroup analysis of citizen perspectives toward e-Government in Thailand and Indonesia. TAM was also used to evaluate e-Government acceptance in Macao (Lai & Pires, 2010). Susanto and Goodwin (2013) developed the SMS-based E-Government Acceptance Model (SEGAM) by extending TAM to study user acceptance of SMS-based e-Government services.

TAM has been extended to TAM2 by imposing moderators from two external variables: *Experience* and *Voluntariness* (Venkatesh & Davis, 2000). TAM2 argues that cognitive responses may be moderated by influence from other people.

2.2.5.2 The Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) integrated eight prominent theories including TAM and TRA into their model called the Unified Theory of Acceptance and Use of Technology

(UTAUT). It predicts user's acceptance of new technology (Venkatesh et al., 2003). Moreover, the UTAUT assists understanding the acceptance factors of related activities such as training to adopt and implement new systems. The UTAUT is depicted in Figure 2.2.

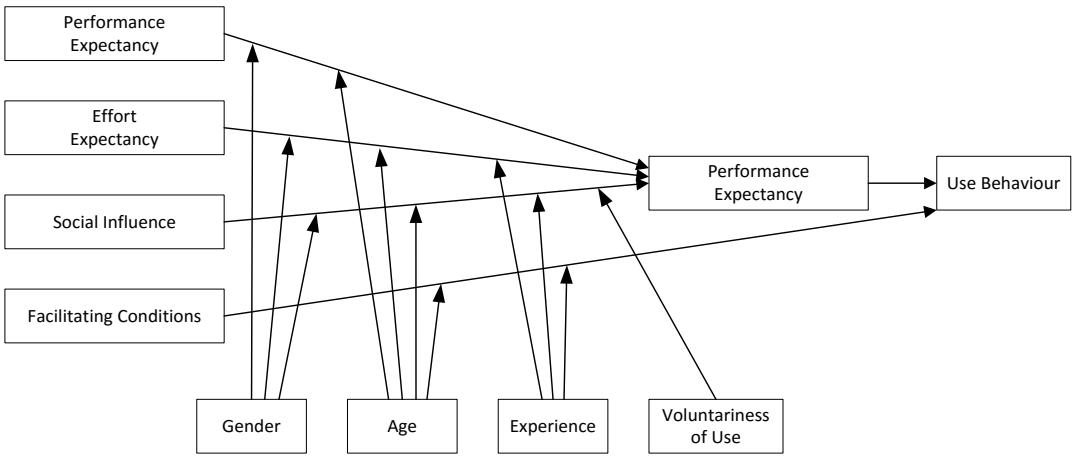


Figure 2.2. The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003, p. 447)

Similar to TAM, UTAUT gained significant attention in e-Government studies. For instance Verdegem and Verleye (2009) built a model on UTAUT to measure user satisfaction in e-Government. A case study of citzen adoption of web-based e-Government in Saudi Arabia also used UTAUT (Alzahrani, 2014). UTAUT has also been used to develop a model determining factors influencing intention to use e-Government in Malaysia (Lean et al., 2009).

Consequently, both TAM and UTAUT have been widely used to predict users' acceptance toward newly adopted technology in various countries. To evaluate technology adoption from the organisation perspective, the Technology-Organisation-Environment (TOE) framework is an option.

2.2.5.3 The Technology–Organisation–Environment (TOE)

The TOE framework was introduced to understand factors that lead to technology adoption from the organisational perspective (Depietro et al., 1990). Depietro et al. (1990) illustrate that technology adoption is influenced by three factors, namely: *technology*, *external task environment* and *organisation* as seen in Figure 2.3.

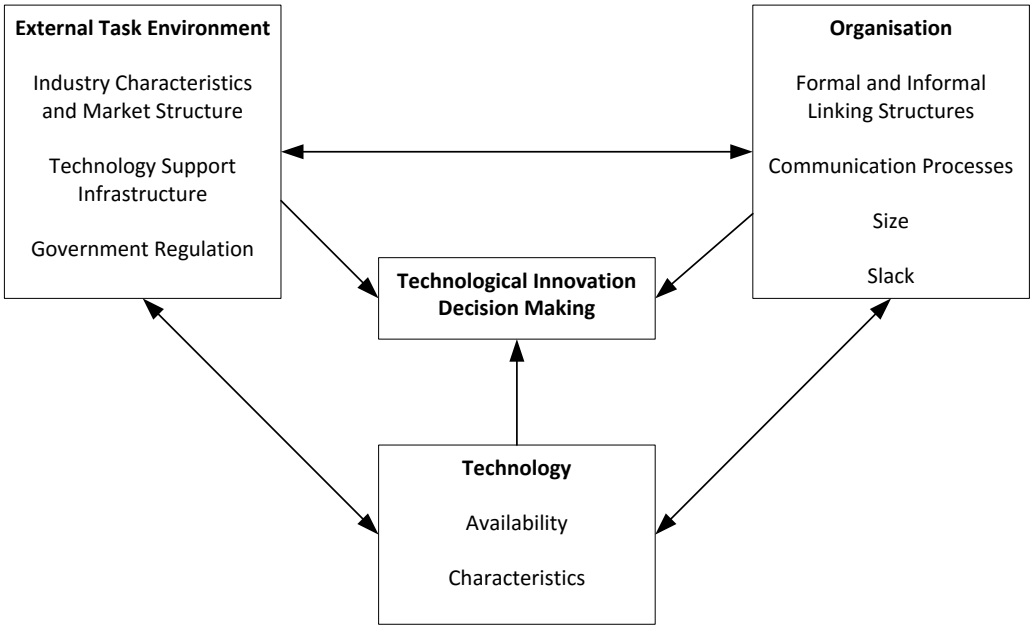


Figure 2.3. The Technology-Organisation-Environment (TOE) (Baker, 2012, p. 236; Depietro et al., 1990, p. 153)

The TOE framework has been used in e-Government studies. Sharif et al. (2013) investigated social media adoption in local government agencies by using the TOE framework. The collective impact of e-Government and e-Business on Singapore's economic performance was empirically validated using the TOE (Srivastava & Teo, 2010). The TOE has also been used to validate determinants of e-Government integration in developing countries such as Indonesia (Pudjianto et al., 2011).

2.2.5.4 Limitations of Technology Adoption in Developing Countries

While technology adoption has received significant attention from researchers in e-Government studies, studies investigating how e-Government can be managed

from a more holistic enterprise architecture perspective in developing countries remain limited. Such a study requires sufficient access to sources of information from government officials and regulations. Accessing sources of information that are not publicly available in developing countries is considered difficult (Banisar, 2006; Poulin, 2004).

As a complex enterprise, government requires an instrument to ensure the alignment of business and technology in e-Government initiatives. Such an instrument should cover all aspects not only within its government agencies but also in the relation with its stakeholders (Saha, 2010b). Business-ICT alignment may be achieved by adopting EA (Gregor et al., 2007; Lankhorst, 2009; Liimatainen, 2008).

This study uses EA as the means for improving e-Government alignment in developing countries. Improved alignment should enhance understanding of e-Government in a broader sense (Walsham & Sahay, 2006). Moreover, it is evident that developing countries still have limitations, such as infrastructure and human resources, which could impact the quality of e-Government systems (Walsham & Sahay, 2006). Therefore, in implementing e-Government systems, governments of developing countries require holistic approaches relevant to their contexts (Ndou, 2004; Walsham & Sahay, 2006) to address transparency, accountability and accessibility (Sandeep & Ravishankar, 2014).

2.2.6 Developing and Deploying e-Government

Implementing e-Government needs a proper strategy. The strategy should refer to internationally acknowledged formulation (Basu, 2004). To achieve the objective of e-Government, the formulated strategy requires strong commitment from all parties who are involved in its development and deployment (Basu, 2004). The e-Government

implementation strategy also requires strong integration across the unique functions of multiple levels of the government (Layne & Lee, 2001).

Commonly, e-Government research is about increasing citizen involvement (Carter & Bélanger, 2005; Cook, 2000; West, 2004); improving public accessibility to government services such as through SMS (Lallana, 2004; Rossel et al., 2006; Susanto, 2012; Trimi & Sheng, 2008), or Internet websites (Ahn, 2012; Gil-Garcia, 2005; Jaeger, 2004; Wong & Welch, 2004). Although Layne and Lee (2001, p. 125) say:

> *the critical benefits of implementing e-Government are actually derived from the integration of underlying processes not only across different levels of government but also different functions of government.*

However, few studies have been undertaken in the area of integration and interoperability among government units. These areas are considered to be within the domain of EA (Saha, 2009, 2010b). Therefore, the presence of EA could be used to assist in achieving the strategic values of e-Government.

2.2.7 Achieving Strategic Values of e-Government

One of the challenges is that most governments consider having an appropriate strategy for implementing e-Government to be of low importance (Aichholzer, 2004; Shahkooh & Abdollahi, 2007). In addition to successful e-Government implementation, having an appropriate strategy also leads to sustainable development in the long run.

In order to have sustainable e-Government development, government should have a clear vision of what will be delivered. Such vision should be articulated clearly in relevant documents (Grant & Chau, 2006). Such documents enable the development process to be executed properly by relevant government agencies. This will result in measurable performance benefits of e-Government systems.

2.2.8 Measuring e-Government Performance

This study defines e-Government performance as the quality of the services it delivers. There are several models available to measure e-Government performance. Peters et al. (2004) classify them into three groups: stage models, service quality, and performance indicators.

2.2.8.1 Stage Models

Stage models identify the maturity of e-Government through how governments exploit ICT, such as the Internet, to interact with their stakeholders including citizens, private sectors, and other government bodies. Although most of the models in this group start with the static government website, the path by which each of the models progresses is different. Most of the models start with the official presence of an e-Government website characterized by simple information distribution (Hiller & Bélanger, 2001; Layne & Lee, 2001; Moon, 2002; Shahkooh et al., 2008; Siau & Long, 2005; Wescott, 2001). Table 2.2 shows the evolution of e-Government stages as described by the authors (in alphabetical order) referred to above.

From this Table it can be seen that most of the models view e-Government by how governments utilize it to improve public participation (Bellamy & Taylor, 1994; Danziger & Andersen, 2002; De Araujo, 2001; Edelenbos & Klijn, 2006; Homburg, 2008; Torres et al., 2005). Therefore, these models can be used to measure e-Government where the Internet is used extensively. These models are, however, lacking empirical evidence. For that reason, Coursey and Norris (2008) conducted an empirical study to find out whether these models can be used to ensure that e-Government is progressing as predicted by the model. They found that it cannot be clearly perceived that e-Government is progressing in accordance with the proposed stages.

Table 2.2. E-Government Stages

Author	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Hiller and Bélanger (2001)		Information dissemination	Two-way communication	Integration	Transaction	Participation
Layne and Lee (2001)		Catalogue	Transaction	Vertical Integration	Horizontal Integration	
Moon (2002)		Information dissemination	Two-way communication	Service and financial transaction	Vertical and Horizontal Integration	Political participation
Shahkooh et al. (2008)		Online presence	Interaction	Transaction	Transformation	Digital Democracy
Siau and Long (2005)		Web presence	Interaction	Transaction	Transformation	e-Democracy
The United Nations (2003)		Emerging presence	Enhanced presence	Interactive presence	Transactional presence	Network presence
Wescott (2001)	e-mail and internal network	Internal organization & public access to information	Two-way communication	Exchange of value	Digital democracy	Joined-up government

The United Nations has been adopting the stage model to measure worldwide e-Government readiness (The United Nations, 2003, 2004, 2005, 2008, 2010, 2012). The stage model may be relevant to recognize at what stage the e-Government is, but relying solely on one of the models may lead to insufficient interpretation of e-Government performance because the quality of public service delivery is excluded in the model.

2.2.8.2 Service Quality

The main role of a government is delivering services to the people (De Araujo, 2001; Kellough & Nigro, 2006). The characteristics of services are intangible (Parasuraman et al., 1985), it requires an instrument that can measure the effectiveness of how a service is being delivered, e.g., service quality. Service quality relies on satisfaction and perceived quality (Peters et al., 2004). It was Parasuraman et al. (1988) who designed an instrument called SERVQUAL to measure perceptions of service quality. Parasuraman et al. (1988) argue that customers' expectations and perception of quality can be used to measure service quality. In order to do so, they developed a questionnaire with 22-item grouped into five dimensions, namely: *tangibles*, *reliability*, *responsiveness*, *assurance*, and *empathy* (Parasuraman et al., 1991; Parasuraman et al., 1988).

Parasuraman et al. (1988) categorise physical facilities, equipment and personnel as part of the *tangibles* dimension. They define the *reliability* dimension as accuracy and the ability to deliver the promised service. Willingness to give immediate support is put into the *responsiveness* dimension. As for the *assurance* dimension, they include sufficient knowledge to stimulate trust and confidence. In the last dimension, *empathy*, understanding individual customer profiles is used.

Initially, SERVQUAL was proposed in marketing studies. Information Systems (IS) studies adopted the model to measure IS effectiveness (Gorla, 2012; Kaisara & Pather, 2011; Kettinger & Lee, 1994; Myerscough, 2002; Petter et al., 2008; Pitt et al., 1995; Van Dyke et al., 1997; Watson et al., 1998). Although the five dimensions in SERVQUAL have been stable over time, these dimensions cannot be considered universal for all disciplines (Bigne et al., 2003). Therefore the use of SERVQUAL in IS research often requires modification (Bigne et al., 2003; Gorla, 2012).

Gorla (2012) modified the instrument to measure IS success by restructuring the questions. This modified instrument has become prominent because it can measure comprehensive ICT service, rather than individual products, delivered by an organization. Thus, it is able to measure whether or not the expected benefits have been achieved.

2.2.8.3 Performance Indicators

In determining the performance of government websites, Lee (2003) proposed measurements based on modifications of the Simeon (1999) studies. His proposed measurement components are as follow:

1. *Attracting*. It is meant to impress the users and is determined by several items, e.g., the logo and tagline; graphics (including the choice of colours, layout, and themes); self-advertisement from the website's owner; attracting services such as quizzes and maps; features for attracting such as a gallery, tourism, game, and finance.
2. *Informing*. It consists of modified Simeon (1999) components, e.g., local links, content for publicity, content for learning, reports, descriptions of the

institution, description of the online administrative services, projects, contact information and counseling.

3. *Community* comprised of ten items: online forum, events, partner links, newsletter, message boards, user participation, focus of news, vision or values, domain identity and community services.
4. *Delivering* is a binary variable to identify the presence or absence of features for each essential item such as a search engine, mailing list, framework, multimedia, password system, downloadable publications.
5. *Innovation* is provided to measure whether or not public institutions have utilized the Internet with sufficient service innovation.

Although Peters et al. (2004) put this two-stage model for monitoring website strategy in the performance indicators group, this model only measures what is visible on the interface of a web site. This group is viable in assessing what governments offer on their Internet website. Yet this model may not be suitable to determine how government is performing in delivering their services based on the utilization of ICT in alignment with how governments conduct their businesses.

2.3 Enterprise Architecture

A sound alignment between ICT and business will definitely deliver benefits to any organization that is able to put it into action (Gregor et al., 2007; Pereira & Sousa, 2005). As a result, outcomes will be improved. Strategic alignment theory defines alignment as a never ending and continuous improvement through understandable performance indicators, framework, good governance and harmonious process execution (Venkatraman et al., 1993). In constructing this alignment, organizations have made ICT their main tool in delivering business objectives (Gregor et al., 2007).

The fundamental alignment should clearly be defined in their business and ICT strategic planning.

In order to achieve an alignment of ICT and business that includes resources such as human capital, organization and knowledge, it is important to have comprehensive management and governance instruments. One tool that can be used to generate this alignment is Enterprise Architecture (Elhari & Bounabat, 2011; Finkelstein, 2006; Gregor et al., 2007; Martin, 2005; Pereira & Sousa, 2005; Ross et al., 2006).

2.3.1 The Evolution of Enterprise Architecture

In 1997, Zachman, after working on information systems architecture for a decade, introduced the terminology of Enterprise Architecture to the Information, Communication and Technology (ICT) industry.

2.3.1.1 Antecedents to the evolution of Enterprise Architecture

To date, "change" still remains the biggest challenge that modern enterprises need to deal with (Zachman, 1997). He argues:

> *there are only three options for managing enterprise change: by trial and error; by reverse engineering; or by going out of business! (Finkelstein, 2006, p. 9)*

Hence, proper plans and strategies are needed to perform necessary changes. In the information systems related industries, shifting from strategy to implementation remains an issue (Zachman, 1997). Other industries, such as the airplane or manufacturing industries, have fewer issues in shifting from strategies to implementations. Architecture was one of the reasons for why this is possible (Zachman, 1997).

Zachman (1997) further argues that the complexity of development and implementation processes in information systems is similar to the product development processes in the airplane and manufacturing industries. Therefore, he suggests an architecture that could be used to not only manage the complexity of ICT implementation from its strategy but also to capture alignment of relevant aspects in information systems development. It is called Enterprise Architecture.

2.3.1.2 Theoretical bases for the Evolution of Enterprise Architecture

Bernard (2012) argues that the development of EA was influenced by organisational theory and systems theory. “Enterprise architecture captures the essentials of the business, IT and its evolution. The most important characteristic of an enterprise architecture is that it provides a holistic view of the enterprise” (Lankhorst, 2009, p. 3).

Zachman (1987) was the first to introduce the EA framework, which was initially called the information system architecture. After that he continuously improved it by extending and formalizing the framework (Zachman & Sowa, 1992). The final result was the Zachman Framework for Enterprise Architecture (Zachman, 1997). Zachman (2003) developed this framework in order to achieve the reusability principle. The idea was to try to replicate practices from the construction and aircraft industries such as doors that can be reused for different targeted objects (Zachman, 2003).

The Zachman framework for Enterprise Architecture is represented by a two dimensional matrix of five rows and six columns as can be seen in Figure 2.4. The last row is generally used to show the functions of an enterprise. In the framework, the six columns represent the objectives. They contain basic questions (what, how, where, who, when and why) that require a specific answer. Then, the five rows list the subjects

or roles that are involved in the process, i.e. planner, owner, designer, builder, and subcontractor. The intersection of a column and a row is called a cell.

	What Data	How Function	Where Location	Who People	When Time	Why Future
PLANNER Objectives/Scope	List of Things	List of Processes	List of Locations	Organization Structure	List of Events	List of Goals Objectives
OWNER Conceptual	Enterprise Model	Activity Model	Business Logistics	Work Flow	Master Schedule	Business Plan
DESIGNER Logical	Logical Data Model	Process Model	Distributed Architecture	Human Interface	Process Structure	Business Rules
BUILDER Physical	Physical Data Model	System Model	Technology Architecture	Presentation Interface	Control Structure	Rule Design
SUBCONTRACTOR Out-of-Context	Data Definition	Program	Network Architecture	Security Interface	Timing Definition	Rule Specifications
FUNCTIONING ENTERPRISE	Data	Function	Network	Organization	Schedule	Strategy

Figure 2.4. The complete Zachman Framework for Enterprise Architecture (Zachman, 2003 cited in Finkelstein, 2006, p. 4)

Unlike the traditional system development that uses a bottom-up view, the Zachman framework is a top-down approach (Finkelstein, 2006). In the traditional model the system development process begins by looking at the current manuals or existing systems. The findings are then analysed to improve them. Normally, the requirements are defined by ICT people through extensive interviews to understand the business needs. This is likely to result in a design based on technology. It will then become a technology dependent solution. As a result, changes to the business will be difficult to resolve with the ICT.

The first three rows of the Zachman Framework are technology independent. The business people create the strategic direction for the future business as a result of these three rows. Therefore, Finkelstein (2006) states that the output of the strategic direction will be in business terms. Hence, in order to develop systems that meet future

business needs, early involvement by the ICT department is essential (Finkelstein, 2006). With a clear strategic plan, Finkelstein (2006) further states that the ICT department will be able to produce technology/system requirements comprised of the designs for the application, database and technology. Once the system is implemented, the performance can be measured through predefined performance requirements. These are the results of rows three to five in the framework.

In addition to the Zachman Framework for Enterprise Architecture, Spewak and Hill (1993) introduced Enterprise Architecture Planning (EAP). EAP is used to define a planning process that includes business strategy, process reengineering, standardization, and system design (CIO Council, 1999; Janssen & Hjort-Madsen, 2007; Minoli, 2008; Rohloff, 2008).

In 2001, the Open Group introduced another industry standard architecture framework, namely TOGAF. In the first release, TOGAF version 7 focused on technical architecture. Two years later, the open group introduced TOGAF version 8.1 to cater for the entire enterprise scope, i.e., business, information, application and technical architecture (Saha, 2004). The latest version of TOGAF, version 9.1, was introduced in 2009. Some changes were made to the previous version to focus more on holistic enterprise change (The Open Group, 2009). Since TOGAF was introduced later, only the Zachman Framework for Enterprise Architecture and Enterprise Architecture Planning were used by the United States to develop the Federal Enterprise Architecture Framework (FEAF).

2.3.2 Definition of Enterprise Architecture

EA is considered to be a relatively new field of study in information systems (Harmon, 2003; Langenberg & Wegmann, 2004; Lankhorst, 2009). Initially, EA was

called an information systems architecture (Zachman, 1987; Zachman & Sowa, 1992). In 1997, Zachman started using the terminology of Enterprise Architecture.

Although EA has existed for over a decade (Zachman & Sowa, 1992), to date there is no single definition for EA (Janssen & Kuk, 2006; Stelzer, 2010). The first definition of EA came from Zachman (1997, p. 6) who defines it as:

> *set of descriptive representations (i.e. 'models') that are relevant for describing an Enterprise that can be produced to management's requirements (quality) and maintained over the period of its useful life (change).*

Langenberg and Wegmann (2004, p. 2) define EA as:

> *blueprint that documents all the information systems within the enterprise, their relationships, and how they interact to fulfil the enterprises mission.*

Ross et al. (2006, p. 9) define EA as:

> *the organizing logic for an organization's core business processes and ICT capabilities captured in a set of policies and technical choices, to achieve business standardization and integration requirements of the firm's operating model.*

The Open Group Architecture Framework (TOGAF) (2009, p. 5) define it as:

> *any collection of organizations that has a common set of goals encompassing all of its information and technology services, processes, and infrastructure.*

A recent definition of EA came from Saha (2010, p. 6), who defines it as:

> *the inherent design and management approach guided by principles, frameworks, methodologies, requirements, tools, reference models, and standards for organizational coherence leading to alignment, agility and assurance.*

The above definitions imply that EA applies beyond just technology. It represents the alignment of business and technology.

2.3.3 Aligning Business and Technology by using Enterprise Architecture

ICT and business alignment consistently ranks in the top five concerns of high level officials who rely on ICT in running their business (Chan & Reich, 2007; Luftman, 2004). EA has the capability for realising the alignment of business and ICT in a common framework (Gregor et al., 2007). It is evident that EA could enable alignment of ICT and business in the public sector (Martin, 2005). Thus, EA is seen as attractive with the governments of some developed countries adopting it as part of their strategies (AGIMO, 2007, 2009; Chief Information Officer, 2005; CIO Council, 1999; Hanafiah & Goodwin, 2011; Joon, 2009; National Information Society Agency, 2011; Saha, 2009, 2010a, 2010b; U.S. Congress, 1996).

In adopting EA as part of government strategy, Martin (2005) argues that a government agency should have detailed information on the expected business and ICT processes, including the required strategies and resources based on its uniqueness. Although the use of EA has become prominent, government needs to make sure that EA adoption will be beneficial in addition to the other commonly adopted instruments.

2.3.4 The Use of Enterprise Architecture and Other Instruments

For years before some governments decided to adopt EA to boost their performance, they had already adopted common standards. Lankhorst (2009) classifies the standards into two main areas: general management and ICT management as seen in Figure 2.5. In the area of general management, such as in strategic management, most governments adopted balanced scorecard (see Griffiths, 2003; Lilian Chan, 2004; Niven, 2011).

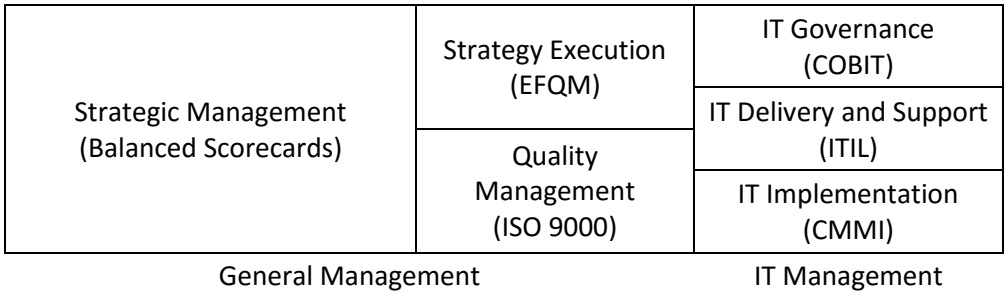


Figure 2.5. Management areas related to Enterprise Architecture (Lankhorst, 2009, p. 14)

Some governments adopted the European Foundation for Quality Management (EFQM) to execute the strategy (Jacobs & Suckling, 2007). The use of The International Organization for Standardization (ISO) 9000 to ensure government achieves desired quality (Bayo-Moriones et al., 2011; Jaap van den et al., 2005) is also common.

In relation to ICT adoption, several instruments were introduced to achieve as much as possible from the ICT investment. Control Objectives for Information and Related Technology (COBIT), a framework to establish appropriate governance in ICT, is also generally accepted by government (Gerke & Ridley, 2006; Ridley et al., 2004).

The United Kingdom government developed the Information Technology Infrastructure Library (ITIL) for service management purposes (Arraj, 2010). The ITIL is adopted by the private and public sectors (for example see Cater-Steel & Tan, 2005; Iden & Langeland, 2010; Pollard & Cater-Steel, 2009).

Carnegie Mellon University developed the Capability Maturity Model Integration (CMMI) to measure ICT implementation, especially in software development, and is another common standard adopted by governments (Mongkolnam et al., 2009; Wu et al., 2006).

The previously mentioned standards remain important even with the adoption of EA (Lankhorst, 2009). Lankhorst (2009) further argues that the presence of EA is needed for general management within an organisation in order to:

1. enrich the Internal Business Processes of the Balanced Scorecards;
2. create a clear view and to communicate the Policy and Strategy and the Processes features of the EFQM; and
3. integrate ICT support systems with the business processes as to how to design, manage and document them.

EA can also be used in conjunction with other established IT management standards such as COBIT, ITIL and CMMI (Lankhorst, 2009; Wilkinson, 2006). Lankhorst (2009) argues that EA could extend such standards by:

1. creating a base line for the internal control governance of COBIT;
2. creating good references that would show dependencies among ICT entities that would boost service management when using ITIL; and
3. providing guidelines and restrictions to assess software development using CMMI.

In light of the above, the presence of EA would not interfere with the adoption of common standards. This study argues that the presence of other established standards could hasten the development of EA because organisations are already familiar with internationally accepted frameworks.

2.3.5 Measuring the Progress of Enterprise Architecture

The progress of EA can be identified by measuring its maturity. To date, limited maturity models have been proposed. This study found a list of EA maturity models as seen in Table 2.3. Some models were developed by governments, e.g., Hite (2003),

the Office of Management and Budget (2005), the National Association of State Chief Information Officers (NASCIO) (2003), and some models developed by prominent consultants such as Gartner (Burke, 2010), EA researchers such as Ross et al. (2006) and the Institute For Enterprise Architecture Development (IFEAD, 2004).

Table 2.3. EA maturity models

Author	Year	Publication title
Brian Burke (Gartner)	2010	ITScore for Enterprise Architecture
NASCIO	2003	Enterprise Architecture Model
Randolph C. Hite (the US Government Accounting Office/GAO)	2003	The Enterprise Architecture Management Maturity Framework (EAMMF)
Ross et.al.	2006	Enterprise Architecture as strategy
The IFEAD	2004	Extended Enterprise Architecture Maturity Model (E2AMM)
The US Office of Management and Budget (OMB)	2005	Enterprise Architecture Assessment Framework

This study found that each model has strengths and weaknesses. A further analysis of EA maturity is presented later in Section 3.5. This study proposes an alternative model in the same chapter. The alternative model can be used to determine whether or not EA makes a significant contribution to e-Government development.

2.4 Enterprise Architecture Contribution to e-Government in Developed Countries

Governments have long searched for ways to improve their public services. The application of e-Government has made this objective achievable. E-Government promises to modernize public services and enable governments to act better, faster, smarter and more reliably to meet the needs of people. To achieve these anticipated benefits, Information, Communication and Technology (ICT) needs to be properly

aligned to government business strategy. Recent studies of e-Government reveal that there is an ICT planning gap in the transformation process (Davison et al., 2005).

Current research in information systems has acknowledged Enterprise Architecture (EA) as an instrument to make integration of business and technology viable. Ross et al. (2006) propose EA to be used in this alignment strategy. Zachman (1987), the first designer of an EA framework, claims that EA could be used to manage change and complexity in the enterprise. EA can also be used to promote interoperability (Finkelstein, 2006; Martin, 2005) among and within enterprises such as government agencies.

The complexity of public sector systems (Saha, 2010a) makes EA an attractive option for governments. Governments in developed countries have introduced EA as a key component of their holistic and coherent e-Government approaches. Although the number of developed countries adopting EA is growing (Liimatainen et al., 2007), very few studies have proven that EA leads to better e-Government performance.

From the United Nations (UN) e-Government development index 2003, Shekkerman (2004) identified a strong correlation between rankings and EA activities. However, Shekkerman (2004) relied on only one year of data. Replicating what he did, the study used serial data from 2003-2012 from the UN e-Government development index to investigate correlation between e-Government and EA programs in four developed countries.

2.4.1 E-Government Development Index

The United Nations regularly produces an e-Government Development Index. The first index was launched in 2003. In measuring the e-Government development index, the UN adopted the stage model (Peters et al., 2004; K. A. Shahkooh et al.,

2008; Siau & Long, 2005). Stage models identify the maturity of e-Government through how governments exploit ICT such as the Internet, to interact with their stakeholders, e.g., citizens, private sectors, and other government bodies.

Research by Coursey and Norris (2008) found that a stage model cannot clearly perceive that e-Government is progressing based on the stages. Instead, a stage model may be relevant in recognizing at what stage the e-Government stands. In evaluating how governments utilize ICT the UN used three major variables in their model.

2.4.1.1 Variables Measured

The three major variables used by the UN in their model, measure: 1) how well the application of ICT is used to improve public services; 2) supporting infrastructure; and, 3) human capital. The maximum result for each variable is one. All variables are weighted equally. The aggregate of these weighted variables leads to the total e-Government index for each country.

The application of ICT in UN member countries was measured by a web measure index. A few years later, this variable was renamed to the online services index. This variable was measured purely by a quantitative online survey on a particular government website or portal on the Internet. The other two variables, supporting infrastructure and human capital, refer to secondary data. Data for supporting infrastructure were predominantly taken from the UN International Telecommunication Union (ITU) and the UN Statistics Division. This variable is referred to as the telecommunication infrastructure index. In generating the human capital index, the UN depends on the United Nations Educational, Scientific and Cultural Organization (UNESCO) data. Since the two variables rely on secondary data,

the dynamic in measuring the government index was partly changed to the application used to improve public services.

2.4.1.2 Changes in the Measurements

Since it was introduced in 2003, the UN has continuously refined its model and instruments. Initially, the objective was intended to measure the use of ICT, particularly the Internet to deliver public services (The United Nations, 2003, 2004, 2005). After that, the view of e-Government as a whole concept was initiated in 2008 (The United Nations, 2008). As the number of mobile device users has grown rapidly (The International Telecommunication Union, 2011), since 2010 the UN has included mobile services (The United Nations, 2010). Consequently, the web measure index was changed to the online services index. In addition to those changes, in the latest publication, the UN measured inter-linkages that will lead to sustainability of e-Government systems (The United Nations, 2012).

Evidence of the changes in the objective of the UN e-Government index can be seen in the modification of the employed stage model. Originally, the UN stage model comprised five stages, namely: Emerging Presence, Enhanced Presence, Interactive Presence, Transactional Presence and Networked Presence. In 2008, the UN modified the stages to Emerging, Enhanced, Interactive, Transactional, and Connected. The modified stages were then simplified to Emerging, Enhanced, Transactional, and Connected in 2010. Since then, the UN has shifted the focus of its objective to a more holistic approach to capture a country's performance in a single internationally-comparable value.

2.4.2 EA in Developed Countries

The purpose of EA is to have a holistic approach in the development of an integrated design (Saha, 2009). Having this in place will lead to better government services (Peristeras & Tarabanis, 2000). To make the most of ICT, the United States government received a mandate from Congress to reform the management of Information Technology in their government. The mandate was called the Clinger-Cohen act (The US Congress, 1996). In order to fulfil this law, the US Chief Information Officer (CIO) introduced the use of EA into its e-Government. They developed the Federal Enterprise Architecture Framework (FEAF) as a common framework to be used in the US government (CIO Council, 1999). Since then, other developed countries have adopted EA in their e-Government strategy.

2.4.2.1 The United Kingdom

The United Kingdom (UK) government acknowledged the importance of technology in transforming its government. Hence, in 2005, "the transformational government strategy enabled by technology" was introduced (Cabinet Office, 2005). In this strategy, the UK government defined citizen centric ICT services that should promote shared services in government. This in turn will enhance proficiency and adaptability in the government to accommodate ICT enabled change. In order to achieve this, the UK government established the eGovernment Unit (eGU) (Liimatainen et al., 2007). From this unit, the UK government published the cross-Government Enterprise Architecture (xGEA) in 2005 (Cabinet Office, 2010; Chief Information Officer, 2005; Liimatainen et al., 2007). Since then, the UK government refers to this xGEA in gaining sustainable alignment of business and ICT functions (Cabinet Office, 2010).

2.4.2.2 Singapore

Singapore is a small country and considered to be the most advanced country in the South East Asia region. Although Singapore has limitations in their resources, they have successfully utilized technology to enhance their economy (Chua, 2012; ICT Working Group, 2002). The Singaporean government is politically committed to enabling ICT in their public services (Chua, 2012). Evidence of this commitment is that in 2006 the Singapore government started to adopt EA (Pheng & Boon, 2007). The development of the Singapore Government Enterprise Architecture (SGEA) (Hanafiah & Goodwin, 2011; Pheng & Boon, 2007) was based on the US FEAF. SGEA was completed with the inclusion of the Methodology for Agency ENTerprise Architecture (MAGENTA) in 2007 (Pallab Saha, 2009).

2.4.2.3 The Republic of Korea

The Republic of Korea paid significant attention to e-Government development. In order to enhance e-Government, the government started to develop Government Wide Enterprise Architecture as their EA program in 2003 (National Information Society Agency, 2011). By adopting EA, the Republic of Korea government expected that it would overcome inter-department and inter-ministry integration issues (Joon, 2009). Although the EA program was started in 2003, the legislation related to EA was not available until 2005 (National Information Society Agency, 2011). Later, this EA law was formally merged into the e-Government act in late 2009.

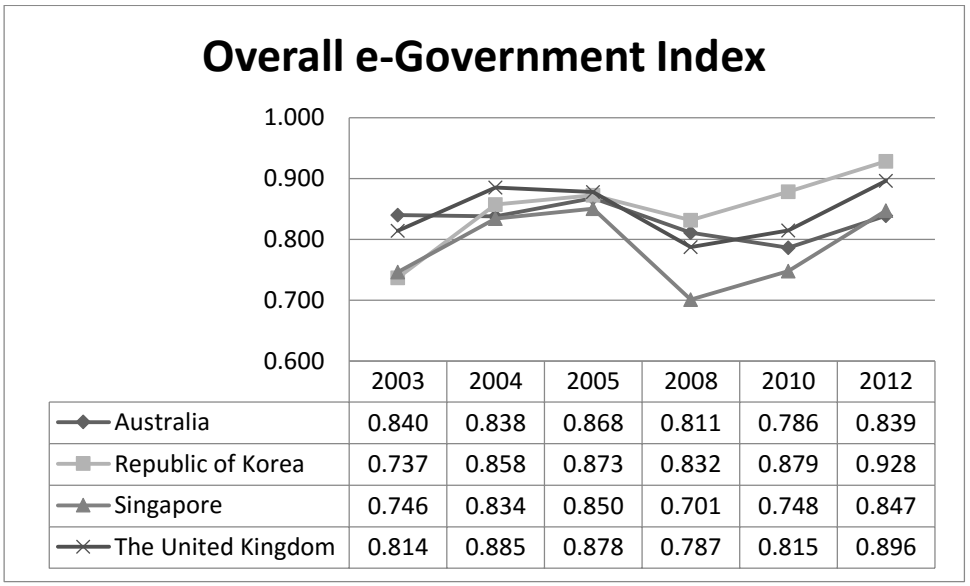
2.4.2.4 Australia

In order to enhance e-Government initiatives, in 2007 the Australian government decided to adopt the US FEAF in its EA program (Hanafiah & Goodwin, 2011). This EA was called the Australian Government Architecture (AGA) (AGIMO, 2007). The development of AGA was completed with the provision of the Business Reference

Model (BRM) details in 2009 (AGIMO, 2009; Hanafiah & Goodwin, 2011). With this in hand, the government expects that EA will be able to deliver significant improvement in e-Government systems.

2.4.3 Significance of EA to e-Government

This study measures the significance of EA in the above mentioned countries by comparing their EA activities to their e-Government by analysing the UN data in the e-Government index. It can be inferred that the overall e-Government index depicts the snapshot of the e-Government development over time. As can be seen in Figure 2.6, in the first index published, the Republic of Korea e-Government was measured slightly under the Singapore e-Government. However, the Republic of Korea successfully gained the first rank with 0.879 out of 1.000 in the overall index in 2010. They retained their position by achieving 0.928 in 2012.



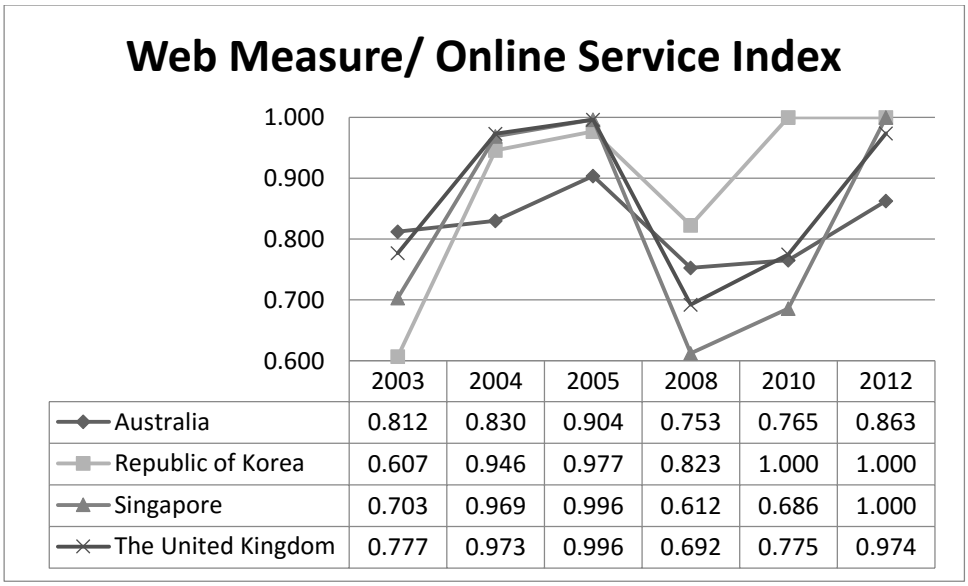
	2003	2004	2005	2008	2010	2012
Australia	0.840	0.838	0.868	0.811	0.786	0.839
Republic of Korea	0.737	0.858	0.873	0.832	0.879	0.928
Singapore	0.746	0.834	0.850	0.701	0.748	0.847
The United Kingdom	0.814	0.885	0.878	0.787	0.815	0.896

Figure 2.6. Overall e-Government Index among observed countries

Although the other observed countries have not reached the same level as the Republic of Korea, they either remained steady or gradually improved their ranking

over time. All observed countries encountered a similar decline in 2008, the year when the UN significantly modified its model (The United Nations, 2008). The Australian e-Government index was considered steady from 2003 to 2008. In 2010, they experienced a decline but successfully rebounded to 0.839 in 2012, two years after the completion of their EA (AGIMO, 2009). Singapore's e-Government and the UK's e-Government showed similar results. They remained steady from 2003 to 2005, but declined in 2008. Notwithstanding, they managed to gain better results in 2010 and 2012.

The web measure/online service index, one of the three variables used to measure e-Government, shows similar results to the overall e-Government index as can be seen in Figure 2.7. The Republic of Korea achieved the maximum mark, 1.000 for this variable in 2010 and again in 2012 when it was joined by Singapore with a perfect score. Australia and the UK have not yet achieved the same results but are trending in the same direction by gradually increasing since 2008.



	2003	2004	2005	2008	2010	2012
Australia	0.812	0.830	0.904	0.753	0.765	0.863
Republic of Korea	0.607	0.946	0.977	0.823	1.000	1.000
Singapore	0.703	0.969	0.996	0.612	0.686	1.000
The United Kingdom	0.777	0.973	0.996	0.692	0.775	0.974

Figure 2.7. Web Measure/Online Service Index

The achievements in the e-Government development indexes are in line with the achievements in EA development. The Republic of Korea started their EA development in 2003. They successfully enacted EA into law in 2005 and merged their EA law into the e-Government act in 2009. Australia accomplished their EA in 2009 and started to gain steady growth in their e-Government index in 2010. Although Singapore and the UK experienced a decline in the indexes after they enabled EA in their e-Government in 2007 and 2005, they have made gradual incremental growth for their overall e-Government index since 2008.

In addition, the Singapore e-Government experience shows that they have positively minimized problems related to government interoperability. Saha (2009) argues that since adopting EA, the Singaporean government has been able to develop whole e-Government solutions that are comprised of modular services. Similarly, the Republic of Korea positively reduced fragmented government services in their e-Government system since the adoption of EA (National Information Society Agency, 2011).

2.5 EA in Developing countries

This study could not find any electronic documents as evidence for the presence of EA in governments of developing countries. Although, some governments have started to promote open government (McDermott, 2010), there remains many government documents inaccessible due to secrecy and privacy concerns. Where documents are available, such as presidential decree number 3/2003 for the Indonesian e-Government implementation strategy, they do not necessarily reflect EA. For example, the presidential decree makes use of architecture framework terminology, but this is not viewed as an EA artefact by this study. This study could not map the

architecture framework for e-Government development in Appendix 4 of the decree to any available EA framework such Zachman or TOGAF. Therefore, further study needs to be done in relation to EA in the e-Government implementation in Indonesia. Such studies also need to consider characteristics of Asian countries' culture.

2.6 Asian Countries' Culture Characteristics

Myers & Tan (2003) argue that culture is essential in the information systems. However, globalisation has led a society to live inclusively (Walsham, 2002). Walsham (2002) further argues that other cultures can influence other society. Therefore, national culture is considered not to completely align with the territorial boundaries. However, Tuunanen and Kuo (2015) found that there are differences between participants from different cultural settings or locations regarding their information system requirements. Therefore, understanding culture characteristics is important.

A research from Trompenaars and Woolliams (2011) shows characteristics of Asian culture. They found that developed and developing countries have different characteristics. Indonesia, like other Asian and developing countries, is considered to be a relationship-centred country rather than a rule-centred one (Trompenaars & Woolliams, 2011). In a relationship-centred country, relationships are respected more than abstract rules.

In their study, Trompenaars and Woolliams (2011) specifically mentioned Indonesia as a communitarian country. In communitarian countries, errors were considered as a group rather than an individual. Other characteristics of developing countries can be seen in Table 2.4. The cultural characteristics of Indonesia, as a focus

country for this study, motivated the applied mixed methods approach presented in Chapter 4 to achieve sound findings.

Table 2.4. Culture Characteristics (Trompenaars & Woolliams, 2011)

Characteristics	Developed Countries	Developing countries
What's more important Rules or Relationships?	Rules	Relationships
Who's responsible to the failure?	Individual	Team
Do We Grant Status According to Performance or Position?	Performance	Position

2.7 Conclusion and Summary

This chapter found very few studies using EA as a theme in e-Government research. Furthermore, this study found there is a relationship between EA adoption and the performance of e-Government systems. Some governments in developed countries such as the United States, the Republic of Korea, the United Kingdom, Singapore and Australia appeared to have gained benefit from EA adoption in their e-Government strategies. Replicating and extending the research by Shekkerman (2004) by using more data series, it can be perceived that there is a strong correlation between EA activities and e-Government system development. However, this study could not find any evidence showing governments and government agencies of developing countries, like the Indonesian Treasury, having adopted EA for their e-Government systems. In order to have a further investigation on the Indonesian Treasury e-Government systems, this study proposed a research model as seen in Chapter 3.

Chapter 3
RESEARCH MODEL

3.1 Overview

The objective of this chapter is to develop a research model to be used in this study. The literature review of Enterprise Architecture (EA) and e-Government in Chapter 2 found that there is a correlation between the two. The relationship between EA and e-Government is further investigated in Section 3.2. The benefits of EA are described in Section 3.3. It is followed, in Section 3.4, by presenting how e-Government performance is measured. Section 4.5 discusses an alternative EA maturity model. Section 3.6 refines the EA Benefit Model (EABM) (Tamm et al., 2011) by using EA maturity and SERVQUAL to be used to depict the correlation between EA and e-Government performance. Hypotheses are developed based on the proposed model in Section 3.7.

3.2 The relationship between EA and e-Government

It has become common to use EA for e-Government in order to overcome government transformation issues that often neglect the importance of interoperability (Wu, 2007). Waseda University of Japan have been including EA as one of the parameters in its recent international e-Government ranking (Obi, 2012). From this, it can be inferred that government are becoming increasingly aware about the importance of interoperability of e-Government systems. Ignoring EA could restrict collaboration between government institutions (Guijarro, 2007; Hjort-Madsen, 2006).

EA is believed to be well suited to enabling interoperability (Chen & Daclin, 2006, 2007; Daclin et al., 2006; Hjort-Madsen, 2006). Moreover, EA may also be used to establish alignment between business and technology (Gregor et al., 2007; Martin,

2005; Pereira & Sousa, 2005; Seppanen et al., 2009; Shah & Kourdi, 2007). EA focuses on both the technological and non-technological points of view (Finkelstein, 2006; Zachman, 1997; Zachman & Sowa, 1992).

3.3 Enterprise Architecture Benefits

EA is used *"for the management of enterprise change. If enterprise architecture is not used, there are only three options for managing enterprise change: by trial and error; by reverse engineering; or by going out of businesses"* (Zachman, 2003 cited in Finkelstein, 2006, p. 9). Consequently, the use of EA is recommended as it can be used not only to express the objectives of an enterprise but also to manage the change required to achieve those objectives.

Several researchers have identified benefits of EA such as management of change (Finkelstein, 2006; Zachman, 2003), alignment of business and ICT (Aversano et al., 2012; Gregor et al., 2007; Pereira & Sousa, 2005; Wegmann et al., 2005), and cost effectiveness (Finkelstein, 2006; Lankhorst, 2009; Ross et al., 2006; Zachman, 2003). Unfortunately, such claims are lacking in empirical evidence (Tamm et al., 2011).

This study identified several models used to analyse EA benefits. First, van Steenbergen et al. (2011) developed and validated a model to determine practices that lead to EA benefits. Second, Lange, Mendling, and Recker (2012) developed and validated the EA benefit realisation model (EABRM). Third, having conducted a systematic review across an extensive array of articles about the benefits of EA, Tamm et al. (2011) proposed the EA Benefits Model (EABM).

The first and second models defined EA to be a dependent variable. Van Steenbergen et al. (2011) found that there are four practices that lead to good EA:

economic sector, project conformance to EA, choices in EA being explicitly linked to business goals, and organised knowledge exchange between architects.

Similarly, in the EABRM, Lange et al. (2012) define factors influencing EA benefits. The final model defined three independent variables and three mediating variables. The independent variables are EA product quality, EA infrastructure quality, and EA service delivery quality. The mediating variables are intention to use, satisfaction, and EA culture. Lastly, the model defined EA net benefits as the dependent variable.

The last model, the EABM, defines EA quality as the independent variable that informs organisational benefit. In the model, Tamm et al. (2011) suggest that there is no direct benefit resulting from EA to the organization. Instead, EA generates intermediate factors that potentially lead to organizational benefits.

These intermediate benefit enablers exist between EA quality and the organization benefits. The dotted lines in Figure 3.1 point from EA quality to resource portfolio optimization and resource complementarity. These variables are dependent on the partial creation of EA. Tamm et al. (2011) further argue that information availability is partly dependent (indicated by the thin, solid line) on the existence of EA. Finally, organizational alignment is achieved as a result of EA development activities. This heavy dependence on EA activity is depicted by the thick, solid line.

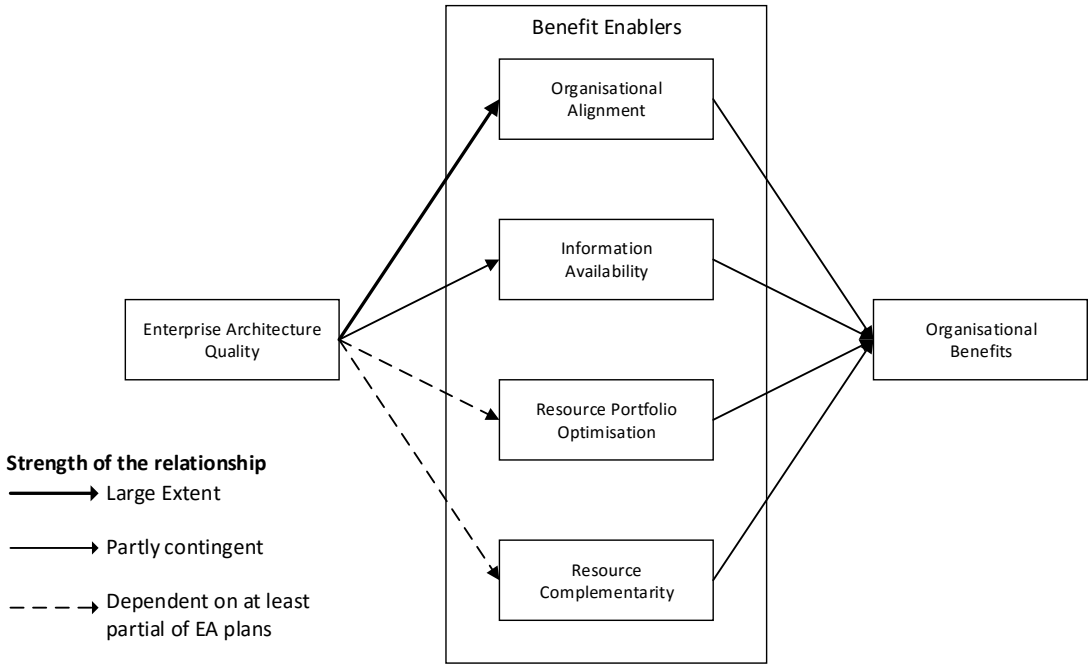


Figure 3.1. The EABM (Tamm et al., 2011)

Tamm et al. (2011, p. 150) define each variable in the EABM as follows:

1. EA Quality is the degree to which the EA provides a clear vision of the future system that is well aligned with organization goals. It is the only independent variable in the model. There are two ways of assessing the quality of EA:

    a. Directly evaluate products such as EA documentation.

    b. Uses the EA development process as a proxy.

2. Organizational Benefits is defined as the outcomes that contribute directly to organizational performance.

3. Organizational alignment is the extent to which an organization's subunits share a common understanding of its strategic goals, and contribute towards achieving these goals.

4. Information Availability is the extent of useful, high-quality information accessible to organizational decision makers.

5. Resource portfolio optimization is the extent to which an organization leverages its existing resources, invests in resources that target performance gaps, and minimizes unnecessary investments in duplicated resources.

6. Resource complementarity is the extent to which the organization's resources synergistically support the pursuit of its strategic goals.

In light of the above, the EABM could be used to illustrate the relationship between EA and e-Government performance. The EABM depicts the effect of EA which is considered to be abstract as it is high level documentation as defined by several researchers starting from page 34, on organisational benefit. Furthermore, it shows that the result of having EA does not directly give benefit to the organisation. The effect is rather mediated by four factors.

3.4 Measuring e-Government Performance using SERVQUAL

The performance of e-Government is in line with its maturity (Peters et al., 2004). Academia, private consultants and non-profit organizations have proposed ways to measure maturity. Peters et al. (2004) identified three groups of instruments to measure e-Government: stage models, service quality, and performance indicators. In the stage model grouping, there are some models that are already available to use, e.g., a four-stage model (Layne & Lee, 2001), and a new model proposed by Siau and Long (2005) resulting from synthesizing several models.

This study regards SERVQUAL as being appropriate for capturing users' perceptions of e-Government systems performance. Constructive reviews of the

literature, presented in Chapter 2, resulted in this selection. Gorla (2012) argues that SERVQUAL can be used to measure expectations and actual performance of a system. Furthermore, SERVQUAL has been validated to measure the quality of information systems in several developed countries (Jiang et al., 2002; Kettinger & Lee, 1994; Landrum et al., 2009; Myerscough, 2002). However, this study could not find any similar study of using SERVQUAL in developing countries. A study in the field of Information Systems from the United Arab Emirates University was based on data collected from CIO's in North America (Gorla, 2012).

The SERVQUAL comprises five dimensions or factors. Parasuraman et al. (1988) defined the factors as follow:

1. Tangibles: Physical facilities, equipment, and appearance of personnel
2. Reliability: Ability to perform the promised service dependably and accurately
3. Responsiveness: Willingness to help customers and provide prompt service
4. Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence
5. Empathy: Caring, individualized attention the firm provides its customers

Studies in the Information Systems context adopted the model differently. Landrum et al. (2009) used all dimensions in their research and concluded that "SERVQUAL the instrument is not homogeneous, and some dimensions potentially matter more to users than others". SERVQUAL was combined with user satisfaction with the information services function (USISF) (Kettinger & Lee, 1994; Myerscough,

2002). Jiang et al. (2002) excluded the tangibles factor in their research. Hence, the dynamic nature of SERVQUAL is noticeable.

This study validates the use of SERVQUAL in developing countries. The model is used to measure users' perceptions about the performance of the Indonesian Treasury e-Government systems. This study was aware of the unstable dimensionality of the SERVQUAL (Van Dyke et al., 1997). As such, the study followed Myerscough (2002) by administering the survey to users within the Indonesian Treasury to manage the instability of SERVQUAL dimensions. This study generated alternative dimensions for its SERVQUAL by using Exploratory Factor Analysis (EFA).

3.5 Developing an Alternative EA Maturity Model

It is important to have an instrument to measure the effectiveness of EA. One way of doing that is by using EA maturity. As stated in Chapter 2, current EA maturity models have apparent strengths and weaknesses. Using the meta-synthesis approach (Noblit & Hare, 1988), proposed an alternative maturity model.

3.5.1 The meta-synthesis approach

According to Schreiber et al. (1997) meta-synthesis is "*the aggregating of a group of studies for the purpose of discovering the essential elements and translating the results into the end product that transforms the original results into a new conceptualization*". The meta-synthesis approach works through an interpretive translation and comparison of some studies in a certain topic.

Schreiber et al. (1997) refers to the Noblit and Hare (1988) meta-synthesis approach. It was Noblit and Hare who coined the meta-synthesis approach in 1988. It involves a seven-step approach. The steps are: getting started, selecting relevant

studies, reading the studies, reviewing the related literature, translating the studies into one another, synthesizing translations, and presenting the findings.

3.5.2 Meta-synthesis research process

Following the seven-step Noblit and Hare meta-synthesis approach, the following processes have been followed in this research:

1. *Getting started*. In this stage, the objective of this research is to analyse EA maturity models.

2. *Selecting relevant studies*. This research used the Internet to search for relevant studies to this topic. Having used relevant databases in the systematic search of the Internet, this research identified six EA maturity models. These models were developed by a private enterprise, a government body, a non-profit organization, an individual researcher and a well-recognized university.

3. *Reviewing the related literature*. Six EA maturity models were reviewed as seen in Table 3.2. Repeated analysis was done to ensure that the details of the entire model were investigated. This is a fundamental process to ensure sufficient literature exploration.

4. *Determining how the studies are related*. This step and the following one are the essential steps in the meta-synthesis approach. Initially, this stage identifies similarities and differences among the models. First, the selected models were investigated for similarities. They all have maturity levels for EA related initiatives. Most of the models started their maturity level from the non-existence of EA. The Ross et al. (2006) maturity model does not use the same approach. It starts with the relationship between ICT and business. The six models differ in terms of viewpoints. Some models were developed and

influenced by a particular EA framework, for example the Enterprise Architecture Management Maturity Framework (EAMMF) and the US Office of Management and Budget (OMB)'s Enterprise Architecture Assessment Framework. The level of information carried by each model is also different. The Institute For Enterprise Architecture Development (IFEAD)'s maturity model has excessive detail in the measurement criteria, yet shifting strategy and diagnostic tools are missing. The reviews of each model are summarized in Table 3.1.

Table 3.1. EA Maturity model comparison

Maturity model	Level completeness	Shifting strategy	Measurement Details	Usability	Diagnostic tools
Enterprise Architecture Maturity Model (NASCIO, 2003)	√	Not Given	Sufficient	General	√
Gartner's IT Score (Burke, 2010)	√	Not Given	Sufficient	General	⊗
GAO's EAMMF (Hite, 2003)	√	Brief	Sufficient	Specific	√
Four stages architecture maturity (Ross et al., 2006)	⊗	Available	Fair	General	⊗
The IFEAD's E2AMM v2 (IFEAD, 2004)	√	Not Given	Rich	General	⊗
OMB's EAAF (Office of Management and Budget, 2005)	√	Not Given	Sufficient	Specific	√

5. *Translating the studies into one another*. The objective of this step is to make a comparison between models. One way to do this is by associating major concepts, similarities and differences. At this step, this research investigates the relationships between the models.

The research discovered there are six levels of relationship among models. The relationships are depicted in Table 3.2 and Table 3.3. The relationships are represented by a combination of a letter and a number, for example Gartner's model is represented by the letter G and its maturity level is represented by the number 1 to 5. This representation is also applied to the other models.

It can be perceived from Table 3.3 that each level of the analysed models shows a strong relationship to the level(s) of the other models. For instance the first two levels of US GAO's EAMMF are similar to Gartner's first level. The initial level of the Gartner model is an absence of EA and the establishment of an EA team. Consequently, the Gartner model combines two different indicators, i.e., absence and building awareness. Further, this analysis found that the Gartner's top maturity level was not represented in the US GAO's EAMMF. This means that the Gartner model identifies the augmentation value of EA whereas the US GAO's model does not. Some notable relationships among the models can also be seen where EA has been accepted in the enterprise, such as IFEAD's level 3 and Ross et al.'s initial level. This analysis also discovered that all reviewed models include maturity levels at which EA application begins and where there is continuous alignment of business and technology.

6. *Synthesising translations.* At this stage, the research synthesises the translations by showing the distribution of maturity levels. The research reviewed the diagnostic tools, shifting strategies, measurement criteria, artefacts and activities of each model. Comparison of the reviewed models can be seen on Table 3.1. The model proposed by this study, as a result of the review of extant models, offers identification of maturity level and strategies for shifting from one level to another.

Table 3.2. Comparison Among Maturity Models

	Level	Gartner's (G)	NASCIO (N)	The US GAO (UG)	Ross et.al (R)	The IFEAD (I)	The US OMB (O)
1	Name		Level 0-No Program	Stage 1	Business Silos	Level 0 (No EA extension)	Undefined
	Definition		No documented architecture	No EA initiatives	Focus on local context	No Extension of EA	No EA is available
	Characteristic		Reliant on individual skills	EA awareness is built	ICT automates specific business processes	Insufficient awareness between parties	No indication
2	Name	Developing	Level1-Informal Program	Stage 2	Standardized Technology	Level 1 (Initial)	Initial
	Definition	Struggling to be successful	Informal Architecture Defined	Recognise the need of EA	Providing ICT efficiencies: business drives technology	Unforeseen participation within parties	Incomplete practices of EA
	Characteristic	Governance is clear	Still Reliant on individual skills	EA management foundation is formed	ICT automates local business processes	Awareness brings initial principle of alignment	Informal and ad-hoc EA processes
3	Name	Defined	Level 2-Repeatable Program	Stage 3	Optimized Core	Level 2 (Under Development)	Managed
	Definition	EA is in place	Confirmable base architecture	Developing the architecture	Shift from local view to enterprise view	Visible awareness for the needs of partnership	High level definition of EA is available
	Characteristic	Measurement metrics are available	The standards have been used to confirm the performance	Framework, methodology, tool and plans are established	ICT enables enterprise achievements through optimizing reusable data and business platforms	Involving more parties in the program	EA processes are planned and managed

4	**Name**	**Managed**	**Level 3-Well Defined Program**	**Stage 4**	**Business Modularity**	**Level 3 (Defined)**	**Utilized**
	Definition	EA is delivering value & repeatable	Well defined architecture	Completing the EA	Continuously refining digitized processes	Parties involved adequately in collaboration and information exchange	Some accomplishments refer to EA
	Characteristic	Integrated Processes	Performance indicators are regularly monitored	EA has been approved	Core system is linked with other internal and external systems through interfaces	High level officials amongst parties aware of the benefit of the program.	EA initiatives are documented, tacit and utilized
5	Name	Optimizing	Level 4-Managed Program	Stage 5		Level 4 (Managed)	Result-oriented
	Definition	EA is driving the change	Performance indicators are analysed and acted upon	Leveraging EA		High level officials review the program periodically.	EA processes are assessable
	Characteristic	Good stakeholder understanding	Indicators are used to forecast future capabilities	EA is used to ensure interoperability		Governance arrangement and management are available	Measured against performance standards
6	Name		Level 5-Continuously Improving Vital Program			Level 5 (Optimized)	Optimized
	Definition		Fully fit business and technology to the organisation vision			High level officials intensively involved in the optimization process	Constantly enable business improvement
	Characteristic		Continuous improvements occur.			Measurement metrics are ready to manage affected environment	Accountable cost spending to support productivity, saving, and service quality

Table 3.3. Illustrating relationship between one model to another

	Gartner (G)	NASCIO (N)	The US GAO (UG)	Ross et al. (R)	The IFEAD (I)	The US OMB (O)
Gartner (G)	-	-	-	-	-	-
NASCIO (N)	N0, N1 ↔G1 N2↔G2 N3↔G3 N4↔G4 N5↔G5	-				
The US GAO (UG)	UG1,UG2↔G1 UG3↔G2 UG4↔G3 UG5↔G4 NULL↔G5	UG1 ↔N0 UG2↔N1 UG3↔N2 UG4↔N3 UG5↔N4, NULL↔N5	-	-	-	-
Ross et al. (R)	NULL↔G1,G2 R1,R2↔G3 R3↔G4 R4↔G5	NULL↔N0,N1 R1,R2↔N2 R3↔N3,N4 R4↔N5	NULL↔UG1-3 R1,R2↔UG4 R3↔UG5 R4↔NULL	-	-	-
The IFEAD (I)	I0,I1↔G1 I2↔G2 I3↔G3 I4↔G4 I5↔G5	I0,I1↔N0 I2↔N1 I3↔N2 I4↔N3 I5↔N4 NULL↔N5	I0↔UG1 I1↔UG2 I2↔UG3 I3↔UG4 I4↔UG5 I5↔NULL	I0-2↔NULL I3↔R1,R2 I4↔R3 I5↔R4	-	-
The US OMB (O)	O1,O2↔G1 O3↔G2 O4↔G3 O5,O6↔G4 NULL↔G5	O1 ↔N0 O2↔N1 O3↔N2 O4↔N3 O5↔N4 O6↔N5	O1↔UG1 O2↔UG2 O3↔UG3 O4↔UG4 O5,O6↔UG5	O1-3↔NULL O4↔R1,R2 O5,O6↔R3 NULL↔R4	O1↔I0 O2↔I1 O3↔I2 O4↔I3 O5,O6↔I4 NULL↔I5	-

7. *Expressing the findings.* In this step, this research documents its findings as text and diagrams. It was discovered that each model has apparent strengths and weaknesses. Ross et al. (2006) presented a concise model in which the alignment of business and ICT was already in place. They presented relevant examples to show how this model is used. Therefore, their model is relatively easy to follow and links with real, well known industries. Since their model mainly focuses on an industry that has already began EA initiatives, new EA entrants will not find their model suitable for their purposes as it is not useful for working out how to put EA in place. Despite rigid measurement elements, E2AMMv2 does not provide any diagnostic tools that will help in using this model. Gartner's model is concise and relatively easy to follow. Since it was developed only to measure the maturity level, insufficient attention is paid to the other criteria used in this research. Both the US GAO and the OMB focus on measuring US government EA initiatives. To date, evidence has not been found showing that this model has been used in other industries.

In light of the above, having linked the maturity levels for the various models and considering the strengths and weaknesses of each model, this study proposes an alternative maturity model. This model is built upon simple yet comprehensive principles. This model is summarized in Table 3.4. This model is called the six As EA maturity model. The benefits of this model are:

1. It refines the existing models that are not fully comprehensive for covering the criteria used in this research.
2. It works for various organisations from early stage implementation of EA to those with a mature EA. Current models are not entirely useful for EA adopters.
3. It provides a perceptible strategy for moving from one level to another.

Table 3.4. The six As EA maturity model

Lvl	Level Name	Indicator
1	Absence	EA does not exist
2	Awareness	Awareness is built, high ranking managerial approval is gained
3	Acceptance	EA organization is established, involvement of more internal parties
4	Application	EA is used as reference in aligning Business and ICT
5	Alignment	Continuous alignment of Business/ICT is regularly conducted
6	Augmentation	EA value is extended to indirect stakeholders

It is likely that any enterprise interested in developing and deploying an EA will be able to utilize this model. A brief explanation of each level in this model is as follows:

Absence. At this level, the organization does not recognize the need for an EA despite the level of ICT usage in the business. Typically, in managing change, the organization would use the trial and error approach. To shift from this level, it is important to have someone, either internal to the organization or an external consultant, influence high-level officials by showing the importance of EA. This achievement is important because EA will be more effective if applied in a top-down fashion (Finkelstein, 2006).

Awareness. Following the acceptance of EA by top-level officials, awareness of EA should then be extended to relevant parties. An initial ad-hoc committee can be used to start formulating or researching the EA framework and methodology to be used.

Acceptance. At this level a formal unit that is responsible for developing and maintaining EA has been established. It will include the involvement of other stakeholders who will be directly affected by the EA. A formal model of EA should

also be available at this stage. The alignment of business and ICT has not been established however.

Application. One feasible indicator at this level is that Business and ICT transformations refer to the EA. EA becomes the main resource in fulfilling the needs of the core system. This core system is represented by digitizing core data or business processes within the organization (Ross et al., 2006). As enabling EA is a continuous process (Gregor et al., 2007), regular review of the architecture will be needed to satisfy supporting systems.

Alignment. Internal, core systems that support the running of the business are developed with the guidance of EA. Business organization will also then be adjusted. In order to move to the next level, it is essential to create a channel by which external stakeholders, who are indirectly affected by the systems, can easily input their concerns or views. This will enhance the systems to fit with their needs.

Augmentation. At the top level of this model, internal stakeholders and indirect parties have gained the benefit of EA enabled systems. They have sufficient access to propose improvements to the systems.

3.6 Refining the EABM

Although there are many studies with regard to the use of EA in government (Janssen & Kuk, 2006; Liimatainen, 2008; Liimatainen et al., 2007; Martin, 2005; Saha, 2010a; Seppanen et al., 2009), very few studies have successfully demonstrated the value of EA to government (Liimatainen, 2008). Tamm et al. (2011) argue that although there is no direct benefit of EA to an organization, the EABM displays the relationship between EA and organizational benefit.

Government, the world's largest and most complex organization (Saha, 2010a), could adopt the EABM to find out if EA delivers benefit to their organization. One significant benefit that needs to be identified is whether or not the e-Government initiative is performing as expected. E-Government performance can then be used as a variable to measure the benefit. Therefore, this study argues that EABM could be adopted to define the relationship between EA and e-Government performance.

This study proposed EA maturity as the measure by which the quality of EA be determined. In the EABM, Tamm et al. (2011) mention that EA quality could be assessed in two different ways: assessing the final products of EA and using the process of EA development as a proxy. These assessment methods are also used in EA maturity (Banger, 2008; Burke, 2010; IFEAD, 2004; NASCIO, 2003) to measure the effectiveness of an EA program within government or private institutions. Therefore, the outcome and the process of EA maturity assessment are deemed similar to EA quality as proposed in the EABM.

Although two variables have been identified and modified to investigate the relation of EA and e-Government, this study needs to map the benefit enablers in the EABM and the dependent variables that lead to e-Government performance.

3.6.1 Mapping EABM's benefits and e-Government performance's variables

The EABM proposed four variables that lead to organizational benefits. Tamm et al. (2011) identified that it is possible to modify the grouping of the enablers in the model due to the lack of empirical validation. The organizational benefit that this study would like to discover is the e-Government performance. Currently, as mentioned in an earlier section, various instruments to measure the e-Government performance are already available.

As argued on pp. 54 - 56, in measuring e-Government performance, this study adopts SERVQUAL. This study uses a modified SERVQUAL (Parasuraman et al., 1988) from the field of Information Systems (Gorla, 2012).

To find theoretical relationships, the variance approach is used. The variance approach reflects models that have different entity properties (Burton-Jones et al., 2011). In this manner, it is essential to map the EA benefits and e-Government performance to find out whether or not the EABM's benefits and e-Government performance's variables fit. The mapping of these models is depicted in Figure 3.2.

The EABM defined four dependent variables that may influence the benefit of EA (Tamm et al., 2011), while Parasuraman et al. (1988) define five variables to measure service quality.

Organizational alignment in the EABM is used to measure how organizations share a common understanding, which in turn improves reliability, responsiveness, assurance and empathy.

Information availability is used to identify the usefulness and accessibility of the output from e-Government. Consequently, this requires reliable, fully responsive and assured IS. The last two variables, resource portfolio optimization and resource complementarity, are used to ensure there will be efficient infrastructure investment. These variables are tangibles. Insufficient infrastructure performance may lead to loss of organizational empathy.

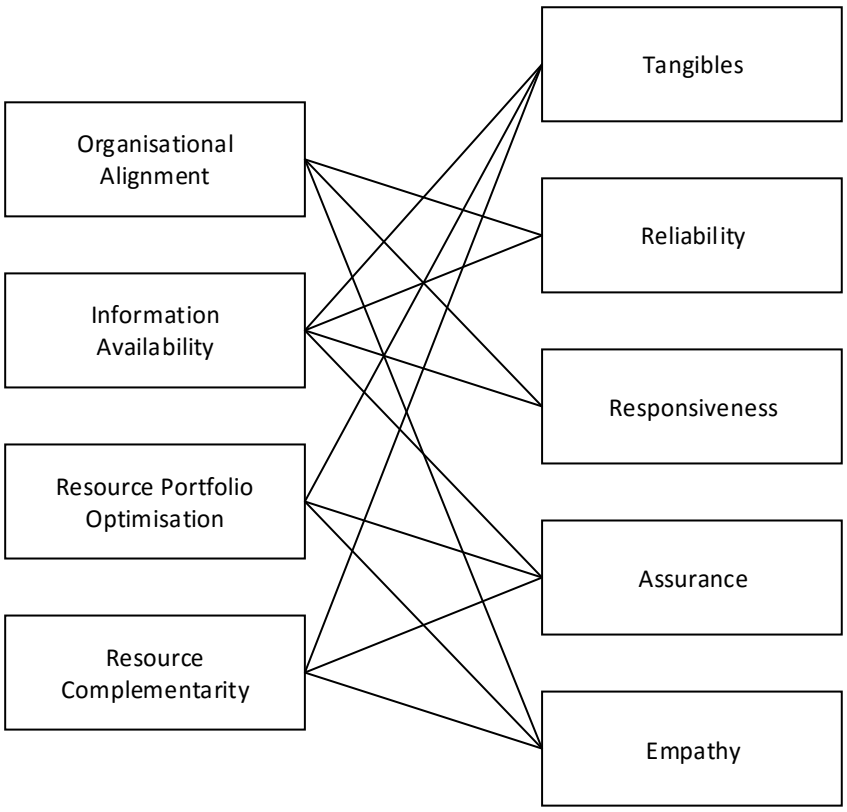


Figure 3.2. Mapping EABM's Benefit Enablers and SERVQUAL variables

3.6.2 Proposed Model

Having reviewed variables in the EABM and SERVQUAL, it was found that both models are considered to be complementary and appropriate, to an extent, to the purposes of this study. Therefore, this study proposes a refinement to the EABM to depict the relationship between EA and e-Government performance. Modified instruments from Gorla (2012) for variables in SERVQUAL (Parasuraman et al., 1988) could then be used to measure e-Government performance.

The maturity of EA drives the performance of e-Government through the performance drivers adopted from the EABM. Therefore, the more mature EA, the better performance that e-Government can deliver. Consequently, EA can be used to improve the quality or performance of e-Government. In order to measure this, the

model depicted in Figure 3.3 is used. This study suggests the strength of relationship in the model to be equal to all mediators because this study could not find any study validating the strength of relationship between EA and performance enablers.

The degree of EA maturity is assessed through completeness of EA documentation and its development process (NASCIO, 2003). Although this study proposes an alternative EA maturity model, measurement details have not yet been developed. Adopting NASCIO (2003), the following categories are used to measure the maturity level of an EA program: administration to measure governance and responsibilities; planning to gather the road map and execution plan; templates and process used to measure the framework; blueprint is gathered from collection of standards used; communication is assembled from education and distribution of EA; compliance is collected through adherence among EA elements; integration is compiled through management process engagements to exchange information; and involvement to determine user participation in the development and deployment process.

This study used modified SERVQUAL as suggested by Gorla (2012) to measure the range of facilities used, how up to date is the hardware and software, engagement of personnel and the operating hours of the IS department for the tangibles variable. The reliability factor was measured through fulfillment of promises, dependability, timely service delivery, and service commitment. Prompt responses, willingness, and staff availability were used for the responsiveness variable. Some elements are used to measure assurance such as: instilling confidence, feeling safe in using the system, interaction between the IS department and users, and IS employees' knowledge. Empathy includes individual attention to users, personal approach to users, IS

department has the user's best interest in mind and they understand user's needs. These variables will be used to measure the e-Government performance.

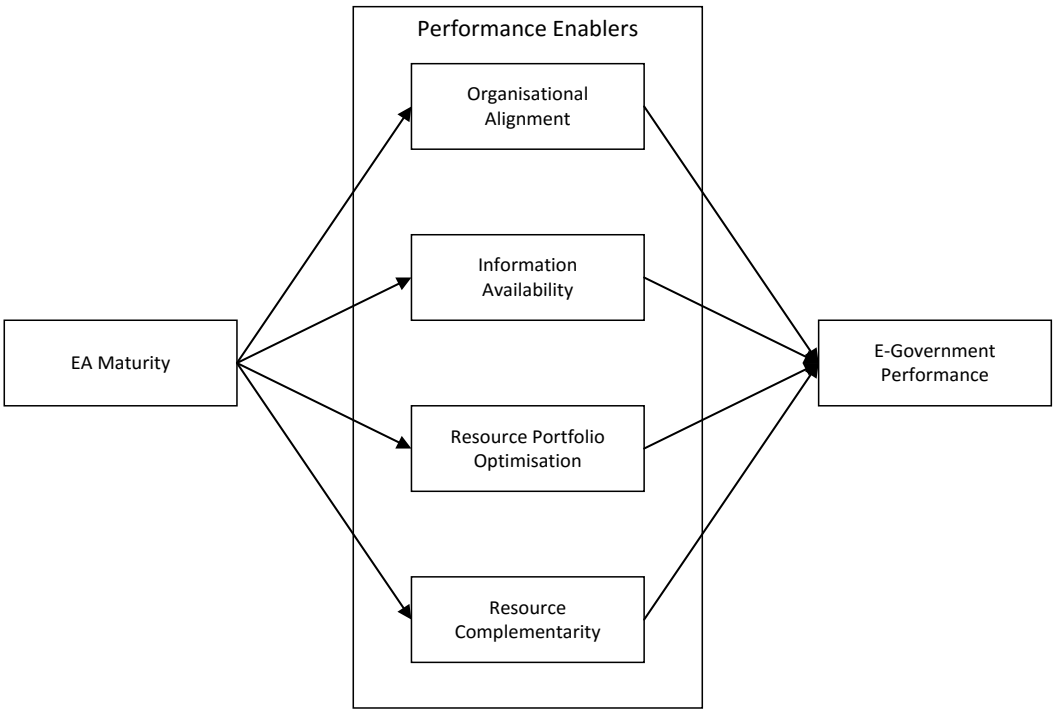


Figure 3.3. Relationship of EA and e-Government Performance

The first performance enabler in the model, namely organisational alignment (OA), was used to measure common understanding (Bernard, 2012; van Steenbergen et al., 2011) of the Indonesian Treasury strategic goals. In regard to OA, the study also captured the presence of good communication between the business and ICT technical parties (Kappelman, 2010; Pereira & Sousa, 2005) in developing the e-Government systems. The manifestation of Business-ICT alignment (Lankhorst, 2004; Ross et al., 2006) was collected as part of measuring organisational alignment.

The second enabler in the model, information availability (IA), was used to investigate the information accessibility (Spewak & Hill, 1993). The study also measured the quality of information generated by the systems (Bernard, 2012;

Finkelstein, 2006; Venkatesh et al., 2007). In addition, data management (Finkelstein, 2006; Ross et al., 2006; Spewak & Hill, 1993) was captured to measure the information availability.

The third enabler, resource portforlio optimisation, measured the detailed resources used in terms of numbers and commonality in the Indonesian Treasury. The presence of EA could minimise duplication of resources (Pereira & Sousa, 2005; Zachman, 1997). In turn, it could reduce the cost of unnecessary ICT investment (Perks & Beveridge, 2002; Ross et al., 2006; Spewak & Hill, 1993).

The last enabler in the model, resource complementarity, was used to measure integration among enterprise resources (Bernard, 2012; Spewak & Hill, 1993; Zachman, 1997). The presence of EA can promote interoperabilty (Alwadain, 2014; Chorafas, 2001; Ross et al., 2006) among resources to support systems integration.

This study goes on to develop the research instruments as presented in Chapter 6 and Chapter 7 to measure the above mentioned dimensions. Such instruments were then presented as a questionnaire as seen in Appendix B and a list of interview questions as seen in Appendix C. All measurements were then used to validate the hypotheses of this study.

3.7 Hypotheses

This study aims to investigate the effect of EA on e-Government performance. The research model in Figure 3.3 shows that e-Government performance is not directly affected by EA. Since EA is cosindered to be a high level design artefact (Bernard, 2012; Lankhorst, 2009), its effect is not seen instantly. As such, the reseach model identified that the relationship between the EA and e-Government performance is

mediated by four dimensions, namely, organisational alignment, information availability, resource portfolio optimisation and resource complementarity.

Hence, this study developed its hypotheses by using mediation analysis (Hayes, 2013; Iacobucci, 2008). Mediation analysis can better explain modelling a process and be used beyond analysing data (Hayes, 2013; Iacobucci, 2008; Kenny et al., 1998).

Kenny et al. (1998) further contend that mediation analyses using structural equation modelling for testing hypotheses to be better than ANOVA[3]. Moreover, evaluating direct effects of EA on each of the mediators and direct effects of mediators on e-Government performance could divert the aims of this study. To understand the effect of each mediator in the model, each of the mediators was analysed separately (Kenny, 2014; Kenny et al., 1998) using simple mediation analysis (Hayes, 2013; Iacobucci, 2008).

The following hypotheses were then used to empirically validate the proposed research model and its data from the Indonesian Treasury:

H1*: Organisational Alignment mediates the positive effect of EA on e-Government performance in the Indonesian Treasury.*

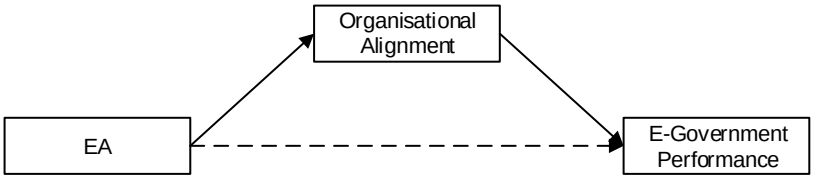


Figure 3.4. Hyphothesis 1 of the study

[3] Analysis of variance (ANOVA) is used to compare group means in statistical method (Pallant, 2011)

***H2**: Information availability mediates the positive effect of EA on e-Government performance in the Indonesian Treasury.*

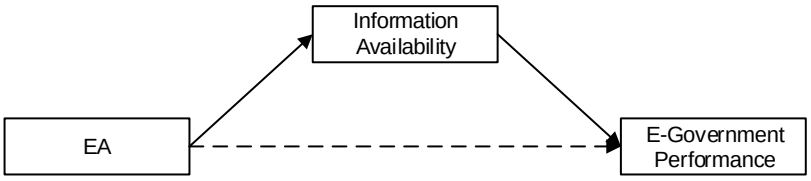


Figure 3.5. Hyphothesis 2 of the study

***H3**: Resource portfolio optimisation mediates the positive effect of EA on e-Government performance in the Indonesian Treasury.*

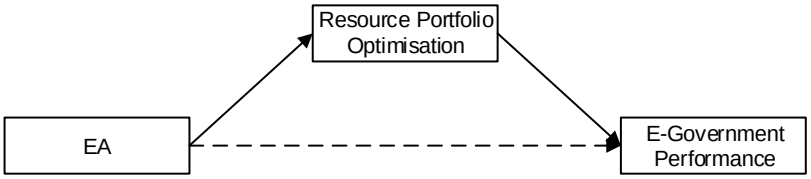


Figure 3.6. Hyphothesis 3 of the study

***H4**: Resource complementarity mediates the positive effect of EA on e-Government performance in the Indonesian Treasury*

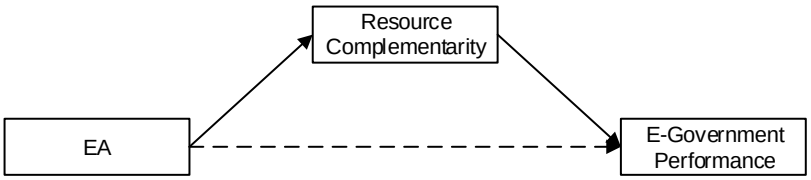


Figure 3.7. Hyphothesis 4 of the study

3.8 Definition of Constructs

The framework used in this study consists of six constructs with the maturity of EA being the independent factor. The other constructs are dependent variables: Organisational Alignment, Information Availability, Resource Portfolio Optimisation, Resource Complementarity and e-Government Performance. The definition for each construct is summarised in Table 3.5.

Table 3.5. Definition of Constructs

Construct	Definition	Reference(s)
EA Maturity	The quality of EA measured through the maturity of EA and the activities related to EA development.	(Hanafiah & Goodwin, 2012; NASCIO, 2003; Tamm et al., 2011; Venkatesh et al., 2007)
Organisational Alignment	The extent to which organisations in the Indonesian Treasury have common understanding of its strategic objectives, and contribute toward these goals.	(Bernard, 2012; Kappelman, 2010; Lankhorst, 2009; Pereira & Sousa, 2005; Ross et al., 2006; Tamm et al., 2011; van Steenbergen et al., 2011)
Information Availability	The extent to which Indonesian Treasury high-level officials generate useful, high-quality information.	(Bernard, 2012; Finkelstein, 2006; Ross et al., 2006; Spewak & Hill, 1993; Tamm et al., 2011; Venkatesh et al., 2007)
Resource Portfolio Optimisation	The extent to which the Indonesian Treasury makes the most of its existing resources, invests in relevant resources to close performance gaps, and minimises duplicated resources.	(Pereira & Sousa, 2005; Perks & Beveridge, 2002; Ross et al., 2006; Tamm et al., 2011; Zachman, 1997)
Resource Complementarity	The extent to which the Indonesian Treasury's resources synergistically support its strategic goals	(Alwadain, 2014; Bernard, 2012; Chorafas, 2001; Ross et al., 2006; Spewak & Hill, 1993; Tamm et al., 2011; Zachman, 1997)
e-Government Performance	Using SERVQUAL to measure the extent to which the Indonesian Treasury e-Government systems performance meet the expected goals.	(Gorla, 2012; Hanafiah & Goodwin, 2014; Parasuraman et al., 1988)

3.9 Conclusion and Summary

This study developed its model by extending the EABM to depict the relationship between EA and e-Government system performance. The SERVQUAL is considered to be a complementary fit to measure the performance. The SERVQUAL has already been empirically tested in various studies in the field of Information Systems (Gorla, 2012; Kettinger & Lee, 1994; Myerscough, 2002; Van Dyke et al., 1997). This study investigates the use of its model in a government institution. To ensure the fitness of this model in the setting of a developing country's government, selection of appropriate research methodology is needed as presented in the following chapter.

Chapter 4
RESEARCH METHODOLOGY

4.1 Overview

This chapter covers the selection of a research methodology intended to validate the research model. It begins with case study research in Section 4.2. Section 5.3 presents the research framework for this study. Data sources are identified in Section 4.4. This study uses a mixed methods approach as presented in Section 4.5 by employing research techniques identified in Section 4.7. This chapter also discusses the selection of respondents in Section 5.6. Data collection, coding and ethical issues are presented in Section 4.8 and Section 4.9. This study's research process is illustrated in Figure 4.1 and its literature coverage in developing its research model in Figure 4.2.

4.2 Case Study Research

A characteristic of Information Systems (IS) research is the need to consider rapid technological changes (Benbasat et al., 1987). As a dynamic subject, research in the IS field requires a relevant research methodology. Case studies are one of the methodologies that can cope with rapid technological change. The strength of case study research is in its capability to reveal causal paths through richness of details (Garson, 2013a).

The use of case study in the information systems field is common (see Cavaye, 1996; Gable, 1994; Gupta & Jana, 2003; Richard & Michael, 2002). Benbasat et al. (1987) argue that:

> *Case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations).*

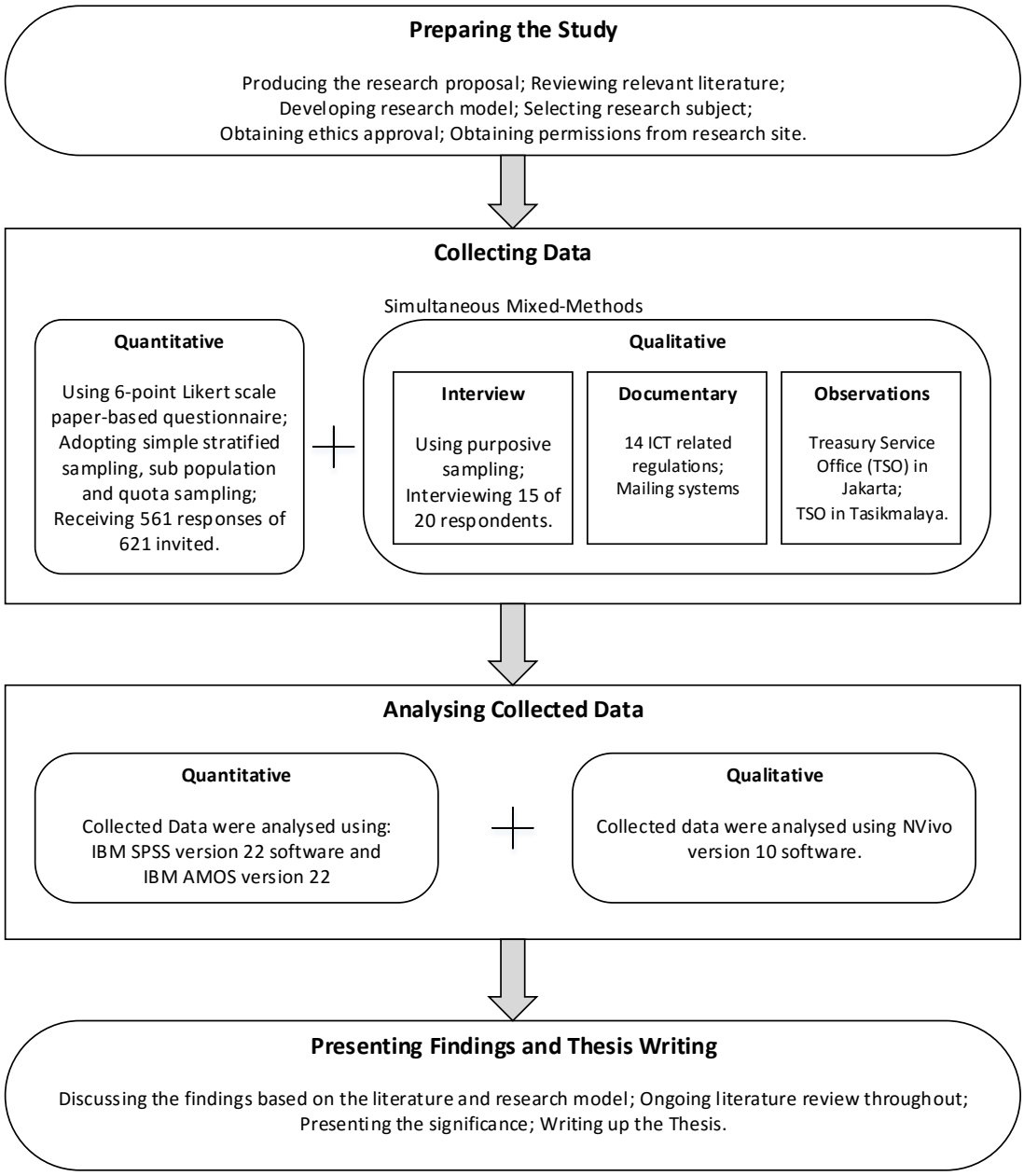


Figure 4.1. The Research Process Of This Study

There are several definitions of case study. This study referred to the definition of case study from Yin (2009). He defines case study as:

> *To understand a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.*

The characteristic of case study:

> *Copes with the technically distinctive situation in which there will be many more variables of interest than data points; relies on multiple sources of evidence, with data needing to converge in a triangulating fashion (Yin, 2009)*

Conducting case study research is at its best when: it is conducted in a natural setting or on current events; is based on newly developed theory to understand the research background; there is less control over the research events (Benbasat et al., 1987).

This study is well suited to case study research since: Enterprise Architecture (EA) and e-Government is a contemporary topic in major developing countries; it is conducted upon a relatively new developed theory of improving e-Government performance through EA based on the EA benefit model; and, there is limited control over the research setting—the Indonesian Treasury.

To make the most of case study research, Garson (2013a) argues that the mixed method approach is required to increase the quality of findings when generated from a single case study. Therefore, this study employed a mixed method approach in collecting the data to gain exceptional outcomes based on the research framework described earlier in Chapter 4.

4.3 Research framework

In formulating a research model of the effect of EA on e-Government performance, this study took a deductive approach. The deductive approach validates theory as a result of a literature review (Creswell, 2009; Van Dinther, 2008). The process of the deductive approach includes developing hypotheses, data collection, and accepting or rejecting hypotheses.

This study included three terms in its theoretical research: e-Government, Enterprise Architecture and the Indonesian Treasury, as reflected in Figure 4.2. Each

term is discussed in a separate chapter. Chapter 2 discussed the wide range of theories in e-Government and Enterprise Architecture that led to answering the first question in the study: internationally, has EA implementation demonstrated benefits to e-Government performance?

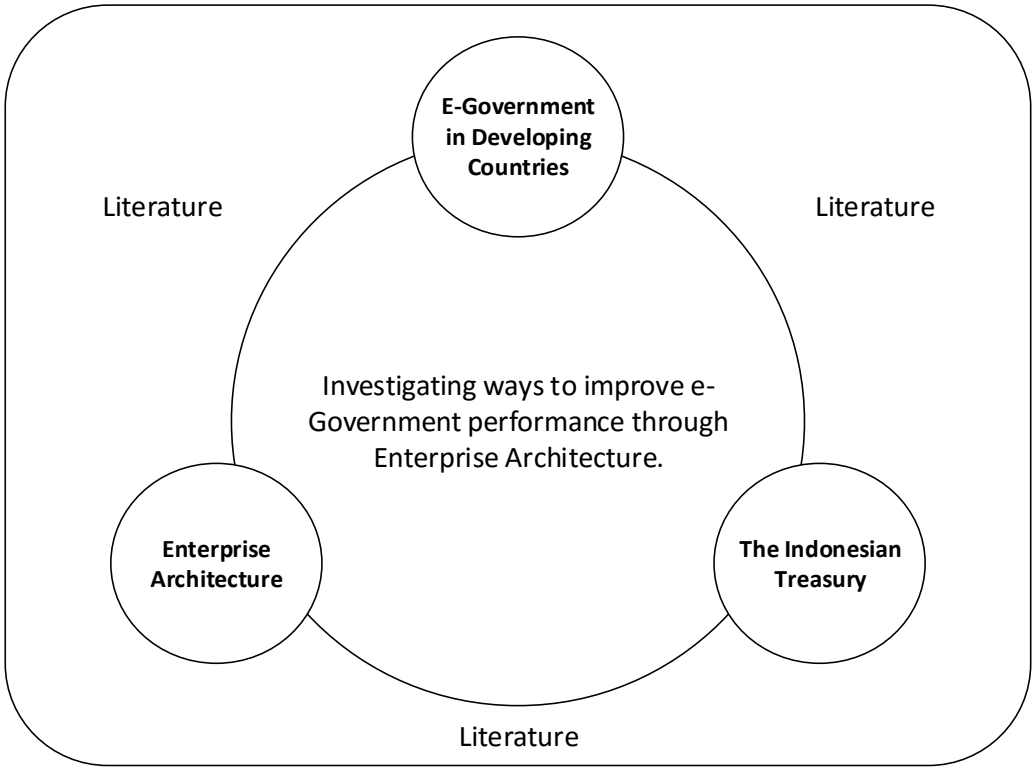


Figure 4.2. Literature Coverage in This Study

Chapter 5 discusses several issues present in the Indonesian Treasury particularly in its e-Government systems development. The aim of Chapter 5 was to answer the other question on the list: What is the current state of the Indonesian Treasury e-Government systems? How can it be improved? This was an important chapter to understand the determinants in the research model.

This study relies on the determinants of the effect of EA on e-Government performance derived from the EABM as discussed in Chapter 3. This chapter

responded to the question: how can the quality or the process of EA development affect e-Government performance? At the end of these three chapters, the study proposes the research model as seen in Figure 3.3.

The research model was empirically validated in the Indonesian Treasury to answer the last question: How can EA be used to improve the quality of the Indonesian Treasury e-Government systems? Hence, this study can answer its focal question: to what extent can EA be used to improve the Indonesian Treasury e-Government performance? The data-collection process in this study is described in the subsequent sections.

4.4 Identification of the Data Sources

The Indonesian Treasury is comprised of three groups of offices: headquarters, Treasury Regional Offices (TRO) and Treasury Service Offices (TSO). With the different levels of hierarchy in the Indonesian Treasury, this study needed to find the most appropriate sources of data in order to minimise bias. Leaders in the headquarters, including the Director General, were identified to significantly contribute to this study. TROs, wherein their former leaders' roles had significantly contributed to the e-Government systems development for the Treasury, contributed sound findings.

The TSOs are the main users of the Indonesian Treasury e-Government systems. Thus, their views of current e-Government systems were needed to gather reliable data. As well, other leaders' within the Ministry of Finance, who were considerably involved in the e-Government systems development for the Indonesian Treasury, were also used as resources. In addition to people as the source of data, regulations and electronic records were also used to contribute to the findings.

Hence, this study adopted both qualitative and quantitative exploration to meet the characteristics of the particular data source. A qualitative approach, such as via interview, is better than distributing questionnaires for high level officials at headquarters and the TROs, due to their time constraints. The other levels of respondents had more flexibility in managing their time. Both groups indicated significant interest in contributing to the study through their responses.

4.5 Selection of Methods: Mixing Qualitative and Quantitative Methods

This study used mixed methods, a combination of qualitative and quantitative, to answer research questions. One of the reasons for selecting mixed methods was the research setting. As mentioned earlier in Chapter 2, Indonesia has distinctive characteristics. Consequently, relying exclusively on one method may generate an incomplete picture of the setting. In addition, Venkatesh et al., (2013) argue that IS researchers can benefit from mixed methods design strategies because of the rapid development of technology in ICT. Hence, the use of mixed methods in IS research can significantly add to theory and practice.

Venkatesh et al. (2013) defines seven reasons for conducting mixed methods research in IS, as can be seen in Table 4.1. The purpose of using mixed methods in this study was to capture the complete picture of how the Indonesian Treasury e-Government systems are performing. As a result, this study is able to generate comprehensive findings.

The use of mixed methods can also improve the credibility of a study. Mixed methods is also known as “triangulation”, “hybrid”, and “integrated” method (Creswell, 2009). In mixed methods, data collection can either be done sequentially or

simultaneously (Johnson & Onwuegbuzie, 2004; Small, 2011; Venkatesh et al., 2013). This study collected its data simultaneously for about six months from September 2013 to March 2014.

Table 4.1. Purpose of Mixed Methods (Venkatesh et al., 2013, p. 26)

No	Purpose	Description	This Study
1	**Complementarity**	Mixed methods are used in order to gain complementary views about the same phenomena or relationships.	○
2	**Completeness**	Mixed methods designs are used to make sure a complete picture of a phenomenon is obtained.	√
3	**Developmental**	Questions for one strand emerge from the inferences of a previous one (sequential mixed methods), or one strand provides hypotheses to be tested in the next one.	○
4	**Expansion**	Mixed methods are used in order to explain or expand upon the understanding obtained in a previous strand of a study.	○
5	**Corroboration/ Confirmation**	Mixed methods are used in order to assess the credibility of inferences obtained from one approach (strand).	○
6	**Compensation**	Mixed methods enable compensating for the weaknesses of one approach by using the other.	○
7	**Diversity**	Mixed methods are used with the hope of obtaining divergent views of the same phenomenon.	○

Multiple sources of data were used to ensure complete findings. Data from high-level officials of the Indonesian Treasury were collected through semi-structured one-on-one interviews. ICT related regulations both in hardcopy and electronic copy were used as part of a document analysis. Since the Indonesian Treasury administers its mailing systems electronically, this study also used its data to analyse the communication between headquarters and other offices. This study used

questionnaires to capture responses from e-Government systems' users in the TROs and TSOs.

4.6 Selection of Respondents

This study applied a mixture of stratified random sampling and purposive sampling (Fowler, 2014; Fuller, 2009) as seen in Table 4.2. Interviewees were selected through purposive sampling (Clark & Creswell, 2011; Creswell, 2009). The interviewees' background, roles, and contribution to the e-Government systems in the Indonesian Treasury were used to satisfy the purposive sampling. The information about participants were gathered through publicly available documents on the Indonesian Treasury website and based on the researcher's experience. Each participant's profile and recent contributions to the e-Government systems development were reviewed to achieve the objectives of this study.

Table 4.2. Respondent Selection Technique

Level	TRO	TSO	Total invitation per Office
Echelon 2	Purposive Sampling	N/A	1[4]
Echelon 3, 4 and Staff	Stratified random sampling	Stratified random sampling	1

The study used a stratified random sampling technique to invite participants to complete a questionnaire. The size of the population is known. Thus, the selection of the sampling method is manageable (Fuller, 2009). The use of these techniques should fit the findings from the Indonesian Treasury. During data collection, the Indonesian Treasury had 30 TROs and 177 TSOs as its operational offices. All offices were invited. Every staff level in each office received one invitation. Although initially

[4] Not all heads of TROs were invited. Only representatives of three regions were invited.

invitations to three different levels of officials were deemed adequate, this study let selected respondents invite others to voluntarily contribute to the survey.

Interviews were mostly conducted in the headquarters. Three out of fifteen interviewees were from the TROs. The three TRO participants demonstrated significant contributions to the e-Government systems development. For instance, Respondent 6 was involved in deploying the Intranet and the modern TSO and Respondent 7 was involved in deploying the Treasury Single Account, which is dependent on proper ICT systems. In addition, they represented three different regions in Indonesia, i.e. Sumatera and Borneo, Java, and Bali and Eastern Indonesia.

In total, this study invited eight participants from Echelon 2 to be interviewed: three from TROs and five from headquarters. The same number of invitations was sent to Echelon 3 in the headquarters. However, they comprised two categories. Four interviewees were from general roles in the headquarters and four interviewees had ICT related roles. As for Echelon 1, this study invited four officials to take part in the study.

4.7 Research Techniques

As mentioned in the previous section, this study uses multiple research techniques as part of its preferred mixed method. Most of the research took place in the Indonesian Treasury headquarters. Two out of three interviews with heads of TROs were conducted in their offices. Another interview with the head of a TRO was conducted in the headquarters when the interviewee was in Jakarta. Questionnaire responses from the TROs and TSOs were collected through postage.

Table 4.3. Research Techniques and Sources of Data

No.	Institution	Technique	Number of people involved
1.	Headquarters	Interview	12 officials
		Document Analysis:	
		Regulations	3 staff
		Mailing Systems	1 systems administrator
2.	Treasury Regional Offices	Interview	3 officials
		Questionnaire	66 respondents
3.	Treasury Service Offices	Questionnaire	490 respondents
		Observations	2 offices

The mixture of interviews, surveys and document analysis was conducted simultaneously. Data collection started in September 2013 and was finished as planned in March 2014. This study observed the e-Government system performance during its peak period, the end of Indonesian government fiscal year in December.

4.7.1 Interview

The nature of the research subjects of this study, EA and e-Government, is that they are generally driven by officials at different levels. Thus, their thoughts regarding the research subject in the Indonesian Treasury were required. One way to do this is through interview.

Despite some drawbacks such as bias, time, lack of anonymity, and cost, the interviews were deemed relevant for this study. The shortcomings are manageable. All interviews were transcribed. The results were sent to the interviewees to get their feedback. Hence, the study was able to control the bias. A list of questions were sent at least a month before the designated time for the interview. These questions were used as guidelines in the meetings rendering the interviews as semi-structured. The questions were generated based on identifiable data generation strategies proposed by Schultze and Avital (2011).

Semi-structured interviews were chosen due to the following reasons: it was unlikely to be able to get more than one opportunity to conduct an interview with the high level officials in the Indonesian Treasury; and, the possibility for different terminologies being used requiring time to synchronise understanding between interviewer and interviewee. In addition, the semi-structured interview provides flexibility in gathering the data from respondents (Myers & Newman, 2007; Newton, 2010; Schultze & Avital, 2011).

Interviews were all conducted in the interviewees' rooms or a place nominated by the interviewees. They were conducted individually and tape-recorded. Information regarding the purpose of the study, a list of questions, consent, and anonymity were provided in the invitation letter. The interviewer reiterated all those points to the interviewees. Despite availability of consent forms, most interviewees preferred using verbal consents rather than signing them. All interviews were conducted by one person only to maintain consistency.

4.7.2 Questionnaire

In addition to the interviews, the study collected data from more respondents within the Indonesian Treasury by using a questionnaire. The questionnaire comprised six levels of categorical data based on a 6-point Likert scale (Croasmun, 2011; Lei Chang, 1994; Likert, 1932) by excluding the neutral point (Guy & Norvell, 1977) to minimise unexpected responses affected by culture (Lee et al., 2002). Questionnaires provide data based on predefined variables and values used to analyse the research subjects (Gray, 2004).

Benefits of using a questionnaire include assuring anonymity, being inexpensive, being accessible and convenient (Achmad, 2012; Wheeldon & Ahlberg,

2011). Nevertheless, using a questionnaire has shortcomings such as being less flexible, having a low response rate, and lack of control of environment. The study managed these shortcomings through: carefully choosing respondents who might foresee the benefits arising from the study; designing an attractive questionnaire; pre-testing the questionnaire with statistical experts, PhD students from Indonesia and elsewhere, and Indonesian Treasury employees who were undergoing post graduate studies in Adelaide.

The study adopted paper-and-pencil questionnaires rather than computerised questionnaires. Paper-and-pencil questionnaires are deemed appropriate based on a recent study from Achmad (2012). He adopted both types of questionnaire in his study at the Indonesian Treasury. He received a higher response rate from the paper-and-pencil questionnaires than from the computerised ones. He sent invitations for computerised questionnaires through e-mail and letter by providing the questionnaire website address. He made the questionnaire available on the web and sent some of them through e-mail attachments. Instead of repeating his approach of providing the questionnaire via multiple mediums, this study selected paper-and-pencil questionnaires only.

The study sent questionnaires to three different staff levels in the hierarchy of the TROs and TSOs. This allowed responses to be captured from various backgrounds. Questionnaires were sent through the postal system. To remain anonymous, each respondent was given a postage paid, self-addressed envelope with which the completed questionnaire could be returned.

The result of this careful preparation paid off. The study received a relatively high response rate of around 90 percent; 561 responses were returned of 621 questionnaires sent as seen in Table 4.4.

Table 4.4. Survey Response Rate

Respondent's Office	Invited	Responded[5]	Percentage
Treasury Regional Offices	90	66	73.33 %
Treasury Service Offices	531	490	92.28 %
Not declared		5	
Total	621	561	90.33%

4.7.3 Documentary Evidence

The study collected relevant documents such as regulations, reports, systems documentation, and administration mailing archive. All documents were held in the headquarters. The documentary evidence was used to supplement the surveys and interviews. Documents are considered to be inconspicuous, firm, rigorous, and far-reaching (Gray, 2004). Hence, documentary evidence was deemed useful.

Nonetheless, documentary evidence has drawbacks, for instance, accessibility (Achmad, 2012). The researcher's background as a member of the staff of the Indonesian Treasury assisted in being able to access required documents. The regulations, current and previous e-Government systems' documentation, reports made by consultancy services and the Indonesian Treasury, financial data in hard and electronic copies, computer specifications, and road maps were collected from the Indonesian Treasury.

[5] Based on respondent's returning the questionnaire

4.7.4 Observations

E-Government systems are meant to improve the quality of services in the Indonesian Treasury, specifically in the TSOs. The TSOs are the place where Treasury related transactions occur. For example, the spending units send their spending orders daily, designated banks and post offices pass their data for revenue transactions on a daily basis as well. Thus, parties who are involved in e-Government systems interactions can be seen in the TSOs. This study used observation to capture this. Observation was deemed appropriate as it provides a chance to portray how the research subject is behaving (Gray, 2004).

Two TSOs were selected: one in Jakarta and the other in Tasikmalaya, approximately 250 kilometres south east of Jakarta. The TSO in Jakarta is considered to be the busiest TSO in Indonesia with nearly half of the overall Indonesian budget being handled in this office. The observation in this office was conducted for about three weeks from the end of November to the middle of December 2014 a few weeks before the Indonesian fiscal year officially ended at the end of December. The Tasikmalaya TSO is a more moderate office. It was selected to support observations made in the Jakarta office. Hence, the study spent only a week in the Tasikmalaya TSO.

The observations were concentrated during the time spent processing spending units' requests. The processes, the queues, the timeliness of service, the interaction between the TSO staff and spending units were monitored. Hence, the process of spending authorisation, accounting data reconciliation, and revenue data handling was observed.

4.8 Data collection, Coding and Analysis

Data were collected concurrently with surveys, collection of documentary evidence, observations, and interviews all being conducted in the same period of time. Individual interviews were audio recorded with notes taken to mark important messages, gestures or expressions. Recorded audio and notes were then compiled into text and stored in electronic forms. These were stored on the University's network drives as the ICT department regularly backs them up. A private external drive was also used as extra backup storage.

Secondary data from documentary evidence were copied into electronic forms. The electronic copies of qualitative data excluding data from observations were transferred into NVivo. NVivo is software used to support qualitative data analysis (Bazeley & Jackson, 2013; Lakeman, 2008). Interview transcripts were kept in the original language (Indonesian). Following Gray's (2004) suggestion for hastening and improving the quality of data analysis, data were classified into specific codes according to the type of documents, respondent's rank, and purposes. The coding was based on the research framework discussed in Section 3.6.2.

Following the research framework presented in Section 3.6.2, the 51 observed variables in the quantitative data were reduced to six factors as seen in Table 4.5. Most questions in the quantitative surveys used ordinal data. In addition to ordinal data, questions to capture demography of respondents used scaled and nominal data. The data were stored in SPSS[6] and AMOS[7] for further analysis.

[6] Statistical Package for the Social Sciences (SPSS) is software package for statistical analysis (Pallant, 2011).

[7] Analysis of Moment Structures (AMOS) is a software that can be used to analyse statistical modeling using graphical interface (Byrne, 2010)

The study applied factor analysis to assist with the aim of this study in finding the correlation between EA and e-Government performance. Data collected into observed variables were reduced to six factors. A combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) was used to measure correlations. Additional analysis was used using several measurements to ensure the goodness-of-fit of the model.

Table 4.5. Dimension Reduction of Observed Variables

No.	Dimension (Factor) Name	Total Variables Used
1	e-Government Performance	5 sub factors (22 observed variables) from the SERVQUAL
2	Organisation Alignment	5 observed variables
3	Information Availability	5 observed variables
4	Resource Portfolio Optimisation	5 observed variables
5	Resource Complementarity	5 observed variables
6	Enterprise Architecture	9 observed variables

The research framework model was converted into statistical modelling using AMOS version 22. Further analysis was then based on Structural Equation Modelling (SEM). SEM is used to test the hypothesised relationships between variables, both observed and latent variables, through comparison of data and model (Byrne, 2010; Hancock & Mueller, 2013; Hoyle, 2012).

This study analysed its qualitative and quantitative data separately as reported in Chapter 5 and Chapter 7. The results are then mixed and discussed in Chapter 8. Creswell (2009) argues that mixed method analysis can be run by:

> *Mixing of the two types of data might occur at several stages: the data collection, the data analysis, interpretation, or at all three phases. (p.185)*

> *Mixing means either that the qualitative and quantitative data are actually merged on one end of the continuum, kept separate on the other end of the continuum, or combined in some way between these two extremes (pp.207-208).*

4.9 Ethical Issues

This study required interaction with humans as research participants. The interactions with humans occur during interviews, collecting government documents, and during observation. Indirect interaction with humans occurs during the survey questionnaires. Therefore, prior to conducting data collection, this study sought ethics approval from the Social and Behavioural Research Ethics Committee at Flinders University. Ethics approval was received on 15 August 2013 with project number 6205 as seen in Appendix A.

During data collection, the researcher introduced himself as a research student at Flinders University and as a staff member at the Indonesian Treasury and elucidated the purposes of the study and the benefits of participating in the research. The researcher then asked participants' consent to record all interviews. The participants were offered consent letters to sign, although, most interviewees chose to give verbal consent.

The study also received permission from the Indonesian Treasury to collect relevant documents on the research subject, to conduct observations in two offices and to distribute paper questionnaires. The cover letter of each questionnaire informed the respondents that the completion and returning of questionnaires was considered to be their approval to participate in the research. Therefore, no explicit consent letter was sent to the respondents of the survey questionnaire.

4.10 Conclusion and Summary

This chapter presented supporting arguments for selecting the research methodology used in this study. Mixed methods were deemed sufficient because of the robustness exhibited in other studies (Gil-Garcia, 2005; Venkatesh et al., 2013) and the ability to capture the cultural uniqueness of Asian countries, particularly Indonesia. Using this method, the study collected sufficient data and revealed subtle information. Hence, the level of confidence for data completeness is considered to be high. The study selected respondents carefully and thoroughly based on roles and responsibilities in the Indonesian treasury as presented in Chapter 5.

Chapter 5
THE INDONESIAN TREASURY E-GOVERNMENT

5.1 Overview

This chapter demonstrates why the Indonesian Treasury e-Government systems could add more value to e-Government studies in developing countries. Some material in this chapter is reused in the discussion presented in Chapter 8. This chapter begins with Section 5.2 presenting the tasks of the Indonesian Treasury e-Government systems. It follows with the antecedent of e-Government implementation in Section 5.3. Current e-Government systems development is presented in Section 3.4. Section 5.5 illustrates the evolution of ICT organisation. Finally, Section 5.6 presents how decisions are made in regards to the Treasury's ICT resources.

5.2 The Core of The Indonesian Public Financial Systems

The Indonesian Treasury e-Government system is considered to be the core of the Indonesian public financial system as seen in Figure 5.1. Arrows in the figure indicate data flow between related parties. According to the Indonesian constitution, three state organs, i.e., the President, the House of Representatives and the Supreme Audit Board, are involved in ensuring good governance in public financial management from budgeting to reporting.

Once the budget is set, the Indonesian Treasury is involved from the beginning to the end. Law No.1/2014 and Law No. 15/2014 mandated the Indonesian Treasury, together with Supreme Audit Board, to develop a government accounting standard. This standard is used for expenses, revenue and asset management when balancing the finances. The cycle is ended with an annual government financial report for each

ministry. Using the same accounting standard, the Supreme Audit Board and the House of Representatives oversee the ministries' financial performance.

Law No. 1/2014 also mandated the Indonesian Treasury to manage the government accounts in the Central Bank of Indonesia. In addition, to hasten disbursement and collection of revenue, the Indonesian Treasury is allowed to have more accounts in commercial banks. All accounts in commercial banks are consolidated regularly to the government account in the Central Bank of Indonesia. The Indonesian Treasury monitors and manages these accounts through its e-Government systems.

The Indonesian Treasury e-Government systems must be able to communicate with other systems within the Ministry of Finance. It begins with the budget data and its variations. The data is received from the *Director General (DG) of Budget*. Budget data is then used as a baseline for the limitation of expenses and for revenue targets.

The systems source revenue data from the *DG of Taxation* for tax revenue, the *DG of Customs and Excise* for revenue from customs and excise, and the *DG of Budget* and spending units for non-tax revenue.

Debt related data such as grants and loans is frequently communicated between the Treasury and the *DG of Debt Management*. Asset management data from the *DG of Assets* is exchanged regularly with the Indonesian Treasury systems to ensure consistency of asset valuation and classification. The Indonesian Treasury e-Government system should also exchange its data with the *DG of Fiscal Balance* to warrant fair and just fiscal distribution throughout the country.

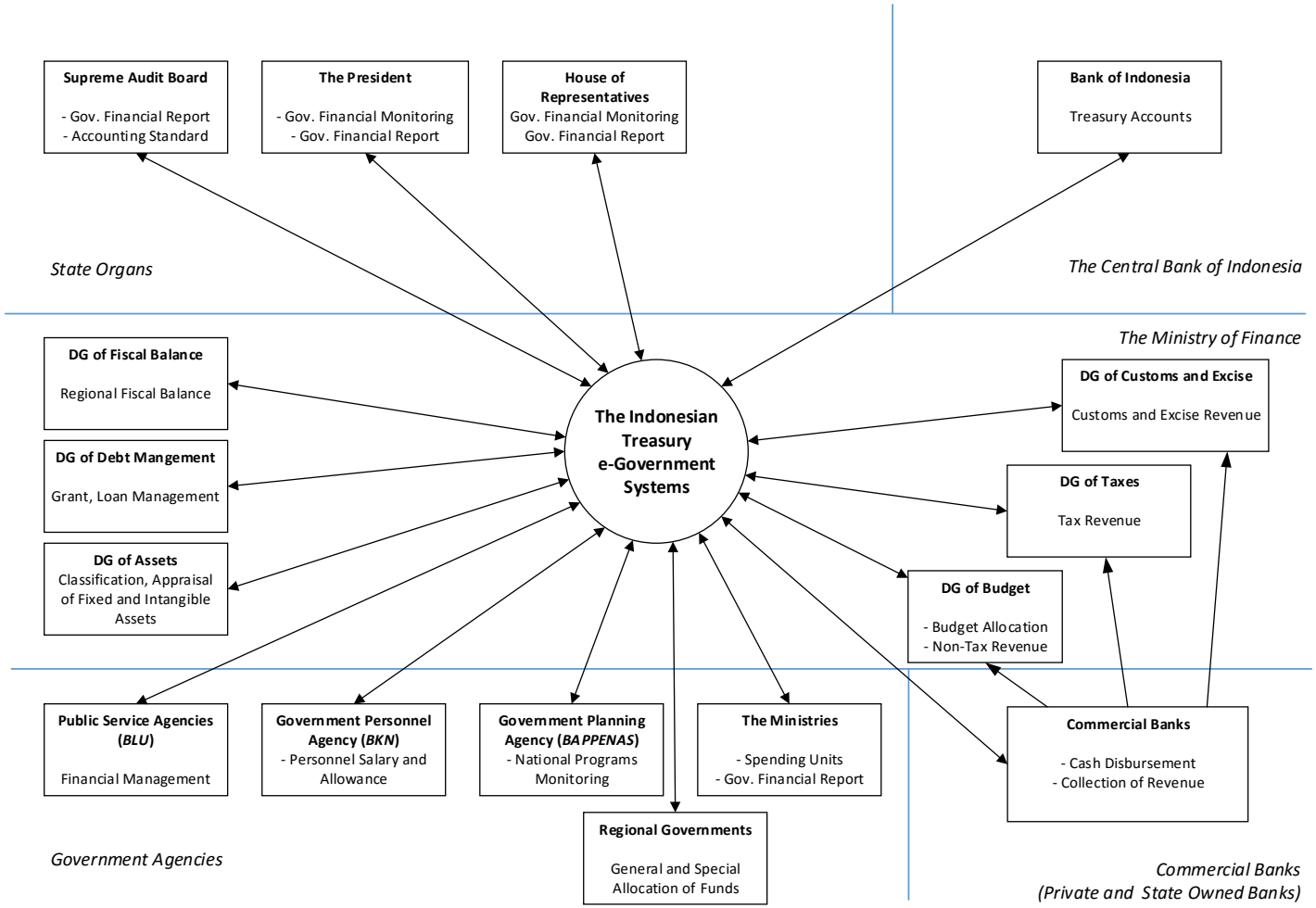


Figure 5.1. The role of the Indonesian Treasury e-Government Systems

The Indonesian Treasury government systems should be able to communicate with the e-Government systems of other government agencies. Examples of government agencies using Indonesian Treasury data includes: the government planning agency (BAPPENAS) monitoring budget outcomes in relation to the national programs (Achmad, 2012); government personnel agency exchanging personnel related data; and the Indonesian Treasury itself in order to support financial management flexibility in the public service agencies (Susilo, n.d.); and, daily transactions with more than twenty thousands spending units.

Commercial banks are involved in the process of disbursement of cash and collection of government revenue. Law No. 17/2003 and Law No. 1/2004 mandated the Indonesian Treasury to manage its cash through the Central Bank and through commerical banks to ensure fiscal stability. The Indonesian Treasury receives daily transactions for its accounts from commercial banks and the Central Bank of Indonesia to its e-Government systems. Hence, the Indonesian Treasury is able to manage its cash. In light of the above, it is seen that the Indonesian Treasury e-Government system has a significant impact on the Indonesian government.

5.3 The Antecedent of e-Government Systems in the Indonesian Treasury

In supporting its role, the Indonesian Treasury has used ICT since the 1980s. The technology used in the Indonesian Treasury has continued to evolve over time. Initially, in the 1980s, the Indonesian Treasury used IBM mainframes to support its business.

5.3.1 The Systems Evolution

In general, the evolution of e-Government systems in the Indonesian Treasury can be divided into two phases: before and after the new millennium, as seen in Figure

5.2. Before year 2000, the government used mainframes due to several issues such as financial, technical, and human resources. Paper based transactions dominated the system design. The cost of ICT implementation in that era was enormous and, as a result, the Indonesian Treasury maintained a single, centralised computing facility.

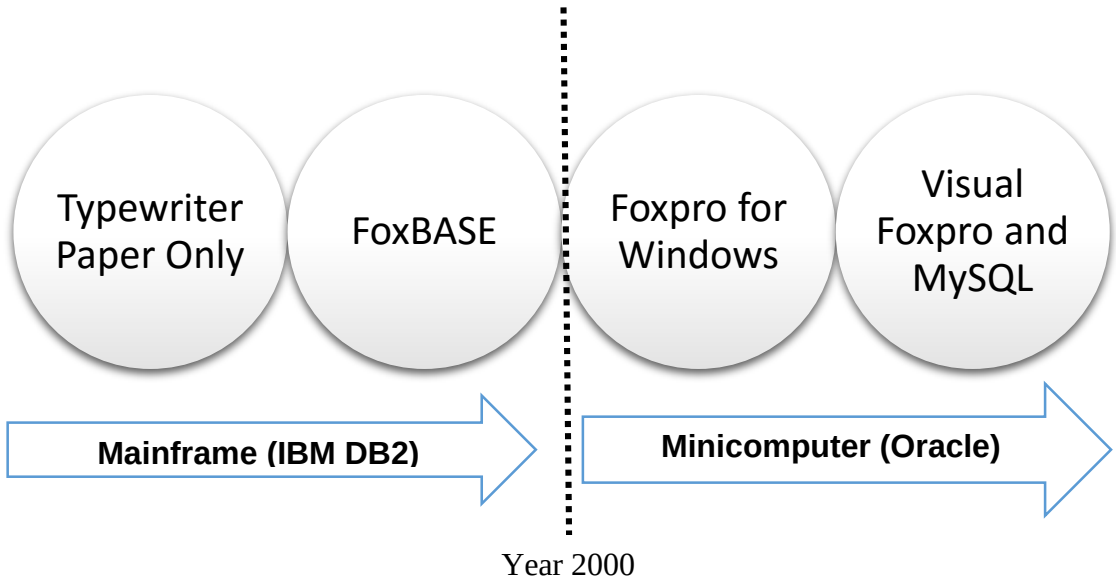


Figure 5.2. Systems Evolution in the Indonesian Treasury

All transactions in the Treasury Service Offices (TSO) nationwide at that time were generated on paper using a typewriter. To ensure the accountability of the data, the Indonesian Treasury generated multiple carbon copy duplicates for each transaction. The paper-based transactions were regularly sent through the postal system to the Information and Data Management Centre. Upon receiving the paper transactions, the data was entered manually into the mainframe systems. This mode of data transfer caused significant delay and errors resulting from data entry mistakes. Later, facsimiles replaced the postal delivery of transactions to reduce the delay but

manual entry was still required resulting in no reduction in errors resulting from data entry.

In the middle of the 1990s, as computers became less expensive, the Indonesian Treasury rolled out computers to replace the typewriters. These computers ran internally developed Indonesian Treasury systems that were based on FoxBASE technology. From that time on, TSOs used computers to replace typewriters in generating required treasury documents such as disbursement, bookkeeping, and reporting. To ensure data validity, TSOs generated both an electronic copy and a hard copy.

From the year 2000, minicomputers began replacing the mainframes and the use of operating systems with graphical user interfaces (GUI), such as Microsoft Windows, became prevalent. The Indonesian Treasury converted its FoxBASE systems to FoxPro and Visual FoxPro for Windows. Most systems developed by the Indonesian Treasury relied on the built-in database provided by FoxPro. As requirements grew, the Indonesian Treasury introduced a client-server architecture in the TSOs. The FoxPro database could not handle the needs properly and was replaced with MySQL.

As the Indonesian Treasury shifted from a centralized to a distributed system, data communication became essential.

5.3.2 Data Communication

In the mainframe era, data communication to connect all offices was unnecessary. Due to a new millennium compliance issue, the Indonesian Treasury shifted its computer technology to the IBM minicomputer. The project was called downsizing.

In the downsizing project, the Indonesian Treasury started using personal computers (PCs) with Local Area Network (LAN) capability. Paper was the only accepted document for Treasury related transactions, PCs were then used to generate electronic data to satisfy paper-based transactions. Due to lack of telecommunication infrastructure, generated data from all offices was sent regularly using diskette(s) and paper to the Information and Data Management Centre.

A year after the downsizing project, the Indonesian Treasury started to use the Internet as a means of transferring data from the TSOs. However, not all TSOs could use the Internet because of limitations in the available telecommunication infrastructure. Figure 5.3 shows that at the beginning of the new millennium, three indicators, i.e., telephone lines, Internet users and fixed broadband subscribers, were very low.

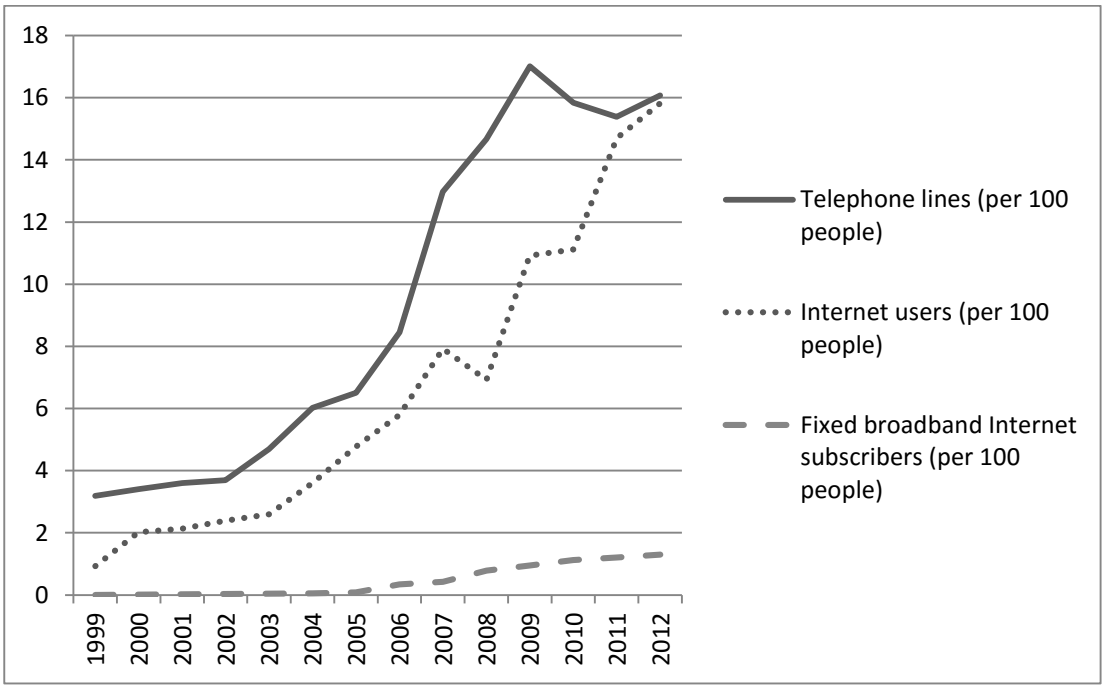


Figure 5.3. Telephone, Internet and Fixed Broadband subscribers in Indonesia per 100 people (The World Bank, 2014)

The use of data communication in the Indonesian Treasury evolved over time. A few years after the enactment of the Indonesian financial laws, i.e., Law No. 17/2003, Law No. 1/2004 and Law No. 15/2004, the Indonesian Treasury successfully installed its first Wide Area Network (WAN). The Indonesian Treasury referred to this WAN as the Intranet.

The Intranet connects all offices in the Indonesian Treasury by using Multiprotocol Label Switching (MPLS) technology. The network was developed with assistance from one of the largest Indonesian telecommunication companies. The presence of the Intranet improved accessibility, availability and reliability of data communication. Although the Intranet became available 24 hours a day, systems only used it for electronic data transfer, data transfer monitoring and other non-core transactions. There were no online and real-time transaction systems running over the network. The nature of system applications in all offices remained similar to those used before the deployment of the Intranet.

Realising what data communication could deliver, the Indonesian Treasury decided to shift from distributed systems to centralised one. A new project initiative came into place in 2004 with assistance from the World Bank after the enactment of the Indonesian public financial laws.

The project is called *Sistem Perbendaharaan dan Anggaran Negara* (SPAN) or state budget and treasury systems. The SPAN adopted a commercial off-the-shelf solution, instead of developing the system from scratch. As of the end of 2014, the project had not been fully implemented. Thus, when this study concluded its data collection, the SPAN had not been fully used for one budget cycle in the piloting

offices. Full rollout of the SPAN to all offices was announced in 2015. Hence, the SPAN was excluded from this study.

5.4 E-Government Systems in the Indonesian Treasury

The Indonesian Treasury uses Microsoft FoxPro as the main software to develop their systems. The Indonesian Treasury follows regulation number 351/KMK.01/2011 from the Ministry of Finance regarding the Policy and Standard of Information Systems Development Cycle within the Ministry of Finance. This regulation dictates that information systems development should adhere to a Software Development Life Cycle (SDLC).

5.4.1 Software Development Life Cycle

SDLC refers to the approach taken in the development of software (Langer, 2008, 2012). The SDLC framework in the Ministry of Finance consists of requirement analysis, systems design, implementation, testing, deployment and evaluation as seen in Figure 5.4.

There are many SDLC models including the traditional Waterfall model, Iterative, Spiral, V-model, Big Bang, Agile, Rapid Application Development and Prototyping (Langer, 2012). Although the Indonesian Treasury defines a generic framework for the SDLC in developing their systems, there is no prescription on any particular SDLC model to use. Regardless, the Indonesian Treasury still managed to develop the e-Government system to support treasury functions.

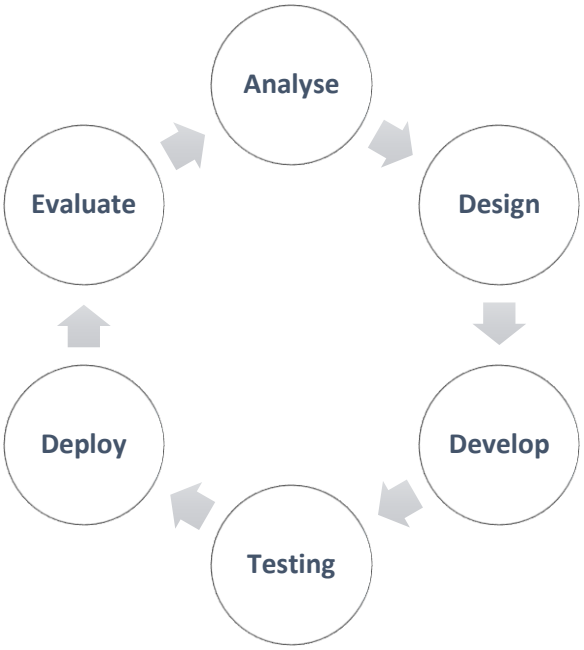


Figure 5.4. SDLC Framework

5.4.2 The Systems

The systems were developed with the multi-level hierarchy of the Indonesian government organisations in mind. According to Law No 1/2004, the treasury functions in Indonesia are applied to the ministries and the Treasurer as seen in Figure 5.5. Each level in a ministry is paired with a unit of the Treasurer. The e-Government systems reflect this structure being run in stages from the lowest to the highest level.

The Indonesian Treasury developed all related systems to satisfy the treasury functions. It is compulsory for all Indonesian government agencies to use the systems. The Indonesian Treasury argues that uniformity of data is the main reason for distributing the systems to all spending units.

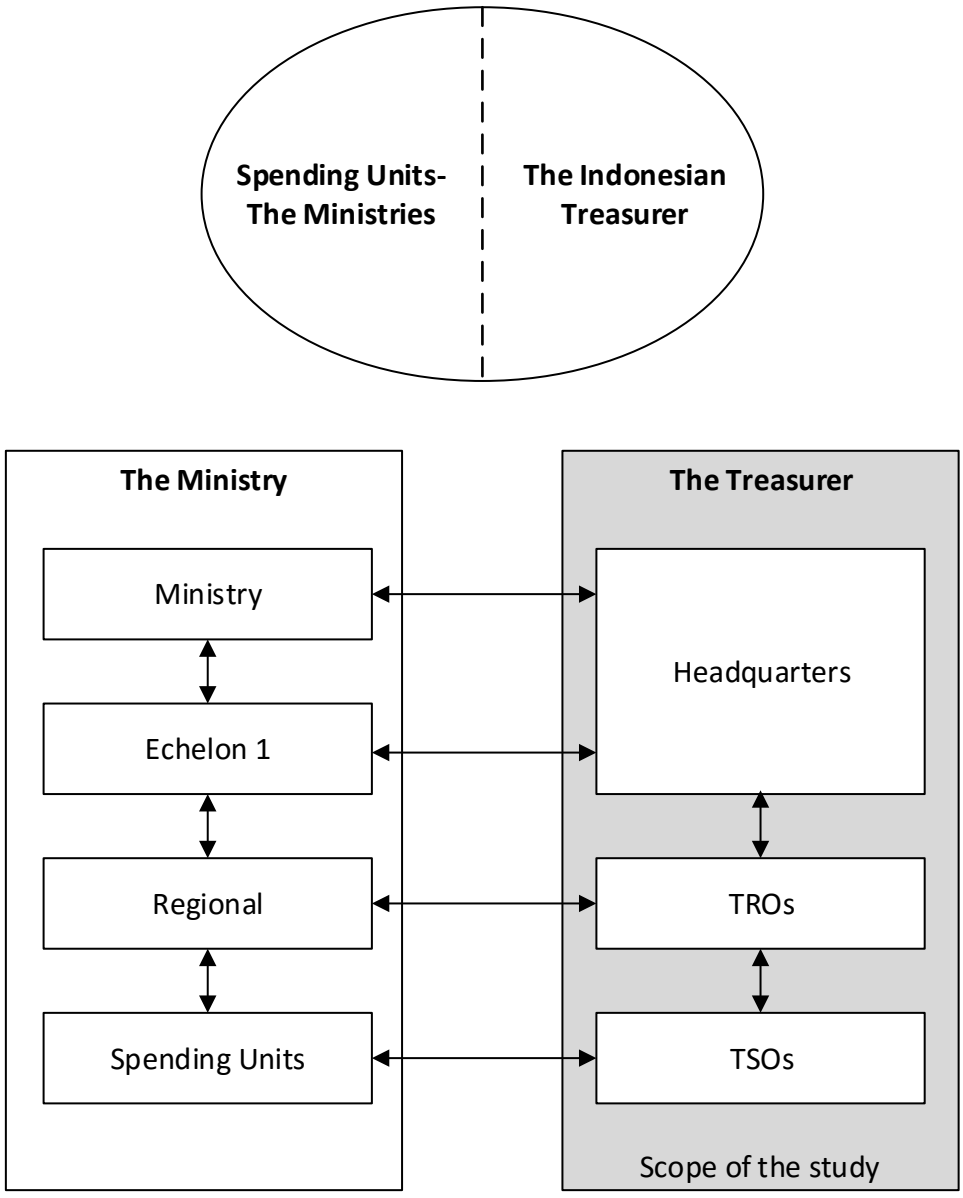


Figure 5.5. Separation of Treasury Function

The Indonesian Treasury's total system is distributed in nature, with each individual, installed system having its own database. A brief systems configuration can be seen in Appendix H.

The business model of the Indonesian Treasury forces all units to transfer the output of one system to other systems. Therefore, each system needs to communicate with other systems as shown in Appendix H. The result of each system is then

transferred in the form of hardcopy, electronic copy, or both. All systems are equipped with functionality to satisfy such processes. Although sufficient training and documents for each system are provided, the Indonesian Treasury still experiences data discrepancy.

The Indonesian Treasury invested in business intelligence applications (Watson & Wixom, 2007) as its decision support system (Sol, 1987) to generate more value from its scattered systems. Negash (2004) argues that business intelligence could increase the value of information by combining operational data and analytical tools. Care is needed, however, as business intelligence can generate insufficient information due to processing of unsound data.

5.5 ICT Organisation Evolution

The Indonesian Treasury has reorganised its ICT department four times since 2004 as seen in Figure 5.6. Initially, a conservative approach was used (Laudon & Laudon, 2011). ICT was part of the accounting directorate. The ICT department was separated from the accounting directorate in 2006 to form the Directorate of Treasury Systems (DTS). The Directorate of Accounting and reporting was responsible for accounting related functions, while the DTS was designed for information systems development.

Although the DTS was originally designed for information systems related development, its actual role was not clearly stated in the Ministry of Finance (MoF) regulation number 466/2006. This resulted in multiple interpretations when the DTS was established. One of the six Deputy Directors, specifically, the Deputy Director for treasury systems development, was designated to be a business analyst that would implement treasury related regulations into the system. Rather than playing this role

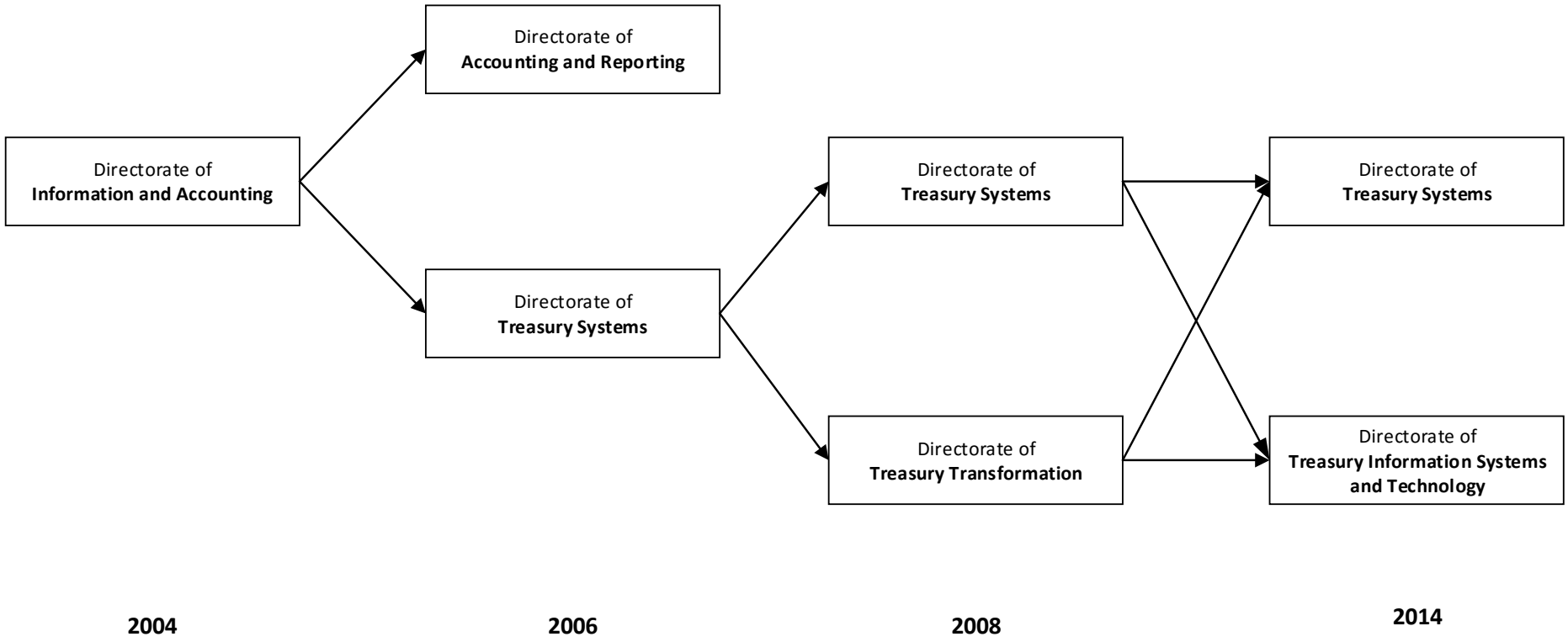


Figure 5.6. ICT Organisation Evolution

as business analyst, the Deputy Director of treasury system development became a division that worked on harmonising treasury regulations.

To hasten e-Governement systems development, the Indonesian Treasury reorganised its ICT department through Ministry of Finance regulation number 100/2008. In addition to the Directorate of Treasury Systems, a Directorate of Treasury Transformation (DTT) was formed. DTT was responsible for the future of the Indonesian Treasury e-Government systems, leaving the DTS to be responsible for ensuring current systems ran properly with minimum alteration.

Subsequently, the role of the DTS was redefined. The need for harmonising treasury regulations and refining busisness processes was paramount. In the DTS, a division of treasury regulations and development was introduced to replace the treasury systems development division. Two ICT related divisions, namely system application development and ICT support, were retained. These two ICT divisions were assigned to work closely with DTT.

Additionally, the DTT took on the role of ensuring that the new initiative of adopting commercial-of-the-shelf (COTS) solutions in the *sistem perbedaharaan dan anggaran negara* (SPAN) project ran smoothly. The DTT is equipped with two business process analyst divisions and two ICT related divisions. Hence, the DTT and the DTS have similar roles. Although the DTT and the DTS were assigned to work closely and collaboratively, confusion between them persists.

A few months after this study completed its data collection, the Ministry of Finance introduced, as a result of adopting balanced scorecard (BSC), regulation number 206/2014 to reorganise the Indonesian Treasury. The SPAN project was considered nearly complete and, as a result, the DTT and the DTS were reformed.

However, this study could not find any documentation to support this ICT organisation evolution. Hence, leadership could play a significant role in the evolution. Taking everything into account, in developing its e-Government systems, the Indonesian Treasury seems to have encountered trials and errors in its ICT organisational evolution.

5.6 ICT Resources

ICT resources in the Indonesian Treasury can simply be divided into hardware, software and human resources. The Indonesian Treasury has invested in all these resources. The decision as to what kind of hardware and software should be purchased was taken conservatively by asking its enterprise entities.

5.6.1 Hardware and Software

The Indonesian Treasury relies on various kinds of computers. Among those, around 30 percent are considered to be obsolete, as seen in Figure 5.7. Yu et al. (2010) suggest that the average computer lifespan in the world varies from 3.8 to 5.75 years old. Hence, the age of the computers used by the Indonesian Treasury could result in insufficient support for their maintenance.

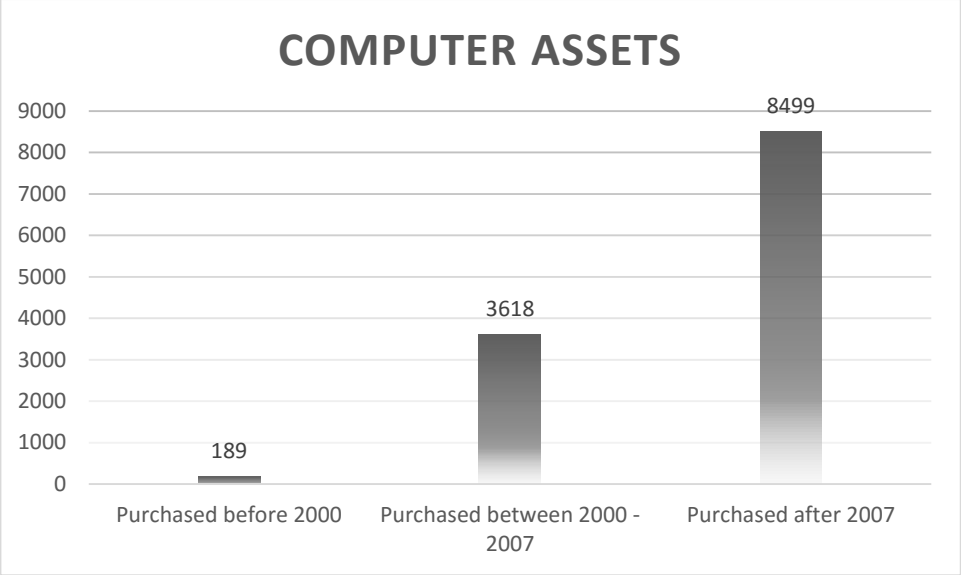


Figure 5.7. Total Computer Assets as of December 2013

Most computers are running a Microsoft Windows operating system. However, this study could not get any information regarding how many computers are using the latest version of Windows, as depicted in Figure 5.8. In the latest computers and assets survey, detailed computer configuration was excluded. The latest detailed configuration data is only available up to the end of 2007.

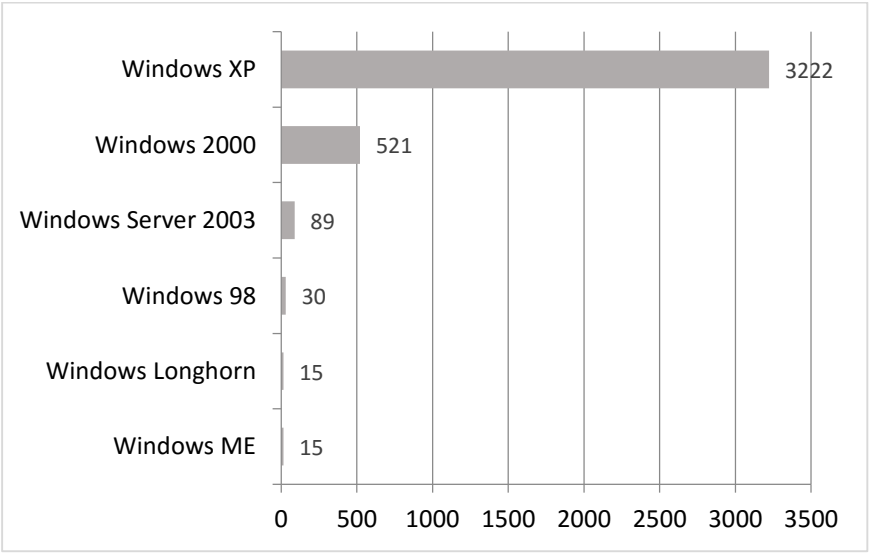


Figure 5.8. Operating Systems Used as of 2008

Data from 2007 probably does not reflect current computer configurations. However, some useful information can still be analysed. Most computers were using Windows XP. This study confirmed during its data collection that the majority of its computers are still using Windows XP. However, Microsoft has announced that they are no longer supporting Windows XP with any updates from April 2014 (Microsoft, 2014b). As a result of not getting any update for Microsoft XP, the Indonesian Treasury may be prone to security threats.

Although most of the e-Government systems were developed using Microsoft FoxPro, they are run with various databases. FoxPro has the ability to connect to different databases, including its built-in database. As presented in Appendix H, most systems used FoxPro DBF. A small number of systems use MySQL or another Oracle database. The databases are installed on several server platforms.

The Indonesian Treasury adopted various operating systems for its server platforms. The majority of its servers used Microsoft Windows Server 2003, as shown in Figure 5.8. The Indonesian Treasury may not be aware of recent announcements that Microsoft will no longer support Windows 2003 servers from mid-2015 (Microsoft, 2014a). In addition to the Windows server platform, the Indonesian Treasury also used various Unix based servers. Variants of Unix platforms evident in the Indonesian Treasury data centre include Solaris, IBM AIX, and Linux.

Hardware and software vendors often develop their own certification programs for qualified engineers (Adelman, 2000; Schlichting & Mason, 2004). Thus, a pool of ICT certified human resources are needed to ensure all resources continue running properly.

5.6.2 Human Resources

The Indonesian Treasury recruits its employees by following a general rule for government employee recruitment in Indonesia. Recruitment is only done at an entry level through its ministry. The process can take around a year from defining the needs until awarding the applicants. Generally, less than 10 percent of applicants recruited into the Indonesian Treasury are for ICT related fields.

In addition to formal education, the skill of ICT related staff needs to be proven by obtaining professional certification (Parnas, 1990; Tondeur et al., 2007). In 2014, across all staff in the Indonesian Treasury, there were only around 100 employees holding bachelor degrees in ICT related fields out of a total of 4617 employees holding some form of Diploma and/or Bachelor Degrees. This is depicted in Figure 5.9. Further, in two directorates with responsibility for ICT, there were only around 30 employees with an ICT background. Also, the number of qualified engineers was considered scarce with less than ten people holding Cisco certification.

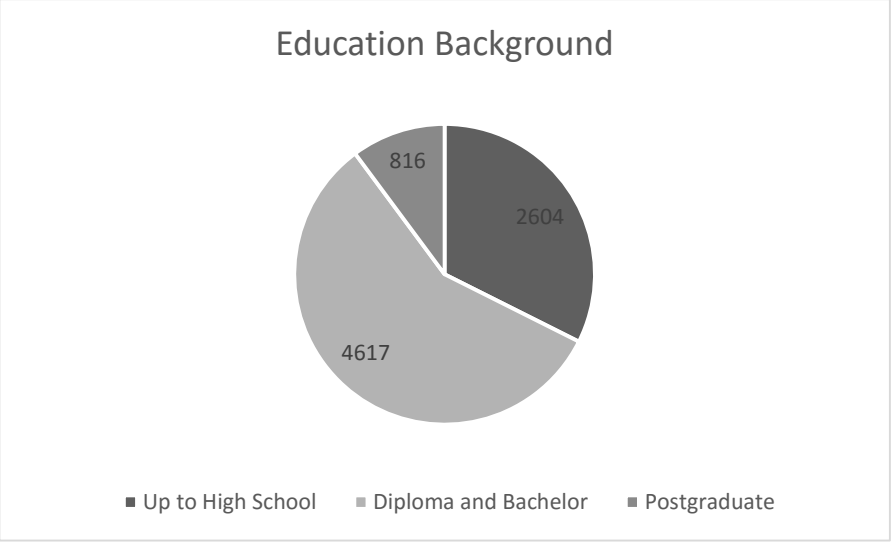


Figure 5.9. Education Background of all staff in the Indonesian Treasury

5.7 Conclusion and Summary

As the back-office (Dawes, 2008) for public financial management systems, the Indonesian Treasury e-Government systems play an important role in Indonesia. The systems impact other systems in other organisations, such as state organs, various government agencies, and banks. Thus, the Indonesian Treasury e-Government systems require more than just a conservative approach. It requires an instrument that can be used not only to develop the systems effectively, but also to communicate with large numbers of parties.

In addition to systems development, this chapter also reflects that the Indonesian Treasury experienced complications in managing its organisation evolution and ICT resources. Enterprise Architecture (EA) could be used to manage such complexity (Op't Land et al., 2009; Townson, 2008; Zachman, 1997). In order to validate whether EA could have an effect on the Indonesian Treasury e-Government system performance, this study uses proposed research model in Chapter 3 and mixed method. The presentation of the collected data begins in the next chapter with the findings of the qualitative analysis.

Chapter 6
QUALITATIVE ANALYSIS

6.1 Overview

The chapter presents the results from the qualitative analysis of this study. The phases of qualitative analysis are presented in Section 6.2. Respondent profiles are presented, ensuring anonymity, in Section 6.3. To ensure rigor in the findings, the results of the semi-structured interviews were reviewed using content analysis, presented in Section 6.4, and thematic analysis, presented in Section 6.5. The findings from the interviews were confirmed using document analysis and observation as discussed in Sections 6.6 and 6.7.

6.2 Phases of Analysis

The study followed Yin (2011) in analysing qualitative data. He suggested a five-phase cycle in analysing qualitative data as seen in Figure 6.1.

First, it begins with compiling the data into a database. The study transcribed all interviews and each transcript was sent to the interviewee for comment and to control bias. The confirmed transcripts were archived in files in the Portable Document Format (PDF). Documentary evidence collected was also kept as PDF files.

The second phase was the process of extracting data from the documents in the database and coding the data accordingly. This study started by classifying the two main sources of data: interview transcripts and documentary evidence.

The third phase, reassembling, is used to obtain insight into any patterns in the data. Before concluding the analysis, the researcher needs to interpret the data, this is the fourth phase. This study used computer software called NVivo version 10 to assist

analysing the data. Finally, in phase five, the results of the analysis are presented after describing the profiles of the respondents who were involved in the study.

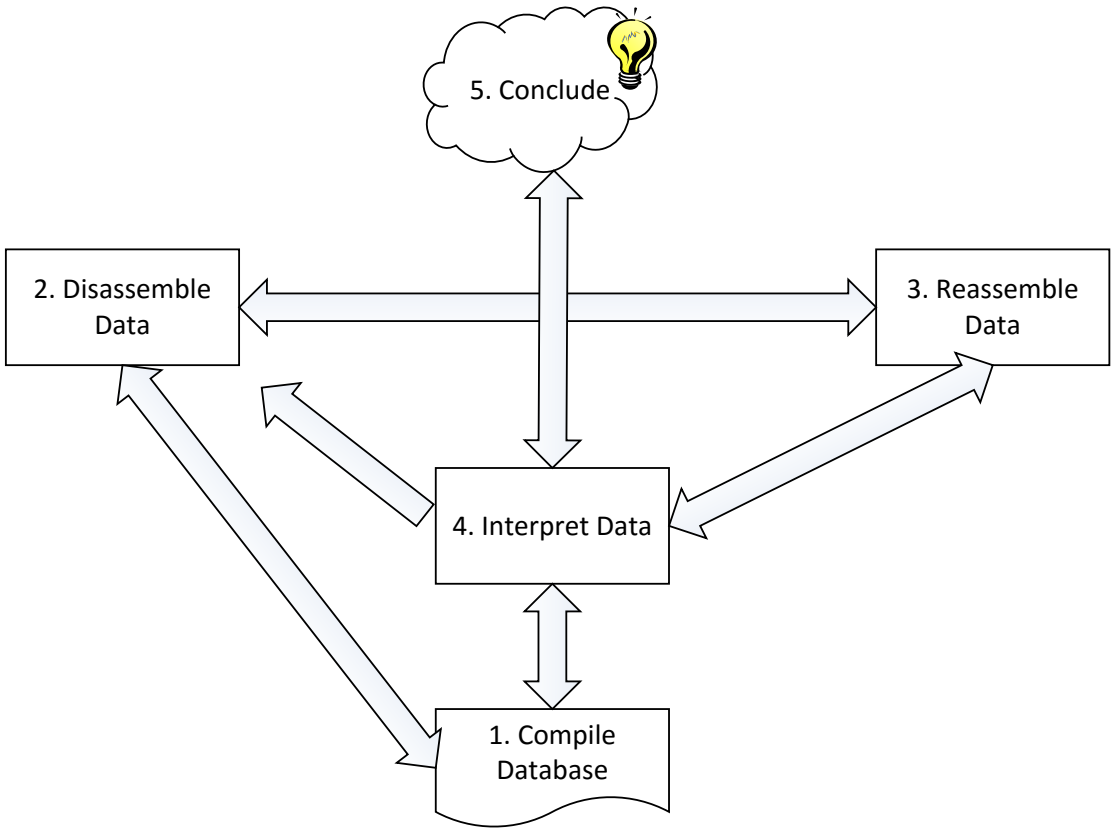


Figure 6.1. Five-phase cycle (Yin, 2011, p. 178)

6.3 Respondent Profiles

This study identified twenty feasible interviewees from the Treasury staff. Feasibility was based on the current position held and previous contributions made to the e-Government systems development. To maintain anonymity, only the role of the interviewee and the date of the interview are seen in Seventy five per cent of the people approached responded positively to the request for interview, as seen in Table 6.2. The remaining twenty five per cent of people approached did not respond even though several gentle reminders were sent.

The majority of respondents came from Echelon Three. Interviewees for this rank were situated only in the headquarters. Responses from this rank in the TROs and TSOs were collected using questionnaires (described in the next chapter).

Table 6.1. All interviewees were given a random respondent ID.

Seventy five per cent of the people approached responded positively to the request for interview, as seen in Table 6.2. The remaining twenty five per cent of people approached did not respond even though several gentle reminders were sent.

The majority of respondents came from Echelon Three. Interviewees for this rank were situated only in the headquarters. Responses from this rank in the TROs and TSOs were collected using questionnaires (described in the next chapter).

Table 6.1. Interviewee Role and Interview Date

Ech	Role	Date
3	Deputy Director of Database Management and ICT Support	26/11/2013
2	Head of Treasury Regional Office of Bali	5/12/2013
3	Deputy Director of System Application Transformation	9/12/2013
2	Director of Treasury Systems	12/12/2013
3	Head of the Indonesian Treasury Human Resources	12/12/2013
3	Deputy Director of System Application Development	13/12/2013
3	Deputy Director of ICT Transformation	17/12/2013
2	Head of Treasury Regional Office of West Java	23/12/2013
2	Head of ICT Centre for the Ministry of Finance	9/01/2014
3	Head of the Indonesian Treasury General Affair	9/01/2014
2	Head of Treasury Regional Office of the Islands of Riau	10/01/2014
3	Deputy Director of Transformation Support	10/01/2014
1	Special Staff for ICT	13/01/2014
2	Director of Treasury Transformation	13/01/2014
1	Secretary General of the Ministry of Finance	17/01/2014

Table 6.2. Response to Interview Request and Respondent ID based on ranks

Level	Able	Unable	PCT per rank
Echelon 1	2	2	50%
Echelon 2	6	2	75%
Echelon 3	7	1	87.5%
Total	15	5	
PCT	75%	25%	

At the time the interviews were conducted, there was only one respondent aged less than forty years old. The main age groups were between 41 and 45 years old and more than 56 years old, as reflected in Table 6.3.

Table 6.3. Age distributions

Age	Total	PCT
Less than 40	1	7%
41 – 45	5	33%
46 – 50	2	13%
51 – 55	2	13%
More than 56	5	33%

This study decided to conduct the majority of interviews in the Treasury headquarters, as depicted in Table 6.4. The main reason for this is that e-Government system development and policy formulation are mainly made in the headquarters. However, respondents from regional offices, such as the head of regional offices who were not giving their responses via the questionnaires, were also invited. The purpose of this invitation was to understand the regional offices' view and contribution to the e-Government systems development.

Table 6.4. Respondent's Location

Location	Total	PCT
Headquarters	12	80%
Regional Office	3	20%

The ratio of respondents who are heavily involved in the systems development and those who have more general roles are relatively equal as seen in Table 6.5.

Table 6.5. Respondent's Role

Job Roles	Total	PCT
General	7	47%
Systems Development	8	53%

All respondents had at least a bachelor degree and all but one had completed some form of postgraduate education, as seen in Table 6.6.

Table 6.6. Educational background

Level	Total	PCT
PhD	2	13%
Master	12	80%
Bachelor	1	7%

Although there were eight interviewees involved in systems development, only two respondents had ICT related degrees. Most respondents came from economics and public management backgrounds, as seen in Table 6.7.

Table 6.7. Respondent's educational background

Field	Total	PCT
Economics	6	40%
ICT	2	13%
Management	7	47%

6.4 Content Analysis

Content analysis refers to "*a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use"* (Krippendorff, 2004, p. 18). According to Elo and Kyngäs (2008) content analysis begins with data preparation, organising the data using open coding, and reporting the results through a model. NVivo was used to assist this process in this study.

This study began with importing the electronic copies of the interview transcripts. Data were organised into groups of folders. Word frequency queries were made on the documents. The study conducted queries across four groupings of respondents: all respondents, Echelon 1, Echelon 2 and Echelon 3. The queries used the following criteria: exact matches, display the 200 most frequent words and words had to contain at least five letters.

All words appearing in the results were thoroughly analysed. Some words in the Indonesian language such as *untuk, sehingga, belum, seperti,* and *dapat* were omitted from the query results. The English equivalents of these words represent grammatical articles such as conjunctions and are considered to be expressions irrelevant to the study. Some words that can be used interchangeably and have similar meanings were combined into one word. The study used the English "information" for both *informasi* (information) and *laporan* (report). Although those two words have different semantic meaning, interviewees used these words in similar contexts.

This study presents the ratio of the top fifteen words identified. The ratio of the frequency of each word and the total frequency of the fifteen most frequently used words is presented as a percentage. The results for the overall grouping and the

individual, Echelon based groups of respondents are presented in the subsequent sections.

6.4.1 All respondents

The fifteen most frequently used words by all respondents can be seen in Figure 6.2. The data shows that all respondents had big concerns regarding the "systems", "information" and "hardware" with the totals of 21%, 15% and 13% respectively. The least frequent words used by the respondents were "integration", "operational" and "alignment".

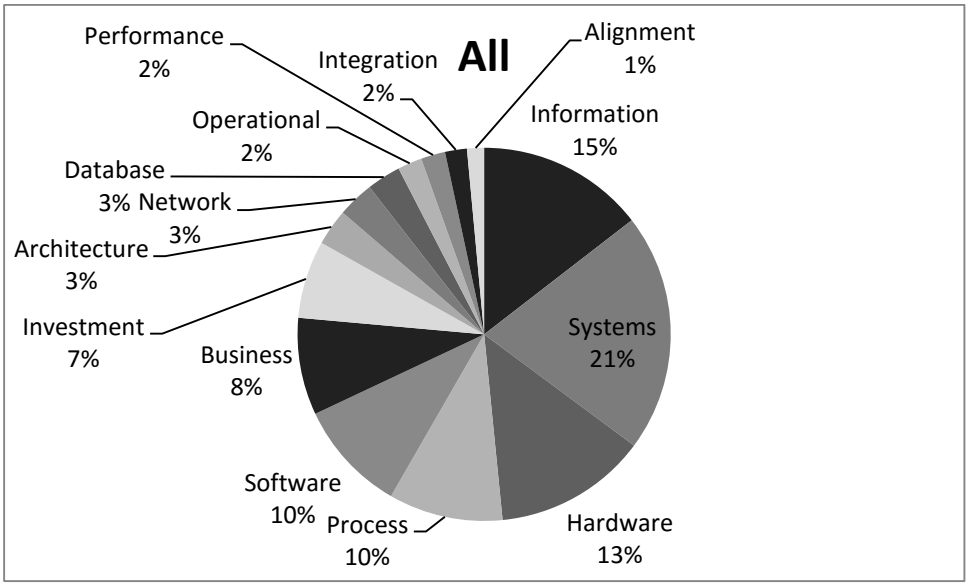


Figure 6.2. Most Frequently Used Words by All Respondents

6.4.2 Echelon 1 (2 Respondents)

The study further analysed the data for each of the Echelon-based respondent groupings. In comparison with all respondents, the respondents who were in Echelon 1 had different concerns reflected by their most frequently used words. Rather than speaking about the "systems", they mentioned "performance", "operational" and "architecture" more frequently with 23%, 14% and 11% as seen in Figure 6.3.

"Integration" was the only word in common with the three least frequently used words by all respondents. The other two words were "network" and "business".

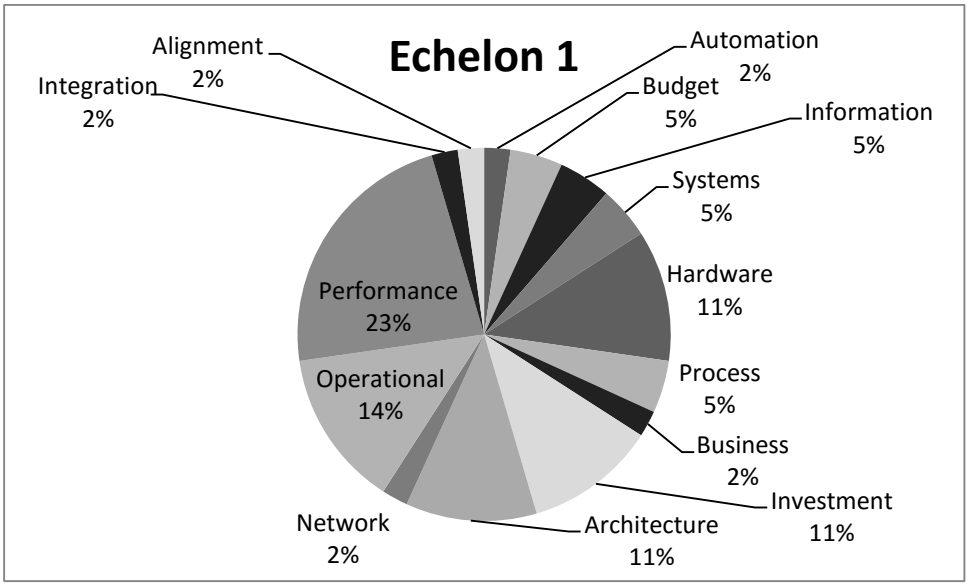


Figure 6.3. Most Frequently Used Words by Echelon 1

6.4.3 Echelon 2 (6 Respondents)

The Echelon 2 respondents showed different interests compared with the Echelon 1 respondents. The Echelon 2 respondents more frequently spoke on strategic and tactical topics such as "systems", "information", and "process", as seen in Figure 6.4. They were less attentive to topics of "alignment", "integration", and "performance".

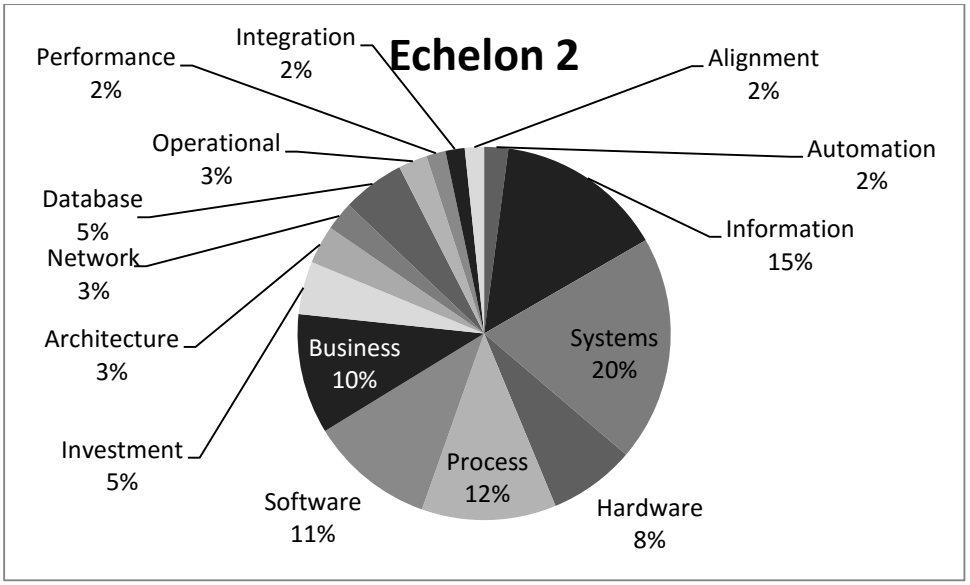


Figure 6.4. Most Frequently Used Words by Echelon 2

6.4.4 Echelon 3 (7 Respondents)

In the interview, Echelon 3 respondents were more concerned with tactical and pragmatic topics such as "systems", "hardware" and "information", as reflected in Figure 6.5. These respondents were less concerned for "performance", "standard" and "accountability". These three words were the least frequently used by the Echelon 3 respondents.

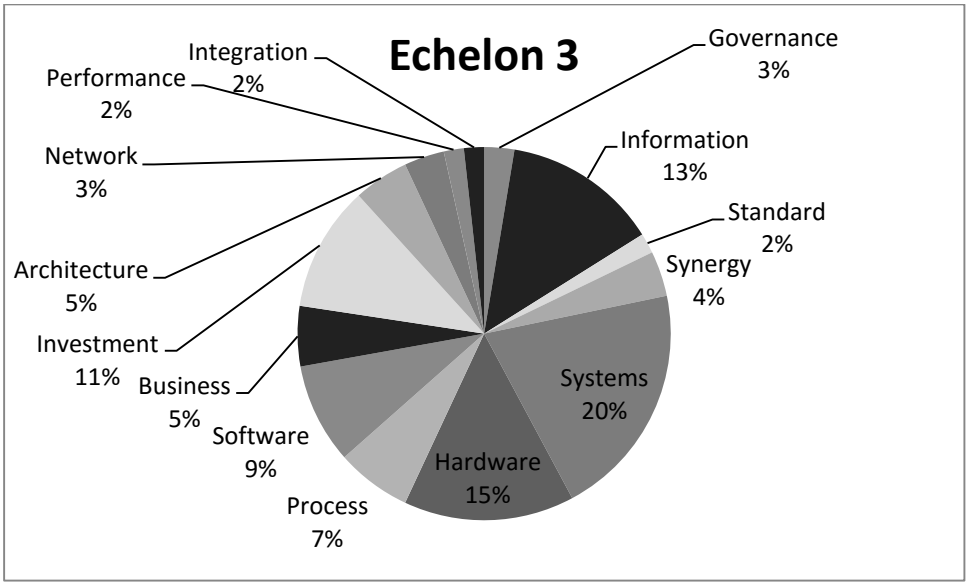


Figure 6.5. Most Frequently Used Words by Echelon 3

6.4.5 Comparison

During the interviews it was evident that there were different interests between the groups of respondents. This can be inferred from the comparison of the fifteen most frequently used words as seen in Table 6.8. Echelon 1 and Echelon 2 respondents used words that reflected strategic views such as “performance”, “automation”, and “budget”. Echelon 2 respondents also expressed interest in technical perspectives as indicated through use of words “software” and “data” (database), although the use of these words was usually in a tactical context. This can be seen from the following responses from Respondent 6:

> *“The Indonesian Treasury e-Government is in the transition of shifting from distributed databases to an integrated one.”*

Respondent 4 highlighted the following message:

> *“Due to multiple databases used for different purposes, the needs for centralised common expenses such as a monthly payment for utilities and salary cannot be simplified from thousands of transactions to only one transaction.”*

Table 6.8. Comparison of Most Frequently Used Words by All Respondents

	All	Echelon 1	Echelon 2	Echelon 3
Automation	-	2.17%	2.08%	-
Budget	-	4.35%	-	-
Governance	-	-	-	2.58%
Information	14.29%	4.35%	14.58%	13.30%
Standard	-	-	-	1.72%
Synergy	-	-	-	3.86%
Systems	20.29%	4.35%	19.58%	20.17%
Hardware	13.04%	10.87%	7.50%	14.59%
Process	9.73%	4.35%	11.67%	6.44%
Software	9.52%	-	10.83%	8.58%
Business	8.28%	2.17%	10.42%	5.15%

Investment	6.63%	10.87%	4.58%	10.73%
Architecture	3.11%	10.87%	3.33%	4.72%
Network	3.11%	2.17%	2.50%	3.43%
Database	2.90%	-	5.42%	-
Operational	2.07%	13.04%	2.50%	-
Performance	2.07%	21.74%	1.67%	1.72%
Integration	1.86%	2.17%	1.67%	1.72%
Alignment	1.45%	2.17%	1.67%	-

All in all, it is seen that the three groups have different concerns regarding the Indonesian Treasury e-Government. The Echelon 1 respondents were more concerned with the performance of the systems whereas the other two groups had a similar level of concern for systems and information as seen in Figure 6.6. This indicates that each level demonstrated different interests. It is consistent with the EA framework proposed by Zachman (1997). He drew four different levels of roles for those involved in IS development within an enterprise. Further analysis for each theme in the interview responses are provided in Section 6.5.

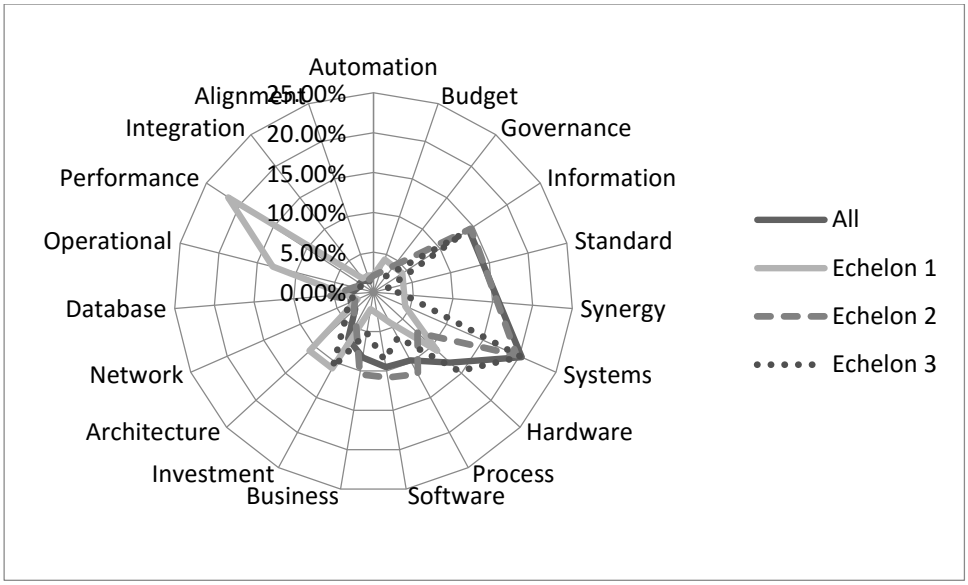


Figure 6.6. Radar View of Frequent Words Used

6.5 Thematic Analysis

Similar to content analysis, the use of thematic analysis as an approach to analysing qualitative data is very common (Vaismoradi, Turunen, & Bondas, 2013). Thematic analysis is defined as *"a method for identifying, analysing and reporting patterns (themes) within data"* (Braun & Clarke, 2006, p. 79). According to Braun and Clarke (2006) thematic analysis begins with becoming familiar with the data by reading it thoroughly. It is then followed by *"generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report"*.

This study followed Bazeley and Jackson (2013) in its conduct of the thematic analysis of its data using NVivo 10. Codes were made according to the research framework introduced earlier in Section 4.3. Searching for themes was conducted through a text search menu by giving pertinent key words. The results were then reviewed. The themes were named as nodes: Architecture, Alignment, Information, Performance, and Resources in NVivo (Bazeley & Jackson, 2013). Each of the nodes represents a theme in the framework. However, the Resources node was used to

represent both the resource portfolio optimisation and resource complementarity themes because they are relatively similar. The results are presented in the following sections.

6.5.1 Enterprise Architecture

This study could not find any artefact showing Enterprise Architecture (EA) or similar being present in the Indonesian Treasury. All interviewees were asked about the presence of ICT related architectural documents such as EA. The common response was:

> *"To date such documents are not available"* (Respondent 1).

Respondent 1 further argued *"In my view, most people in the Indonesian Treasury view ICT like other peripherals such as cars. We only consider using cars to take us to our destination. Conversely, ICT requires proper planning and governance. As such, I would say there is no reference as to where ICT should be developed."*

Similar to responses from Respondent 1, Respondent 4 argued:

> *"We never had any ICT related architecture documents. We do not know what we are going to develop within the next five years. Even in the technical levels, we did not have proper documentation as to how ICT is developed. Technical documentation for the e-Government systems are also absent. Thus, e-Government systems development is controlled by only a few people."*

Another interviewee, Respondent 3 corroborated with the following:

> *"The direction of existing e-Government systems remains unclear as to how they should be developed because there is no architecture as its guidance."*

A different interviewee, Respondent 12 discussed:

> *"Since there is no architectural documentation both at the Ministry of Finance level and the Indonesian Treasury, as an e-Government systems development framework, we did not know how ICT will be utilised in the future. Thus, to some extent I think our investment in ICT is not efficient".*

Another interviewee, Respondent 10 pointed out:

"I heard there was an initiative to create an ICT blueprint. Yet I had never read such a document. Thus, currently systems are developed upon request from users. Missing architectural documentation causes each directorate to only view their needs. As a result they demonstrate lack of respect to others."

In addition to responses from interviewees residing in headquarters, interviewees from regional offices also confirmed that there was no architecture documentation. Some interviewees referred to them as blueprints, such as Respondent 5 stating:

"E-Government systems require a blueprint so that it can be used as a point of reference for everyone involved."

Another interviewee, Respondent 7, mentioned:

"To the best of my knowledge, there is no complete e-Government design to come from Jakarta (headquarters). Thus, I do not know of any documentation as a guideline for us in the regional offices."

However, one of the fifteen interviewees did not give a clear response. Respondent 11 said:

"I heard about it. However, the Indonesian Treasury does not have lots of people who understood what it would bring. I believe that at the ministerial level (Ministry of Finance), we have such documents. A government unit under the ministry such as the Indonesian Treasury was expected to develop one too."

Despite the absence of architectural documents for the Indonesian Treasury e-Government systems, the Indonesian Treasury manages to run their businesses by relying on other instruments. Using balance scorecard, the Indonesian Treasury defined key performance indicators (KPI) for its offices nationwide. Similarly, for offices in the field of e-Government systems, the Indonesian Treasury is using KPIs as stated by Respondent 13:

"Although to date an ICT blueprint is not available, all offices in the Indonesian Treasury, including ICT units, are given KPIs. These KPIs should be accomplished annually."

Notwithstanding responses regarding lack of architectural documentation in the Indonesian Treasury e-Government systems, there is a growing awareness of the need for architecture documents. This is reflected in responses such as:

> *"My staff is starting to develop architecture documentation for ICT infrastructure, data, and others. I am not sure whether or not they have sufficient knowledge about it because they are technical people"* (Respondent 3).

Another respondent, Respondent 5 stated:

> *"We needed a blueprint as guidelines. To date, systems application development is heavily reliant on individuals, which is not acceptable. We are heading in that direction. We understand the needs of proper design to make the most of our ICT investment"*.

Respondent 4 also stated that:

> *"Unlike before 2010, we now know how our core businesses should be run, such as cash management, and government accounting in the Indonesian context. We needed a comprehensive plan and how to achieve it. That includes managing the impact of such a plan. I believe the plan will have a significant impact on our organisation."*

It can be inferred that the Indonesian Treasury are not referring to any architectural document in developing their e-Government systems.

6.5.2 Organisational Alignment

The study asked its respondents whether they shared a common understanding of the strategic goals of e-Government and what they contributed towards achieving these goals. Different responses were received during the interviews. Most respondents replied by saying that common understanding did not exist. They had a tendency for answering the question by saying the alignment was insignificant or even that no alignment existed, such as:

> *"Alignment is a long way off*" (Respondent 4).

Respondent 4 further used his experience by stating:

"when I was involved in designing complex systems, there was nearly no significant direction as to how the systems should be developed. Most initiatives took a bottom up approach rather than top down. ICT should be treated as a strategic project and sufficient direction should come from the top".

Another interviewee (Respondent 3) confirmed by saying:

"In the existing e-Government systems, we cannot estimate government expenses per month or semester. We are not sure whether or not the provision of funds is sufficient. Therefore, I would say the existing systems do not fully align with the Indonesian Treasury strategic mission."

Some respondents mentioned holistic views, which could lead to common understanding, were not available, such as:

"Common understanding of the Indonesian Treasury vision and mission can be seen from the e-Government systems development, which is considered to be partial. Users only see their roles and responsibilities by overlooking others. The need for a common framework to bring them to the same viewpoint is needed" (Respondent 10).

In addition, another interviewee, Respondent 15 said:

"up until now we have developed the systems based on partial needs. They have not been combined into one integrated system".

Respondent 14 supported the statements by saying

"When the existing e-Government systems were launched, it was found that they did not fully fit with the business process requirements".

Another interviewee gave an example of such a situation:

"When we deployed e-Government systems, we found out that they were not referring to the business process we designed for, the treasurer bookkeeping systems report" (Respondent 8).

This situation might come from leadership issues as stated by Respondent 12:

"The e-Government systems development cannot be hastened or improved due to lack of sufficient support from the policy makers."

However, not all respondents gave the same response. One respondent, Respondent 6 stated that:

"To date, the e-Government systems have aligned with the Indonesian Treasury strategic mission. However, I believe there is still room for improvement. I was convinced that we are walking on the right path. The systems will be continuously developed".

Another interviewee, Respondent 5 provided similar response saying:

"ICT has been utilised in alignment with the business process. ICT has helped the service performance. Yet the current systems are not fully optimised because some improvements are still needed".

According to responses from the interviewees, it can be inferred that the Indonesian Treasury are still struggling in aligning with their organisation entities.

6.5.3 Information Availability

The Indonesian Treasury seems to be struggling in gathering reliable information in a timely manner. This can be seen in some of the responses given by interviewees during the data collection. For example, Respondent 11 stated:

"Reports presented to high level officials are sometimes delayed by about a month. There may be some problem in the financial process itself or the reporting process. The delay causes a loss in value derived from the reports for the high level officials."

Likewise, one of the respondents from Echelon 1, Respondent 2 stated:

"There were circumstances where we needed additional time in making some decisions caused by the delays in generating the financial report".

Similarly, Respondent 6 stated:

"To date the data quality is considered low. The quality is getting better, however. We are aiming for data perfection."

Other interviewees supported such statements by saying:

"Lack of discipline in managing data results in a lot of time being required for data cleansing. Therefore, the Indonesian Treasury cannot be fully responsive in providing reliable information" (Respondent 1)*;*

and

"We were too permissive to the ministries and spending units as budget users. This resulted in data variation" (Respondent 3).

The Indonesian Treasury has some issues regarding how the e-Government systems are running within its offices as well. First, the way reports are made, as stated by some respondents, such as:

"The Treasury Service Offices send two sets of data to the headquarters i.e. data transaction and general ledger (GL). Data transaction is used to generate financial managerial reports called BUKU MERAH in Indonesian. Data in the general ledger is used to generate accounting based financial reports. This results in two different reports. In short, I would be hesitant to call these valid reports" (Respondent 4).

Another interviewee said:

"I found some discrepancies when comparing data from the Treasury Service Offices and the headquarters" (Respondent 12).

In addition, extra effort was needed involving humans in generating the reports. Human error is considered to be one of the causes of system failures (Brown & Patterson, 2001; Dix et al., 1997). Therefore, this could affect the quality of information. Respondent 8 stated:

"Current e-Government systems can generate invaluable reports such as: Actual Government Budget Report, Cash Flow Report, and Government Financial Report. They are not automatically generated by the systems. The systems are used to make data collection easy but not to generate reports. The reports are made manually."

Second, there are complications within the e-Government systems, as stated by Respondent 12:

"Most supervisors have backdoor access straight through to the database. They can manipulate the data without leaving any trace. This harms both the systems and the data transactions."

Another interviewee, Respondent 14, supported this statement by saying:

"Even though it came from one transaction, data discrepancies are still common."

Third, e-Government systems were developed reflecting each individual business. Regarding this, Respondent 2 said:

> *"The Indonesian Treasury business units separately managed their own data. This led to multiple stages of data consolidation. However, we are in the process of integrating them all in the SPAN."*

Other respondents made similar statements in this regard:

> *"Causing extra effort and processes to bring together the data into valuable information in the form of reports"* (Respondent 11); and
>
> *"What we sent to Jakarta was not immediately updated in the systems causing some time lag for the TSOs to run their businesses"* (Respondent 7).

Thus, time wise, the Indonesia Treasury has to be tolerant in receiving data and generating reports from its offices (Respondent 6; Respondent 10)

Fourth, unclear governance as to how the data should be managed also emmerged in the study as in the following statement:

> *"Governance as to when the information can be accessed by the Treasury staff and who are entitled to access such information is missing"* (Respondent 11).
>
> Further, Respondent 11 said:
>
> *"Not all leaders in the Indonesian Treasury are aware of what ICT can deliver, such as being able to create their own customised reports directly from the systems. As of now, there are no decision support systems used by the leaders that would aggregate all transactions nationwide."*
>
> In contrast to most responses, Respondent 5 stated:
>
> *"In certain cases, the Indonesian Treasury e-Government systems have been able to provide adequate information. This information can be directly used by decisions makers and other units."*
>
> Also, from Respondent 9:
>
> *"Advisors to the President rely on the reports produced by the Indonesian Treasury using the systems and resources currently available to the Treasury."*

6.5.4 Resource Portfolio Optimisation

Investment in ICT resources in the Indonesian Treasury is not considered fully satisfactory. This can be seen from most respondents stating that unnecessary investments were still occasionally present. The Indonesian Treasury tried to minimise further problems by referring to the data on obsolete resources according to a standard for economic life and issued requests to vertical offices nationwide in deciding where to invest in ICT (Respondent 15). Thus, the Indonesian Treasury headquarters regularly asks vertical offices (TROs and TSOs) to send their needs requests (Respondent 6; Respondent 15). The needs are then used to formulate technical specifications with the ICT Directorates: Directorate of Treasury Systems (DTS) and Directorate of Treasury Transformation (DTT). Thus, the Indonesian Treasury is not referring to an ICT plan (Respondent 11).

Such a plan has never been formed in any ICT blueprint, architecture or framework (Respondent 12). Respondent 12 further argued that there was no clear direction as to how and where to invest in ICT because ICT was still viewed as tools. This leads to a lack of awareness for proper planning (Respondent 1; Respondent 12). Missing a proper design for ICT resulted in insufficient program budget proposals (Respondent 1). The budget constraints were also caused by lack of awareness, from the leaders, of the importance of having reliable e-Government systems (Respondent 3). Thus, there is lack of support for driving suitable investment in ICT resources.

Furthermore, another respondent, Respondent 5 stated that:

"we might not need to have high specification computers to run the business".

Similarly, another respondent, Respondent 7 mentioned:

"There was no control as to what computer specifications should be purchased and how the PCs should be used. We were inclined to purchase the most sophisticated computers without knowing the real needs".

Therefore, it is understandable why Respondent 4 said that ICT spending was not generating additional value to the Indonesian Treasury. Although the Indonesian Treasury had a constrained budget (Respondent 3), another interviewee stated:

"When I was working in the TRO, I found that on the one hand some TSOs received new computers when there was no need for additional computers, on the other hand other offices who really needed new computers did not receive any" (Respondent 13).

The small budget for ICT investment was only used to support day-to-day operations (Respondent 4). Respondent 4 further argued that an insignificant budget was allocated to future systems development. Systems were developed in an ad-hoc fashion and based on the need to complement what was already currently running.

6.5.5 Resource Complementarity

The Indonesian Treasury focused on the development of SPAN. However, Respondent 1 was concerned about program sustainability because the Indonesian Treasury lacked people who could formulate the ICT strategic management. Moreover, it was evident that the Indonesian Treasury did not have qualified human resources to make the most of the hardware and software purchased (Respondent 3). The same respondent further gave the example:

"We bought data warehousing and business intelligence software. Having bought the software we realised that we did not have qualified staff to make the most of it"

Notwithstanding the availability of the Human Capital Development Plan (HDCP) to synergistically support ICT development (Respondent 14) by sending staff to study further in the area of ICT and law in addition to economics and public policy (Respondent 11), Respondent 11 argued that:

"It was not clear as to how they would be utilised".

The Indonesian Treasury frequently sent people for ICT training but most of them were not available because they were not ready or they were transferred to other offices.

At the operational level, the Indonesian Treasury offices, the TROs and TSOs, viewed the current resources being relevant to achieving the Indonesian Treasury objectives. Respondent 6 stated:

> *"whenever headquarters deployed new systems or hardware, staff from TROs and TSOs were given training to run them".*
>
> Hence daily operation in the TROs and TSOs were manageable.

6.5.6 E-Government Systems Performance

This study found that the Indonesian Treasury was at the initial stage of changing ICT to be a partner for business (Respondent 8). ICT had long been viewed as tools only (Respondent 8; Respondent 10). Nevertheless, at the operational level, the Indonesian Treasury e-Government systems are considered satisfactory (Respondent 3; Respondent 6; Respondent 9). Respondent 7 mentioned that current systems were considered reliable in supporting daily operations at the TROs and TSOs. However, the systems had not been satisfying the people at the strategic level, as stated by Respondent 1:

> *"The current Indonesian Treasury e-Government systems do not fully deliver what is needed by the people at the strategic level. However, the systems are considered satisfactory at the operational level."*
>
> Another response from Respondent 3 conformed:

> *"From the operational point of view, current systems are considered satisfactory. The systems can help generate complex government financial reports. However, I'm questioning whether or not the data is valid, useful and*

available. For example, when the data is converted to meet SPAN's standard, we found some invalid data."

The systems were considered satisfactory because the Indonesian Treasury did not have high expectations as stated by Respondent 1:

"I can see that the user's interests are mainly in getting the job done. The expectation is not high."

Respondent 1 further stated:

"The Indonesian Treasury e-Government performance is better than the manual one. However, if I look at the spending in ICT investment, the systems should deliver more. One of the issues that I would like to address is in improving the system reliability."

Although the law mandated that public financial management should be run as an integrated system (Respondent 4), the Indonesian Treasury was aware that current systems were fragmented, as Respondent 2 mentioned:

"The e-Government performance is not easy to measure as they tend to be separated. Each business unit has its own systems and maintains its own data."

Fragmented systems were due to responses to interim needs from business (Respondent 4; Respondent 10). Hence, high-level officials required extra work to consolidate data through meetings (Respondent 2).

Although the current systems had hastened the Treasury services, the systems quality had to be improved (Respondent 6; Respondent 9). The quality of data could be affected by significant back doors in the existing systems (Respondent 12). Thus, user awareness needs to be enhanced (Respondent 11).

Based on thematic analysis, it can be inferred that the absence of architectural document can have some impacts on the e-Government system performance.

6.6 Documentary Evidence

6.6.1 Government Regulations

This study was not able to locate Enterprise Architecture documents either in the Indonesian Treasury or the Indonesian Ministry of Finance. However, this study found fourteen documents associated with ICT as listed in Appendix D. One of them was issued by the Indonesian Treasury. It was regulation number KEP10/PB/2008 regarding a standard for hardware and software. Unfortunately, the regulation expired in 2011. This study was not able to locate any document to replace it.

This study analysed ICT related regulations that were used by the Indonesian Treasury. Some of these documents referred to internationally known standards such as Software Development Life Cycle (SDLC) in regulation number 351/KMK.01/2011, ITIL in regulation numbers 414/KMK.01/2011 and 64/KMK.01/2012, and ISO 20000:2011 in regulation number 83/KMK.01/2013.

6.6.2 Administration Mailing Systems

Using the administration mailing systems archive, the study found that the number of data requests, report requests and reconciliations from the headquarters is still growing as seen in Figure 6.7. The Indonesian Treasury maintained its mailing administration in a web application using a MySQL database. The results were generated from query statements in Structured Query Language (SQL) as seen in Appendix E.

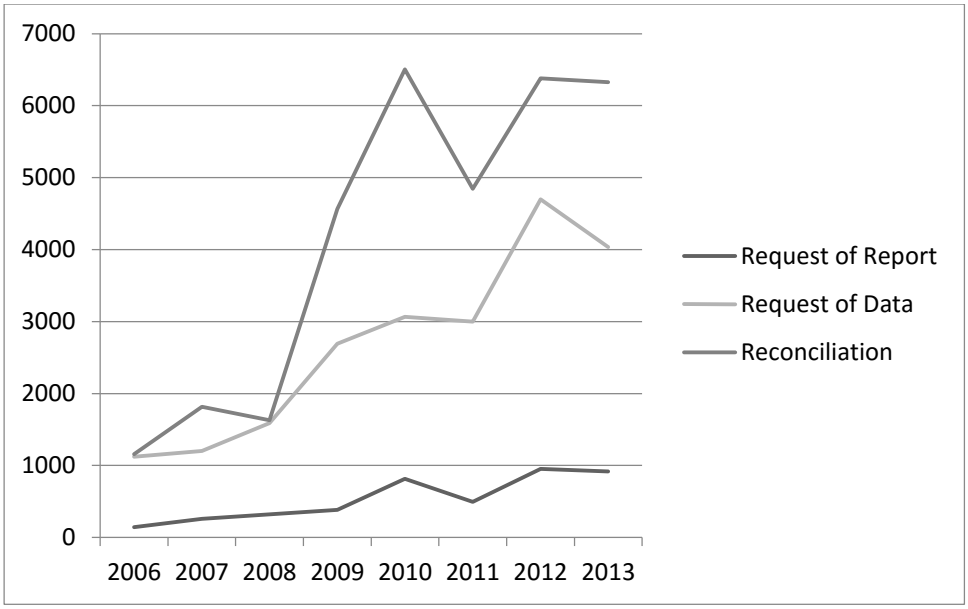


Figure 6.7. The growth of requests from the Indonesian Treasury Headquarters

The administration mailing systems data were used to understand how beneficial the current Indonesian Treasury e-Government systems are to the high level officials in the headquarters. The study used *permintaan data* (request of data), *permintaan laporan* (request of report), and *rekonsiliasi* (reconciliation) as its criteria in the query. The frequency of requests can be used to infer whether or not the e-Government systems provided sufficient information and accessibility for the high level officials. It could be inferred from the trend of such requests that high-level officials in the Indonesian Treasury required extra effort in fulfilling their needs for information. Further detailed results of queries applied to the years 2006 to 2013 can be found in Appendix F.

6.7 Observation

The study observed how the Indonesian Treasury and its stakeholders interact with the systems during its peak. The peak of financial transactions normally occurs at the end of the Indonesian fiscal year. The Indonesian fiscal year follows the calendar

year (The Central Intelligence Agency, 2014). It follows that the peak for financial transactions occurs in November and December.

According to the Indonesian Treasury regulation number 42/2013 regarding transactions at the end of fiscal year, the last day for payment order submission is on 23 December 2013. During the observation, the study did not find significant queues on that day and also not for a few days before. This means that the systems did not experience extensive transactions that could lead to major performance issues. The situation occurred because the head of TSOs asked its spending units to distribute their payment orders across several days. The TSO head office also set a limit on the number of payment orders per day for each spending unit.

6.8 Conclusion and Summary

Most research techniques used in the qualitative analysis demonstrated similar findings. However, the observation did not give additional findings since the Indonesian Treasury managed its transaction load by using human controls. Hence, treasury transactions were fairly distributed before the peak period was reached. The results of the interviews with the fifteen respondents are reasonably similar to the hypotheses of the study wherein the presence or absence of EA is affecting the e-Government performance. Content analysis of the interviews revealed each group of respondents had different interests. This is consistent with the EA framework developed by Zachman (1992) acknowledging various interests for different groups of an enterprise. Thus, the qualitative findings have partially answered the last two research questions. This study then used quantitative analysis to complete the answers of its research questions.

Chapter 7
QUANTITATIVE FINDINGS

7.1 Overview

This chapter discusses the quantitative analysis used in this study. A variety of statistical techniques were employed. The stages followed in conducting the quantitative analysis are reflected in the sections of this chapter and illustrated in Figure 7.1. It begins by developing measures of constructs in the framework. It follows by presenting the result of data validity tests. Subsequently, it reveals descriptive statistics for the respondents from the sample data. More advanced statistical analysis is discussed in a simple mediation analysis using second-order structural equation modelling (SEM). The analysis aims to validate the proposed model. It then presents the outcomes of each of the mediators in the research model. This chapter concludes with the quantitative analysis results.

7.2 Developing the Measures

In developing the measures, this study makes use of a 6-point Likert scale (Likert, 1932). The neutral value was excluded in the measure due to the characteristics of the respondents (Trompenaars & Woolliams, 2011) and to introduce systematic method adjustment (Raaijmakers, 2000). The measures were developed as observed variables.

This study developed questions for the observed variables to represent the dimensions in the model. Each dimension has at least five questions. The e-Government Performance dimension adopted the questions/statements from Gorla (2012) and Parasuraman et al. (1988). The lists of questions/statements are listed in Table 7.1 and Table 7.2.

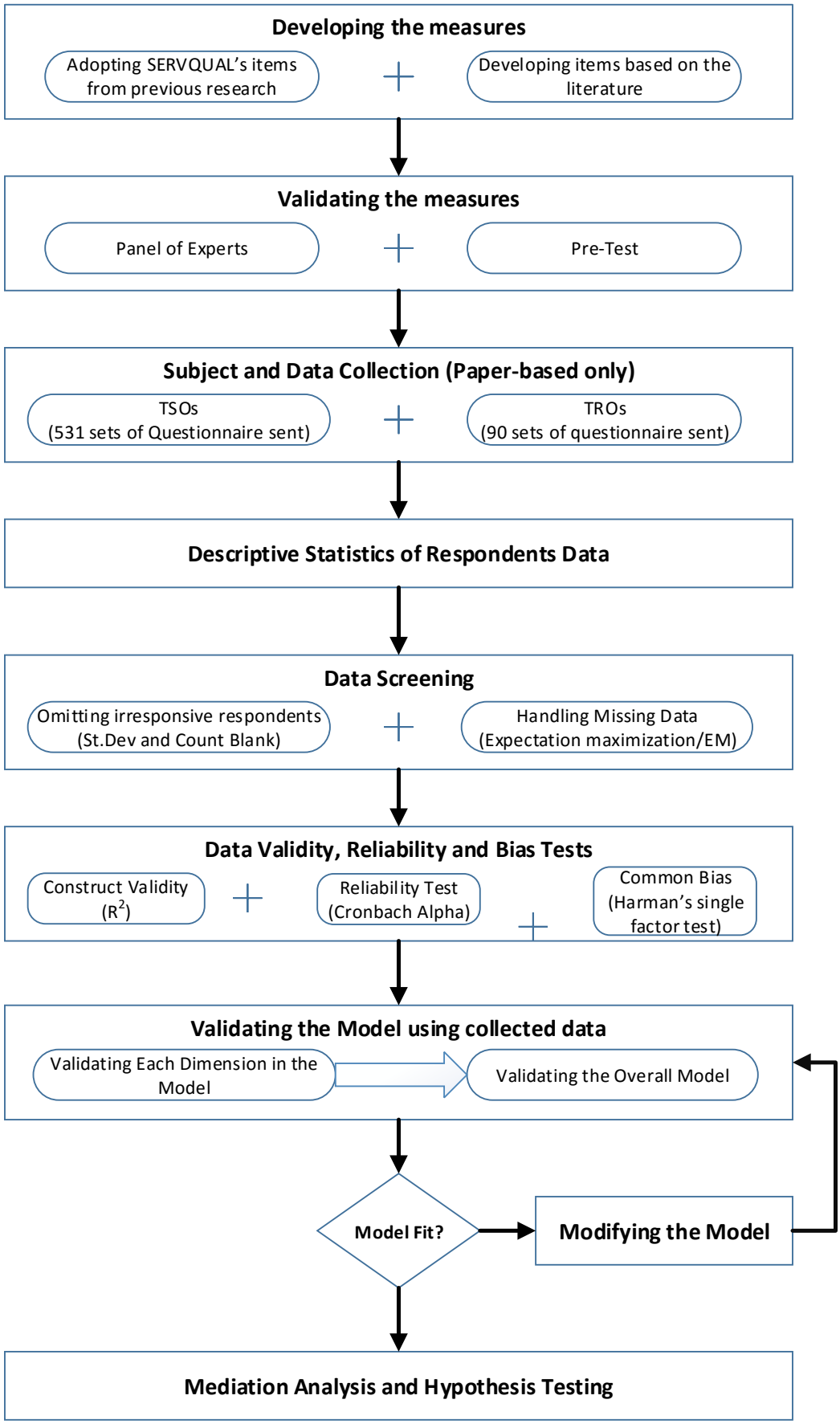


Figure 7.1. Quantitative Analysis Flowchart

Table 7.1. List of Questions/Statements Developed

	Enterprise Architecture (EA)
EA1	I am involved in the process of designing information systems.
EA2	Frequently requested to suggest ways to optimise the system.
EA3	ICT Standard(s) is/are already available.
EA4	Enterprise attributes (such as business, ICT, people) have fully aligned with the strategic missions.
EA5	Mechanisms are available to propose enterprise enhancement.
EA6	Contribute to some parts of information system development only e.g. system testing, training.
EA7	Data are interchangeable with other government institutions.
EA8	ICT infrastructures always comply with the approved standard(s).
EA9	Enterprise performance indicators affect budget allocation.
	Organisational Alignment (OA)
OA1	Indonesian Treasury's mission is clear.
OA2	Existing business process has significantly represented the strategic goals.
OA3	The system has fully complied with Indonesian treasury business.
OA4	The changes in organizational structure align with the strategic mission.
OA5	Current system needs significant adjustment.
	Information Availability (IA)
IA1	Current system can directly generate useful information.
IA2	Data management in the existing systems is simple.
IA3	Data are easy to access.
IA4	High-level officials can customize their own reports.
IA5	High-quality information can be easily generated from the existing system.
	Resource Portfolio Optimisation (RP)
RP1	ICT investment relies on existing resources.
RP2	There are no idle resources.
RP3	Investment policies are targeted to fill target performance gaps.
RP4	There are no duplicated resources.
RP5	Information on existing resources is accessible for the system architect and/or high-level officials.
	Resource Complementarity (RC)
RC1	The intention of ICT investment is solely to support Indonesian treasury's strategic mission.
RC2	Although budget is available, no additional resources are needed because current systems are already optimised.
RC3	Locally purchased resources always align with headquarters' investment.
RC4	Complementarity resources improve service delivery.
RC5	Unnecessary resources are rarely purchased.

Table 7.2. List of Questions/Statements adopting SERVQUAL

	e-Government Performance (e-Gov)	Factor
T1	Up-to-date hardware and software applied immediately.	Tangible
T2	My office has visually appealing physical facilities.	
T3	Neat appearance of IS employees.	
T4	Physical facilities align with service provided.	
RL1	Information Systems (IS) units always fulfil promises.	Reliability
RL2	IS units show sufficient interest to solve users problems.	
RL3	I am highly dependent on IS units.	
RL4	IS units provide timely services.	
RL5	IS units record users problems accurately.	
RS1	Prompt service to users.	Responsiveness
RS2	Willingness to help users.	
RS3	IS staff available to respond to user requests.	
RS4	Frequent termination of unfinished tasks.	
A1	IS units' staff are instilling confidence.	Assurance
A2	Users feel secure when using the systems.	
A3	Courteous interaction with IS users.	
A4	Knowledgeable IS employees.	
EM1	Individual attention to users.	Empathy
EM2	Proper behaviour towards users.	
EM3	IS units act in best interest of users	
EM4	IS staff understands users' needs.	
EM5	Convenient IS support operating hours.	

The study conducted several validity tests to ensure the measures were valid, reliable and consistent.

7.3 Validity Test of the Measures

Del Greco et al. (1987) argue that there are four validity tests that improve the consistency and the quality of questionnaires. They are content validity to determine adequacy, face validity to improve the the look of the questionnaire, criterion validity to increase the level of questionnaire effectiveness and construct validity to conform with the theory.

This study employed different resources to comply with all validity tests. A draft of the questionnaire was sent to Indonesian Treasury staffs who were conducting post graduate studies in Adelaide. This was done after receiveing suggestions from a panel of experts' including research supervisors, a statistical consultant at Flinders University, and other PhD students from Indonesia and other countries.

7.3.1 Panel of Experts

The research received several recommendations to improve the quality of the questionnaire. The comments received from the experts are categorsied into validity criteria as presented in Table 7.3. The study took into account some major contributions to the questionnaire from the experts, such as:

1. The layout: experts advised a redesign of the initial questionnaire to make it look professional;
2. The order of questions: experts suggested that the order of questions be randomised to make the answers less predictable;
3. Breaking questions into groups: it was suggested that questions be collected into two or three groups per page to guard against participants from becoming uninterested in responding to the questions/statements;
4. Selection of words: the Indonesian PhD students advocated for the most commonly accepted interpretation in Indonesian language to minimise misinterpretation;

The study accomodated the recommendations in the revised questionnaire. The study then sent them to the Indonesian Treasury employees in Adelaide to pre-test the questionnaire in order to enhance the quality of questions asked.

Table 7.3. Group of validity responses received from experts

Validity Criteria	Research Supervisors	Statistical Consultant	Indonesian PhD Students	Other PhD Students
Content	√	√	√	√
Face	-	√	√	-
Criterion	√	√	√	√
Construct	√	√	-	-

7.3.2 Pre-Test

The study received seven responses from ten Indonesian Treasury employees who were studying in Adelaide. They completed the questionnaires and gave comments on any area of the questionnaire that could be improved. Their contributions were significant in improving the questionnaire's content and criterion validities. Proper terminology was suggested such as *pengadaan* (procurement) instead of *investasi* (investment). Although those words have different semantic meanings, the Indonesian Treasury uses procurement interchangebly with investment.

The finalised questionnaire was sent to the Ethics Committee at Flinders University to gain ethics approval. Having received the ethics approval, the study sent the questionnaire to the subjects of the research.

7.4 Subject and Data Collection

Since the aim of this study is to investigate ways to improve the e-Government performance in developing countries with the Indonesian Treasury as its case study, this study validated its research model with Indonesian Treasury employees. The study involved the Indonesian Treasury offices nationwide including its headquarters, the Treasury Regional Offices (TRO), and the Treasury Service Offices (TSO).

The respondents were informed of the expected benefits arising from this study for the Indonesian Treasury. Consequently, respondents were expected to be careful and honest in responding to the survey. Although the study did not offer any direct

recompense in any form for a response, the number of responses received was around 90% of invitations sent. This indicates that the study was considered important and useful by the respondents.

Upon receiving responses, the study conducted preliminary data preparation activities. Data preparation in this study comprises data coding, data entry, and data cleansing. First, this study prepared the database before entering any data. The number of fields used in the database was coded according to the observed variables. The scales in the database referred to the scales in the questionnaire from 1 (strongly disagree) to 6 (strongly agree).

Second, this study entered the data into statistical package SPSS version 22. Third, this study conducted a thorough evaluation of the data by looking for maximum and minimum values for each response. This study manually compared the results with the original responses. Thus, this study could ensure that the data had been accurately entered before analysing its descriptive statistics.

7.5 Descriptive Statistics of Respondents Data

According to Pallant (2011), descriptive statistics can be used to show the basic features of the data, to validate any incorrect asumptions, and to generate further research questions. Using the frequency feature of SPSS version 22, the study generated descriptive statistics for each dimension in the research framework and for the demography of its respondents.

This study received 561 responses. Most responses came from males as seen in Table 7.4. This response distribution reflects the gender distribution of Indonesian Treasury employees as shown in Appendix G.

Table 7.4. Respondent Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	433	77.2	86.9	86.9
	Female	65	11.6	13.1	100.0
	Total	498	88.8	100.0	
Missing	System	63	11.2		
Total		561	100.0		

The majority of responses were received from Indonesian Treasury staff aged more than 40 years old, as seen in Table 7.5. Respondent's age distribution is also deemed similar with employee's age distribution as presented in Appendix G.

Table 7.5. Respondent Group of Age in years old

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25	33	5.9	5.9	5.9
	Between 25 and 30	72	12.8	12.9	18.8
	Between 30 and 35	56	10.0	10.0	28.9
	Between 36 and 40	72	12.8	12.9	41.8
	Between 41 and 45	120	21.4	21.5	63.3
	Between 46 and 50	107	19.1	19.2	82.4
	More than 51	98	17.5	17.6	100.0
	Total	558	99.5	100.0	
Missing	System	3	.5		
Total		561	100.0		

The majority of the 561 participants have been working for the Indonesian Treasury for more than ten years as seen in

Table 7.6. This indicates that the participants had sufficient information over the life of the dynamic e-Government systems there. This also meant that the participants were aware of any changes after the enactment of public financial laws.

Table 7.6. Working Period

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5	39	7.0	7.7	7.7
	Between 5 and 9	77	13.7	15.2	22.9
	Between 10 and 14	87	15.5	17.2	40.1
	Between 15 and 19	105	18.7	20.8	60.9
	Between 20 and 24	50	8.9	9.9	70.8
	More than 25 years	148	26.4	29.2	100.0
	Total	506	90.2	100.0	
Missing	System	55	9.8		
Total		561	100.0		

Table 7.7 shows that the majority of participants were from the Treasury Service Offices. This distribution is also close to the comparison between the total number of TROs and TSOs as covered in Appendix G

Table 7.7. Working place

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Treasury Regional Office	66	11.8	11.9	11.9
	Treasury Service Office	490	87.3	88.1	100.0
	Total	556	99.1	100.0	
Missing	System	5	.9		
Total		561	100.0		

The study received most responses from Indonesian Treasury officers who were working on the islands of Java, Sumatera and Borneo as seen in Table 7.8. The concentration of responses in Java and Sumatera reflects the fact that most offices are situated on these main islands of Indonesia, as stated in Appendix G.

Table 7.8. Office Location Area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Java / Bali	175	31.2	33.5	33.5
	Sumatera / Borneo	201	35.8	38.4	71.9
	Celebes / Papua	83	14.8	15.9	87.8
	Other areas	64	11.4	12.2	100.0
	Total	523	93.2	100.0	
Missing	System	38	6.8		
Total		561	100.0		

The study aimed for an equal distribution of the 561 participants across their roles in their office as stated in Section 4.6. The comparison among roles, as depicted in Table 7.9, is considered to be close to the expected number. Thus, representation of each role is present in this study.

Table 7.9. Role in Office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Head of Office	81	14.4	19.1	19.1
	Division Head	21	3.7	5.0	24.1
	Section Head	141	25.1	33.3	57.4
	Staff	180	32.1	42.6	100.0
	Total	423	75.4	100.0	
Missing	System	138	24.6		
Total		561	100.0		

Table 7.10 indicates that most participants have earned at least a diploma degree. It can be inferred from this that the participants have sufficient knowledge on the use of ICT to achive the Indonesian Treasury objectives.

Table 7.10. Educational Background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Postgraduate	126	22.5	22.7	22.7
	Undergraduate	294	52.4	52.9	75.5
	Diploma	115	20.5	20.7	96.2
	Others	21	3.7	3.8	100.0
	Total	556	99.1	100.0	
Missing	System	5	.9		
Total		561	100.0		

7.6 Data Screening

The quality of the data was verified through preliminary data analysis. Respondents who missed more than 33% of the questions were excluded. Also excluded were respondents who provided similar answers to all questions, as indicated by using the standard deviation for each respondent. Respondents with a standard deviation less than 0.3 were deemed to not be engaged in the research. The study rejected nine respondents' data. They were removed as part of cautious data preparation before handling missing data in responses.

7.6.1 Handling Missing Data

Missing data could harm further analysis for the estimation of the structural equation model (SEM) used in this study (Allison, 2003; Davey, 2009; Graham, 2012). This study employed an expectation maximisation (EM) algorithm to resolve missing data. The EM algorithm is one of many techniques that can be used to account for missing data (Graham, 2012). The EM algorithm is designed to produce the maximum likelihood (ML) parameter estimates in each variable.

Missing data occurred at random in the responses. As seen in Table 7.11, the percentage of missing data varies across the questionnaire statements. Five variables had no missing responses and one variable (EA9) had considerably higher number of

missing values at 7.49%. This study used SPSS to conduct missing value analysis using the EM algorithm.

Table 7.11. Total Missing Responses for Observed Variables

Missing Response(s)	PCT Missing	Number of Variable(s)	Variable(s)
0	0.00%	5	T2,RL1,RL3,A3,EM3
1	0.18%	1	RL5
2	0.36%	4	RS2,A1,EM1,EM5
3	0.53%	3	RC4,EA2,EA8
4	0.71%	5	T1,RS4,EM2,IA1,RP3
5	0.89%	5	IA2,RP4,RC1,RC3,EA4
7	1.25%	2	EM4,IA5
9	1.60%	2	A2,RP5
10	1.78%	3	T4,RS3,EA5
11	1.96%	3	RL2,RL4,OA3
12	2.14%	1	A4
13	2.32%	1	OA5
14	2.50%	3	OA2,IA4,RC2
15	2.67%	2	OA4,EA1
16	2.85%	2	RP2,RC5
17	3.03%	2	OA1,RP1
19	3.39%	2	T3,IA3
20	3.57%	2	EA3,EA7
25	4.46%	1	RS1
42	7.49%	1	EA9

This study calculated Little's MCAR test: Chi-Square = 4707.088, DF = 4728, Sig. = 0.583. The study conducted a separate variance t Test for EA9 because it had more than 5% of values missing. The results of the analysis show all the p values did not exceed 0.05. Consistent with suggestion from Moss (2009) and Enders (2003), the result of the missing value analysis using EM can be deemed sufficient.

This study replaced missing values by conducting a maximum of 200 iterations of the EM algorithm in order to improve the likelihood (Neal & Hinton, 1998). Therefore, the data are considered ready for the preliminary analyses.

7.6.2 Preliminary Data Analyses

This study ran its preliminary data analysis to calculate skewness, kurtosis and outliers. Kline (2011, p. 54) defines outliers as *"scores that are different from the rest"*. Errors in data entry, insufficient instruction or layout of the survey instruments could be the cause of the outliers (Barnett, 1978; Byrne, 2010; Kline, 2011). The normality of data could be affected by outliers (Karunasena, 2012). Using Boxplot to identfy the outliers, as susgested by Hair, Black, Babin, Anderson, and Tatham (2010), this study found only a few cases with serious outliers. These outliers were excluded from further analysis.

The kurtosis and skewness for each variable was reviewed as part of the preliminary analysis. Kurtosis refers to the peakedness or flatness of a data distribution (Hair et al., 2010; Pallant, 2011). Skewness indicates the symmetry of the data distribution (Pallant, 2011). The presence of extreme skewness and kurtosis can harm the SEM analysis (Hair et al., 2010).

This study did not find any extreme skewness or kurtosis in its data. As seen in Appendix I, the observed variables were not considered to be extremely skewed because none of them has an absolute value of skewness greater than 3.0 (Kline, 2011). Similarly, for the kurtosis, none of the variables had a value greater than 7.0 (Byrne, 2010). Hence, the result of the examination of the skewness and kurtosis indicates that the data for this study are within range for further analysis.

7.7 Data Reliability, Validity and Bias Tests

In order to run the SEM analysis smoothly, the model should have good measurements for each of the latent variables (Hair et al., 2010). A construct validity test and internal consistency reliability test were conducted to determine if this was the case.

7.7.1 Construct Validity Test

Constuct validity was tested using convergent validity and discriminant validity. Items in the same factor are considered to satisfy convergent validity when they demonstrate high correlation among the measures (Garson, 2013c; Kline, 2011). Whilst discriminant validity refers to low correlation with other measuring factors (Alzahrani, 2014; Garson, 2013c; Karunasena, 2012; Kline, 2011; Susanto, 2012).

In assessing the construct validity of the measures, this study used SEM in AMOS version 22. The latent variables were connected using curve covariance arrows (Garson, 2013c). This study used multiple regression weight (r^2) as the convergent validity (Garson, 2013c; Hooper et al., 2008). The discriminant validity referred to the correlation between the items and the factors (Byrne, 2010; Garson, 2013c).

Construct validity was conducted in two stages. First was an assessment of the validity of the second-order factors in the model. Instead of measuring through direct observed variables, second-order factors were measured through the related first-order factors (Byrne, 2010; Kline, 2011). The e-Government Performance was the only dimension that referred to the second-order factor in the model, as seen in Figure 7.2.

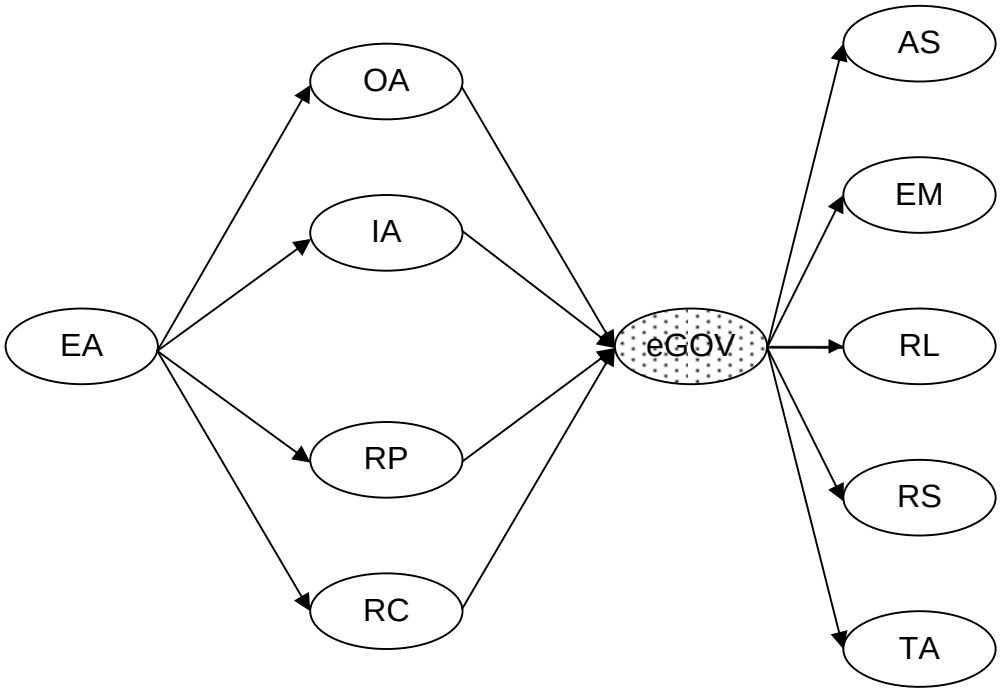


Figure 7.2. The Relationship of Latent Variables in the Model

7.7.1.1 The Second-order dimension

The study adopted the measurements from SERVQUAL for the e-Government Performance (eGov) dimension. This study was aware of SERVQUAL's unstable dimensionality (Jiang et al., 2002; Landrum et al., 2009; Myerscough, 2002). As a second-order factor in the model, e-Government Performance was not measured directly from the observed variables. Therefore, the e-Government factor was exogenous. It was measured through details of the covariances in the first-order factors (Kline, 2011). Thus, should this study require any modification to SERVQUAL, it should not harm the Confirmatory Factor Analysis of the model in this study.

The construct validity test for the second-order dimension used in the SEM model is as seen in Figure A. 6 of Appendix J. The study dropped RL3 and RS4 to

ensure convergent validity. Those variables had squared regression weights (r^2) less than 0.20 as seen in Table 7.12.

Table 7.12. Convergent Validity Analysis for the e-Government Dimension

e-Gov Performance		
Obs ← Lat	**R**	**r^2**
A1 ← AS	0.731	0.535
A2 ← AS	0.701	0.492
A3 ← AS	0.684	0.468
A4 ← AS	0.581	0.338
EM1 ← EM	0.765	0.585
EM2 ← EM	0.528	0.279
EM3 ← EM	0.776	0.602
EM4 ← EM	0.722	0.522
EM5 ← EM	0.462	0.213
RL1 ← RL	0.733	0.537
RL2 ← RL	0.767	0.589
RL3 ← RL	0.305	**0.093**
RL4 ← RL	0.727	0.528
RL5 ← RL	0.657	0.432
RS1 ← RS	0.663	0.439
RS2 ← RS	0.510	0.260
RS3 ← RS	0.587	0.345
RS4 ← RS	-0.297	**0.088**
T1 ← TA	0.592	0.351
T2 ← TA	0.629	0.396
T3 ← TA	0.632	0.400
T4 ← TA	0.638	0.407

Although the remaining twenty items were statistically significant (p value <0.01), the observed variables could not be reduced into five factors as seen in Table 7.13. This indicated inconsistencies between the data and the model. As stated earlier,

this was consistent to other studies adopting SERVQUAL in the Information Systems field (Jiang et al., 2002; Landrum et al., 2009; Myerscough, 2002). Consequently this study needed to reconstruct the factors for SERVQUAL by using Exploratory Factor Analysis (EFA).

Table 7.13. Factor Score Weight

Variables	TA	RS	AS	EM	RL
A1	0.089	**0.105**	0.045	0.065	0.080
A2	0.076	**0.089**	0.038	0.055	0.068
A3	0.092	**0.108**	0.046	0.066	0.083
A4	0.058	**0.069**	0.029	0.042	0.052
EM1	0.044	**0.225**	0.083	0.091	0.074
EM2	0.020	**0.103**	0.038	0.042	0.034
EM3	0.043	**0.219**	0.081	0.089	0.072
EM4	0.038	**0.192**	0.071	0.078	0.063
EM5	0.010	**0.051**	0.019	0.021	0.017
RL1	0.059	**0.120**	0.066	0.047	0.065
RL2	0.081	**0.166**	0.090	0.064	0.090
RL4	0.060	**0.123**	0.067	0.048	0.067
RL5	0.042	**0.086**	0.047	0.033	0.047
RS1	-0.017	-0.201	0.066	**0.109**	0.092
RS2	-0.010	-0.121	0.039	**0.066**	0.055
RS3	-0.014	-0.165	0.054	**0.090**	0.076
T1	**0.072**	-0.011	0.037	0.014	0.029
T2	**0.109**	-0.017	0.055	0.021	0.044
T3	**0.120**	-0.019	0.060	0.023	0.049
T4	**0.113**	-0.018	0.057	0.022	0.046

The observed variables in the e-Government Performance dimension were reconstructed using EFA. DeCoster (1998) argues that performing EFA to resolve inconsistencies between the data and the model is acceptable. However, EFA should be performed using not more than half of the data (DeCoster, 1998). As such, forty

percent of the data was randomly selected using SPSS. More than 200 data sets as a result of this selection were sufficient to be analysed using factor analysis (Gorsuch, 1997; Henson & Roberts, 2006; Tabachnick & Fidell, 2007).

The data were then tested in SPSS version 22 and MPLUS for the remaining twenty observed variables. As a result, another observed variable, namely T4, was dropped. Both MPLUS and SPSS showed that this observed variable had a factor score weight similar to more than two other factors. Using maximum likelihood, SPSS suggested three factors for the nineteen observed variables. MPLUS suggested four factors as the construct in the model. The comparison between the two can be seen in Table 7.14 with items for each factor highlighted in bold.

Table 7.14. EFA Results Comparison

Observed Variables	MPLUS - 4 FACTORS				SPSS (EFA - ML)		
	1	2	3	4	1	2	3
T1	**0.580**	0.2	0.0	-0.1			0.434
T2	**0.830**	0.0	-0.1	0.0			0.707
T3	**0.607**	0.0	0.1	0.1			0.543
RL1	0.2	**0.680**	0.0	0.0	0.630		
RL2	0.0	0.2	0.2	**0.576**		0.547	
RL4	0.0	**0.535**	0.2	0.2	0.469		
RS1	0.0	**0.862**	0.0	0.0	0.811		
RS2	0.1	-0.2	**0.753**	0.1		0.708	
RS3	0.0	0.2	**0.416**	0.2		0.525	
RL5	**0.358**	0.3	0.0	0.2			0.372
A1	0.363	**0.475**	0.1	0.0	0.482		
A2	**0.422**	0.337	0.1	0.0	0.353		
A3	0.0	0.0	0.2	**0.684**		0.613	
A4	**0.708**	0.0	0.0	0.0			0.610
EM1	0.1	0.2	**0.763**	-0.1		0.616	
EM2	0.1	0.0	-0.1	**0.767**		0.391	
EM3	**0.465**	0.308	0.1	0.1			0.441
EM4	0.0	0.2	**0.667**	0.0		0.643	
EM5	-0.1	0.0	**0.518**	0.2		0.558	

The results from MPLUS were chosen for further analysis in the e-Government Performance dimension. They were selected due to the grouping of observed variables having close semantic meaning with the languange used for the questionnaire and because they were relevant to the cultural reactions from the respondents as suggested by Trompenaars and Woolliams (2011).

The original names of the observed variabls were kept as the constructs of SERVQUAL. Thus, this study retained Tangible (TA) as factor number 1, Reliability (RL) as factor number 2 and Assurance (AS) as factor number 4. Empathy and Responsiveness (EMRS) were merged as factor number 3. The modified e-Government Performance dimension can be seen in Figure 7.3. All dimensions were then combined for the overall construct validity test.

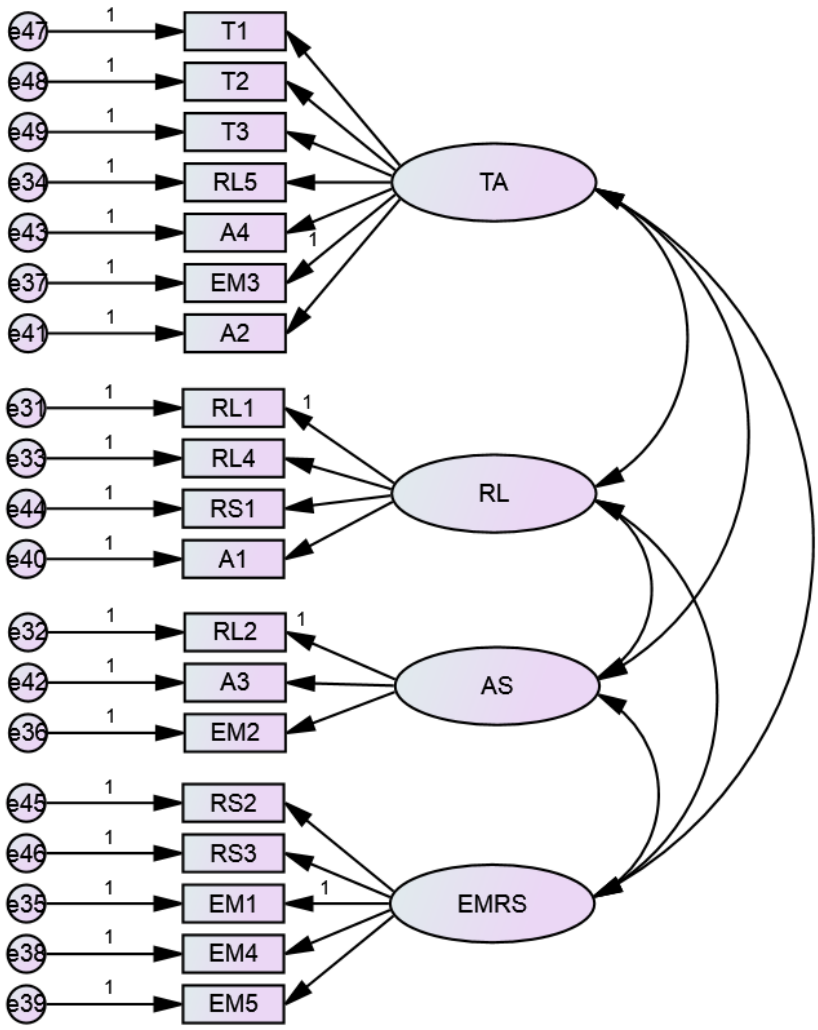


Figure 7.3. Modified e-Government Performance Dimension

7.7.1.2 All Dimensions in the Model

Having refined the unstable SERVQUAL constructs used for the e-Government Performance dimension, this study then covaried all dimensions in the model as depicted in Figure A. 7 of Appendix J. The multiple regression weights (r^2) are presented in Table 7.15. All observed first-order variables of e-Government performance satisfied the convergent validity test. Thus, no observed variables were excluded for the e-Government Performance dimension.

Table 7.15. Convergent Validity of the Measures

Obs ← Latents	R	r^2
TA ← eGov*	0.960	0.920
RL ← eGov*	0.900	0.810
AS ← eGov*	0.878	0.770
EMRS ← eGov*	0.879	0.770
EM2 ← AS	0.600	0.360
A3 ← AS	0.772	0.600
RL2 ← AS	0.851	0.720
EM5 ← EMRS	0.457	0.210
EM4 ← EMRS	0.784	0.610
EM1 ← EMRS	0.836	0.700
RS3 ← EMRS	0.686	0.470
RS2 ← EMRS	0.528	0.280
RS1 ← RL	0.799	0.640
RL4 ← RL	0.759	0.580
RL1 ← RL	0.806	0.650
A1 ← RL	0.782	0.610
EM3 ← TA	0.813	0.660
A4 ← TA	0.627	0.390
RL5 ← TA	0.694	0.480
T3 ← TA	0.631	0.400
T2 ← TA	0.603	0.360
T1 ← TA	0.585	0.340
A2 ← TA	0.742	0.550
EA1 ← EA	0.443	**0.196**
EA2 ← EA	0.411	**0.169**
EA3 ← EA	0.738	0.544
EA4 ← EA	0.539	0.290
EA5 ← EA	0.573	0.328
EA6 ← EA	0.416	**0.173**
EA7 ← EA	0.366	**0.134**
EA8 ← EA	0.486	0.236
EA9 ← EA	0.801	0.641
OA1 ← OA	0.654	0.428
OA2 ← OA	0.769	0.592
OA3 ← OA	0.458	0.210
OA4 ← OA	0.696	0.485
OA5 ← OA	0.032	**0.001**
IA1 ← IA	0.630	0.397
IA2 ← IA	0.228	**0.052**
IA3 ← IA	0.476	0.227
IA4 ← IA	0.329	**0.108**
IA5 ← IA	0.727	0.528
RP1 ← RP	0.568	0.323
RP2 ← RP	0.598	0.358
RP3 ← RP	0.585	0.342
RP4 ← RP	0.634	0.402
RP5 ← RP	0.527	0.278
RC1 ← RC	0.661	0.437
RC2 ← RC	0.257	**0.066**
RC3 ← RC	0.655	0.429
RC4 ← RC	0.558	0.311
RC5 ← RC	0.580	0.336

*** indicates second-order factor**

The number of variables dropped as a result of the convergent validity test were varied. RP was the only dimension that did not have any observed variables dropped for further analysis. The study excluded EA1, EA2, EA6 and EA7 for the EA dimension; OA5 for the OA dimension; IA2 and IA4 for the IA dimension; RC2 for the RC dimension. The r^2 values for the above mentioned variables were less than 0.20. Variables with an r^2 value less than 0.20 indicate high levels of error (Hooper et al., 2008; Iacobucci, 2009; Susanto, 2012).

This study then ran several tests to ensure discriminant validity. To satisfy discriminant validity, Garson (2013b) suggests that the correlation values between observed variables and unintended latent variables should be less than 0.85. In addition, Schmitt and Stults (1986) suggest that discriminant validity is achieved when multicollinearity between factors was not present. The correlation value between two factors should not be more than 1.00, otherwise it indicates the presence of multicollinearity (Byrne, 2010).

The result of such discriminant validity tests, as seen in Table 7.16 and Table 7.17, were considered to satisfy both criteria mentioned above. This study did not find any value above 1.00 for the correlation among factors as seen in Table 7.16. Moreover there was no observed variable with a value more than 0.85 for the unintended factor. Thus, the findings indicate that discriminant validity had been achieved.

Table 7.16. Correlation Between Factors

Pairs of Factors	Correlation Estimate
EA <--> IA	0.803
EA <--> RC	0.747
EA <--> OA	0.770
EA <--> RP	0.818
EA <--> eGov	0.707
IA <--> RC	0.840
IA <--> OA	0.918
IA <--> RP	0.898
IA <--> eGov	0.812
RC <--> OA	0.942
RC <--> RP	0.949
RC <--> eGov	0.802
OA <--> RP	0.893
OA <--> eGov	0.762
RP <--> eGov	0.852

Table 7.17. Correlation Between Items and Factors

Obs	RP	OA	RC	IA	EA	EMRS	AS	RL	TA
RP1	**0.065**	0.027	0.057	0.034	0.029	0.007	0.008	0.009	0.012
RP2	**0.027**	0.011	0.024	0.014	0.012	0.003	0.003	0.004	0.005
RP3	**0.092**	0.039	0.081	0.049	0.042	0.010	0.011	0.012	0.017
RP4	**0.034**	0.014	0.030	0.018	0.016	0.004	0.004	0.005	0.006
RP5	**0.036**	0.015	0.032	0.019	0.017	0.004	0.004	0.005	0.007
OA1	0.023	**0.101**	0.064	0.058	0.020	0.002	0.002	0.002	0.003
OA2	0.026	**0.115**	0.073	0.066	0.022	0.002	0.003	0.003	0.004
OA3	0.019	**0.084**	0.053	0.048	0.016	0.002	0.002	0.002	0.003
OA4	0.023	**0.101**	0.064	0.058	0.020	0.002	0.002	0.002	0.003
RC1	0.053	0.070	**0.103**	0.012	0.011	0.005	0.006	0.007	0.009
RC3	0.042	0.056	**0.083**	0.010	0.009	0.004	0.005	0.005	0.007
RC4	0.044	0.059	**0.086**	0.010	0.010	0.004	0.005	0.005	0.008
RC5	0.033	0.044	**0.065**	0.008	0.007	0.003	0.004	0.004	0.006

IA1	0.033	0.066	0.013	**0.128**	0.035	0.007	0.008	0.009	0.012
IA3	0.008	0.017	0.003	**0.034**	0.009	0.002	0.002	0.002	0.003
IA5	0.045	0.090	0.017	**0.176**	0.047	0.009	0.011	0.012	0.016
EA3	0.011	0.009	0.005	0.014	**0.077**	0.001	0.001	0.002	0.002
EA4	0.023	0.018	0.010	0.028	**0.158**	0.003	0.003	0.003	0.005
EA5	0.014	0.011	0.006	0.017	**0.096**	0.002	0.002	0.002	0.003
EA8	0.022	0.017	0.009	0.027	**0.154**	0.002	0.003	0.003	0.004
EA9	0.010	0.008	0.004	0.012	**0.068**	0.001	0.001	0.001	0.002
RS2	0.004	0.001	0.003	0.004	0.002	**0.067**	0.008	0.009	0.013
RS3	0.006	0.002	0.005	0.006	0.003	**0.104**	0.013	0.014	0.019
EM1	0.016	0.005	0.013	0.016	0.008	**0.263**	0.032	0.036	0.049
EM4	0.012	0.004	0.010	0.012	0.006	**0.198**	0.024	0.027	0.037
EM5	0.003	0.001	0.002	0.003	0.001	**0.046**	0.006	0.006	0.009
RL2	0.018	0.006	0.015	0.019	0.009	0.032	**0.327**	0.041	0.057
A3	0.013	0.005	0.011	0.014	0.007	0.024	**0.240**	0.030	0.042
EM2	0.007	0.002	0.006	0.007	0.003	0.012	**0.121**	0.015	0.021
RL1	0.010	0.003	0.008	0.011	0.005	0.018	0.021	**0.180**	0.032
RL4	0.008	0.003	0.007	0.009	0.004	0.015	0.017	**0.149**	0.027
RS1	0.010	0.003	0.008	0.010	0.005	0.017	0.020	**0.173**	0.031
A1	0.010	0.003	0.008	0.010	0.005	0.018	0.020	**0.175**	0.031
T1	0.005	0.002	0.004	0.006	0.003	0.009	0.011	0.012	**0.044**
T2	0.007	0.003	0.006	0.008	0.004	0.013	0.015	0.017	**0.062**
T3	0.009	0.003	0.008	0.010	0.005	0.016	0.019	0.021	**0.077**
RL5	0.009	0.003	0.008	0.010	0.005	0.017	0.019	0.021	**0.078**
A2	0.013	0.004	0.011	0.013	0.006	0.022	0.026	0.029	**0.105**
A4	0.010	0.003	0.008	0.010	0.005	0.017	0.020	0.022	**0.080**
EM3	0.020	0.007	0.016	0.021	0.010	0.035	0.040	0.044	**0.162**

7.7.2 Reliability Test

It is common to use the Cronbach α (alpha) to identify data reliability (Achmad, 2012; Alzahrani, 2014; Karunasena, 2012; Susanto, 2012). The Cronbach α value should be above 0.7 (DeVellis, 2003 cited in Pallant, 2011). However, Pallant (2011) argues that the Cronbach α values are sensitive to the number of items. Low Cronbach α values with less than ten items can be reported using the mean inter-item correlation

(Pallant, 2011). An acceptable range of values for the mean inter-item is between 0.2 and 0.4 (Briggs and Cheek, 1986 cited in Pallant, 2011)

The results of the reliability data test are seen in Table 7.18. All latent variables are still within the acceptable range of values. Although the Cronbach α value for the modified IA is less than 0.7, the mean inter-item value is still within the range of 0.2–0.4. Hence, the data are considered to be reliable for further analysis such as common method variance.

Table 7.18. Cronbach Alpha and Mean Inter-Item Correlations

Latent Variables	Alpha	Mean inter-item	N Items
TA	0.847	-	7
RL	0.865	-	4
EMRS	0.791	-	5
AS	0.786	-	3
OA	0.730	-	4
IA	0.603	0.370	3
RP	0.707	-	5
RC	0.704	-	4
EA	0.715	-	5

7.7.3 Common Method Variance Bias

This study used Harman's single factor to test potential bias. Harman's single factor, a technique using one-factor for all observed varaibles to test common method variance, has frequently been used in studies (Podsakoff et al., 2003).

Although other techniques such as the marker variable and the multitrait-multimethod (MTMM) (Malhotra et al., 2006; Podsakoff et al., 2003; Schaller et al., 2015; Siemsen et al., 2010) were available as an alternatives to test common method variance, Malhotra et al. (2006) argue that studies in the IS field do not demonstrate

significant problems for the method biases. Thus, the use of Harman's single factor remained relevant for this study.

The result of the Harman's single factor, as seen in Table 7.19, is below forty percent. Hence, it satisfied the requirement for the test, which should not be more than fifty percent (Gaskin, 2011; Malhotra et al., 2006; Podsakoff et al., 2003). As such, the data were considered to be ready for the goodness-of-fit analysis with the model.

Table 7.19. Harman's Single Factor Test

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.641	36.603	36.603	14.641	36.603	36.603
2	2.06	5.15	41.753			
3	1.673	4.184	45.936			
4	1.44	3.601	49.537			
5	1.302	3.256	52.793			

7.8 The goodness-of-fit

Prior to measuring the goodness-of-fit (GOF) of the model, it was important for the study to apply appropriate estimation methods in AMOS (Byrne, 2010). Selection of suitable model estimation methods leads to sound measures (Byrne, 2010; Hair et al., 2010; Kline, 2011; Mulaik, 2009). This study applied maximum likelihood (ML) to estimate the research model and its data.

There are several methods available for model estimation such as ML, generalised least square (GLS), weighted least square (WLS), and scale free least square (Byrne, 2010; Hair et al., 2010; Kline, 2011; Mulaik, 2009; Tabachnick & Fidell, 2007). ML estimation method has been widely used in recent studies (Bou-Llusar et al., 2009; Karunasena, 2012; Moshagen, 2012; Preacher, Zhang, & Zyphur,

2011; Savalei, 2012; Stromeyer et al., 2014). Hair et al. (2010) argue that current versions of ML estimation have reliable techniques to resolve data normality issues. Hence, ML estimation can generate results with high reliability to further validate the model and its measurements.

The validity of the measurement model in the study was estimated by using confirmatory factor analysis (CFA), structural equation modelling (SEM) and AMOS version 22. Byrne (2010) argues that the use of AMOS in conjunction with CFA and SEM is useful to evaluate the research model based on the sample data. She further stated that the AMOS program makes it easy to perform CFA due to its graphical interface and its ability to generate a variety of output analyses in text such as model fit, number of estimates and modification indices.

The measurement in the model is considered valid when it has reached acceptable levels of goodness-of-fit (Hair et al., 2010; Kline, 2011; Mulaik, 2009; Tabachnick & Fidell, 2007). Acceptable levels of GOF means the theory estimated by the covariance matrix and the reality estimated by the observed covariance matrix are similar (Hair et al., 2010).

Although several indices were available, this study referred to Chi Square (χ^2), χ^2/df, standardised root mean residual (SRMR), root mean square error of approximation (RMSEA), comparative fit index (CFI), incremental fit index (IFI) and Tucker-Lewis index (TLI), as seen Table 7.20, to measure the GOF for collected data in the model.

The GOF should report indices calculating misspecification in the factor covariance and the factor loading (Hu & Bentler, 1999). Therefore, in addition to Chi Square (χ^2) and χ^2/df, the SRMR should always be available in reporting the GOF of

SEM model (Bentler, 2007; Hu & Bentler, 1999; Tabachnick & Fidell, 2007). The SRMR is characterised by its sensitivity to improper factor covariance specification (Chen, 2007), whereas RMSEA, CFI, IFI and TLI are sensitive to inappropriate factor loading specification (Chen, 2007; Hu & Bentler, 1999).

Table 7.20. The goodness-of-fit cut-off values (Barrett, 2007; Byrne, 2010; Hu & Bentler, 1999; Iacobucci, 2010; Marsh et al., 2004; Susanto, 2012)

Indices of Fit	Cut-off Values/ Criteria	
Chi Square (χ^2)	The lower the better	
χ^2/df	< 3	Good Fit
	3-5	Acceptable
	> 5	Poor Fit
SRMR	< 0.08	Close Fit
RMSEA	< 0.05	Close fit
	0.05 - 0.08	Fair Fit
	0.08 - 0.10	Mediocre Fit
	> 0.10	Poor Fit
CFI, IFI, TLI	> 0.95	Good Fit
	> 0.90	Acceptable

RMSEA and CFI are the most common indices used to validate SEM model (Hu & Bentler, 1999; Iacobucci, 2010; Tabachnick & Fidell, 2007). Recent studies in the e-Government field demonstrated that IFI and TLI were also useful to validate their models (Alzahrani, 2014; Karunasena, 2012; Susanto, 2012). Thus, the GOF indices used in the study were considered sufficient to measure the validity of measurements in the model. Prior to validating the model and the data for each of the hypotheses, the study began with validating each of the dimensions in the model.

7.9 Generating and Validating the Model Dimensions

According to the GOF indices, as seen in Table 7.21, the study found that two of six dimensions in the model required modification. Highlighted values in Table 7.21 are considered over or below acceptable cut-off values. Hence, the RP and e-Gov dimensions should be accordingly altered. In altering the model, the study referred to the modification indices (Byrne, 2010; Tabachnick & Fidell, 2007).

Table 7.21. The GOF of Research Model Dimensions

Indicator	EA	OA	IA	RP		RC	e-GOV	
				Origin	Mod		Origin	Mod
Chi Square (χ2)	8.849	1.661	0	73.83	2.841	3.684	482.06	194.879
χ2/df	1.770	0.830	0	**14.766**	0.710	1.842	**3.302**	2.030
SRMR	0.023	0.010	0.000	0.064	0.013	0.016	0.040	0.028
RMSEA	0.037	0	0.037	**0.157**	0	0.039	**0.064**	0.043
CFI	0.992	1	1	**0.867**	1	0.996	0.939	0.978
IFI	0.992	1	1	**0.868**	1	0.996	0.939	0.978
TLI	0.984	1	1	**0.734**	1	0.987	0.928	0.972

Poor fit in the SEM indicated that the relationship between observed and latent variables were lacking (Whittaker, 2012). As such, further investigation is required. Chou and Bentler (2002) argue that model generation in the SEM should be viewed as a temporary model. Thus, it is common to have to modify the model in the SEM (Chou & Huh, 2012; Sörbom, 1989; Whittaker, 2012). When the model is considered to lack, the model should be modified and retested (Chou & Bentler, 2002). The modification indices in the AMOS output can be used as reference to conduct such modification (Byrne, 2010; Kline, 2011; Whittaker, 2012).

7.9.1 The Unchanged Dimensions

The study did not make any modification to the following dimensions: EA, OA, IA and RC. The standarised estimates for these dimensions are seen in Figure 7.4 and Figure 7.5.

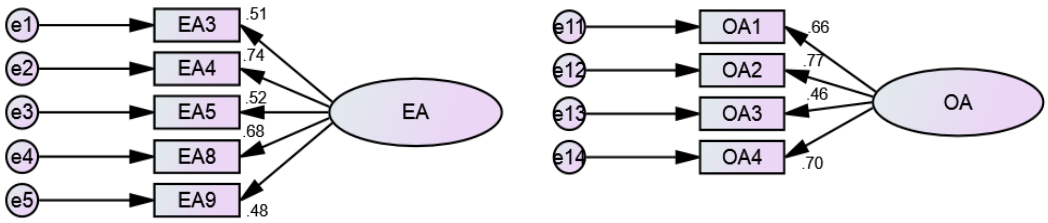


Figure 7.4. EA and OA Standarised Estimates

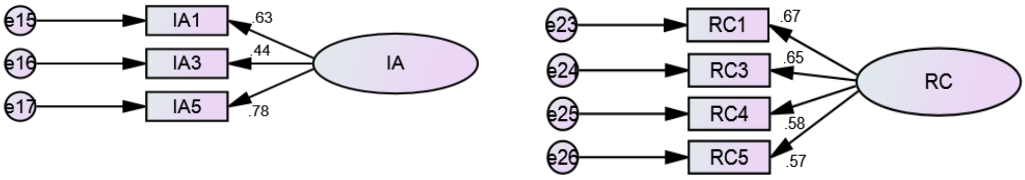


Figure 7.5. IA and RC Standarised Estimates

7.9.2 Resource Portfolio Optimisation

The study found that the RP dimension required modification. Almost all indicators from the GOF (Table 7.21) confirmed it. Only the SRMR value was still within the acceptable fit value because there was no covariance among residuals in the RP dimension.

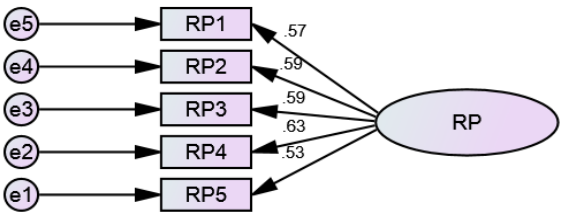


Figure 7.6. Initial RP Standarised Estimates

This study covaried the residuals for the RP2 and RP4 variables. Byrne (2010) suggested that the study could start modifying the model by referring to the highest values if the model was covaried. Table 7.22 shows that the covariance between the residuals of RP2 and RP4 can create significant changes. Before covarying the residuals, the study confirmed this with the list of questions. Respondents might consider that these corelated items were similar in intent. The perception of "there are no idle resources" (RP2) may overlap with "there are no duplicated resources" (RP4). Thus, the study covaried these residuals.

Table 7.22. RP Modification Indices - Covariances

			M.I.	Par Change
e4	<-->	e5	7.096	-.094
e3	<-->	e5	16.909	.090
e3	<-->	e4	12.958	-.097
e2	<-->	e5	7.018	-.083
e2	<-->	e4	45.849	.260
e2	<-->	e3	4.929	-.053
e1	<-->	e3	5.685	.068
e1	<-->	e2	5.636	-.098

The model modification significantly improved the GOF for the RP dimension as seen in Table 7.21. The standrised estimates for the refined RP dimension can be seen in Figure 7.7. Having re-run the model, AMOS did not suggest any further modification to the RP dimension.

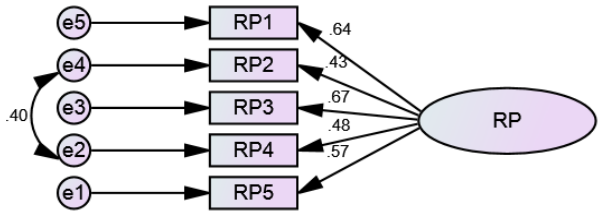


Figure 7.7. Modified RP Standarised Estimates

7.9.3 e-Government Performance

Although most measurements for the e-Gov dimension demonstrated significant lack of fit, this study still reviewed the modification indices in the AMOS output to improve its level of confidence. As seen in Table 7.23, residuals for RS1 (e44), RS2 (e45) and T1 (e47) were required to be covaried with others. However, most of them were to be covaried with other factors. In CFA, residuals of observed varaibles can only be covaried when they are within the same latent factor (Gaskin, 2011; Kline, 2011). Thus, the above mentioned variables were excluded for further analysis by releasing their constraints in the model (Chou & Bentler, 2002).

Referring to the same modification indices in Table 7.23, this study covaried the residuals for A4 (e43) and T2 (e48). Both of them were in the same factor: Tangible (TA). Respondents may have viewed these items as similar. Hence, the "perception of knowledgeable IS employees" (A4) might lead to having "visually appealing physical facilities" (T2). Similarly, the residuals of RL4 (e33) and A1 (e40) in the Reliability (RL) factor were covaried because respondents might perceive "IS units provide timely services" (RL4) similar with the "IS units' staff are instilling confidence" (A1).

Table 7.23. e-Gov Dimension Modification Indices – Covariances

Covariances	M.I.	Dropped/Covaried Variables
e44<-->e31	14.305	RS1
e44<-->RL	9.571	
e44<-->e41	6.335	
e44<-->AS	5.553	
e43<-->e44	8.445	
e49<-->e44	9.714	
e45<-->AS	7.497	RS2
e45<-->RL	27.218	
e31<-->e45	6.04	
e38<-->e45	5.901	
e39<-->e45	48.429	
e42<-->e45	6.008	
e44<-->e45	16.405	
e46<-->e45	16.063	
e49<-->e45	4.956	
e47<-->e31	10.653	T1
e47<-->e39	10.096	
e47<-->AS	7.484	
e47<-->e46	6.57	
e48<-->e47	21.669	
e33<-->e40	8.205	RL4 <--> A1
e43<-->e48	11.062	A4 <--> T2

As such, model modification significantly improved the GOF for the e-Gov dimension as seen in Table 7.21. The standarised estimates for the final e-Gov model can be seen in Figure 7.8. All dimensions were considered ready to be analysed as a whole SEM model.

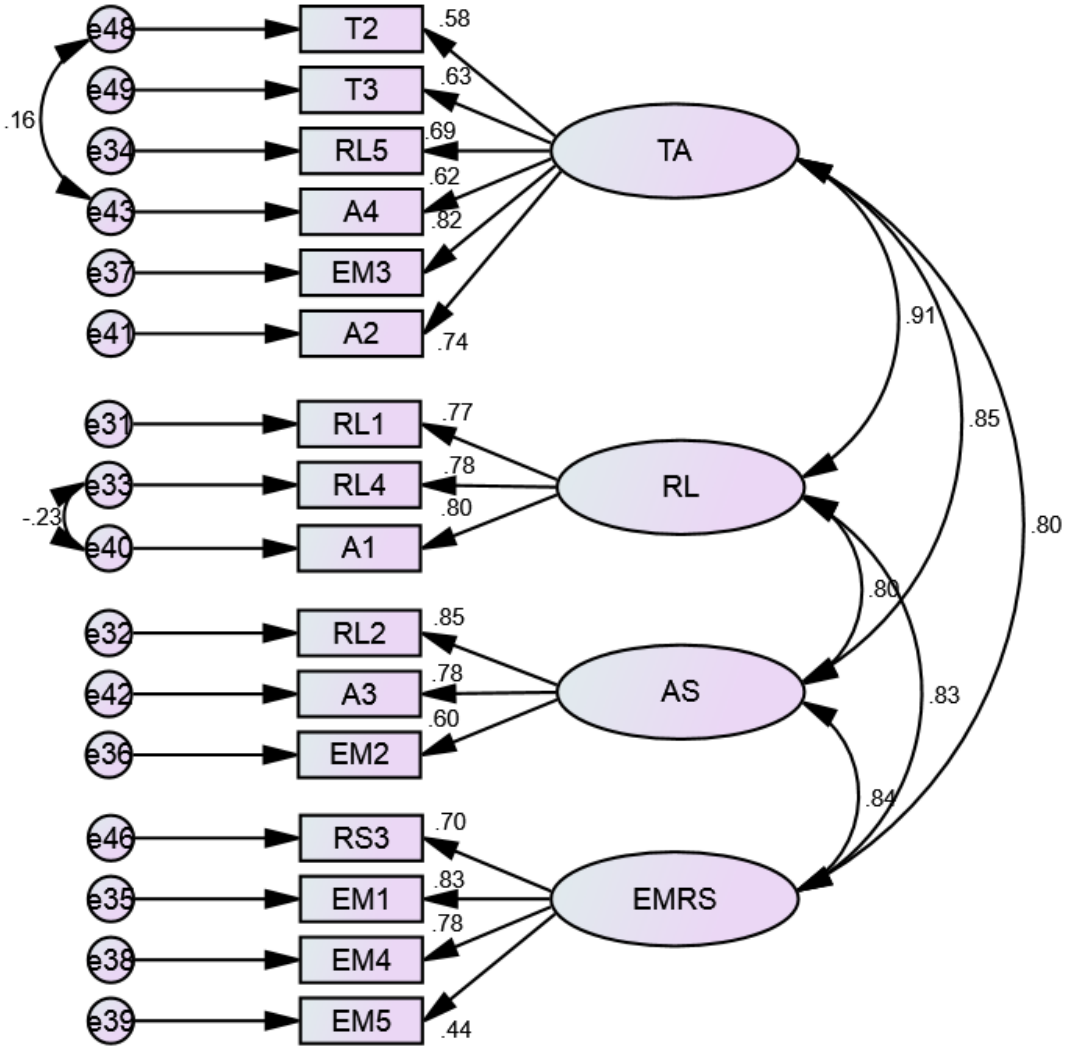


Figure 7.8. Final e-Gov Dimension Standarised Estimates

7.10 Generating and Validating the Overall Model

Although all dimensions had already demonstrated signficant fit, some indicators for the GOF of the overall SEM model, as seen in Table 7.24, indicated some fitness issues. The highlighted values in Table 7.24 were either below or above the cut-off GOF values. Hence, further analysis was needed using modification indices in the AMOS output. The residuals' covariance effects were reviewed thoroughly for

the causal dimension (EA), mediators (OA, IA, RP and RC), and the effect dimension (e-Gov).

Table 7.24. The GOF for Overall Model

Indices	Original	Final
χ2	1611.326	1145.004
df	613	478
χ2/df	2.629	2.395
SRMR	0.055	0.041
RMSEA	**0.054**	0.050
CFI	**0.895**	0.923
IFI	**0.895**	0.923
TLI	**0.885**	0.915

Three more variables were dropped as a result of the GOF analysis. Modification indices were not the only sources in modifying the model. This study further reviewed the questions used in the survey. Some questions may have been ambiguous to respondents (Iacobucci, 2009). As seen in Table 7.25, EA5, IA3 and OA3 indicated the presence of cross-loading between factors. Respondents may have been confused with the question asking about "mechanisms are available to propose enterprise enchancement" (EA 5). Respondents might infer a logical connection between the EA factor and the Empathy Responsiveness factor since proposing enhancement indicated respondents' concern.

Next, the question asking about "data are easy to access" (IA3) could be inferred as being similar with the question asking about "information on existing resources is accessible" (RP5). Respondents might also see the question asking about "the system has fully complied with Indonesian Treasury business" (OA3) covering the overall OA

factor. As a result, covariance between residuals of OA3 and the OA factor have a large modification index.

Using the same source of information, the study covaried the residuals for the OA4 (e40) and OA2 (e42). Respondents may have identified these two items as referring to a similar idea. The notion of "existing business process has significantly represented the strategic goals" (OA2) and "the changes in organizational structure align with the strategic mission" (OA4) may have commonality.

Table 7.25. Overall Modification Indices – Covariances

Covariances	M.I.	Dropped / Covaried Variables
e5<-->e6	5.14	EA5
e5<-->z4	29.378	
e5<-->e7	13.662	
e5<-->e47	13.658	
e5<-->z1	12.65	
e5<-->e33	11.689	
e5<-->e40	10.526	
e5<-->z9	9.699	
e5<-->e42	5.393	
e10<-->e5	10.937	
e19<-->e5	7.527	
e21<-->e5	4.5	
e22<-->e5	45.242	
e24<-->e5	4.119	
e31<-->e44	35.086	IA3
e31<-->e46	6.906	
e31<-->z7	6.491	
e31<-->e43	6.026	
e31<-->e36	5.189	
e31<-->z9	4.543	
e6<-->e31	8.4	

e41<-->z6	22.639	OA3
e41<-->e44	18.398	
e41<-->e42	16.687	
e41<-->e43	10.428	
e41<-->z7	7.757	
e41<-->z3	6.119	
e41<-->e45	4.369	
e20<-->e41	5.437	
e6<-->e41	9.934	
e27<-->e41	4.755	
e33<-->e41	4.855	
e38<-->e41	5.735	
e40<-->e41	14.117	
e40<-->e42	18.693	OA4 <--> OA2

The result of such model modification significantly improved the GOF of the overall model as seen in Table 7.24. All indicators satisfied the GOF cut-off values as stated earlier in Table 7.20. The standarised estimates for the final overall model can be found in Appendix K. All in all, the model was considered ready for more in-depth analysis for the effect of each mediator.

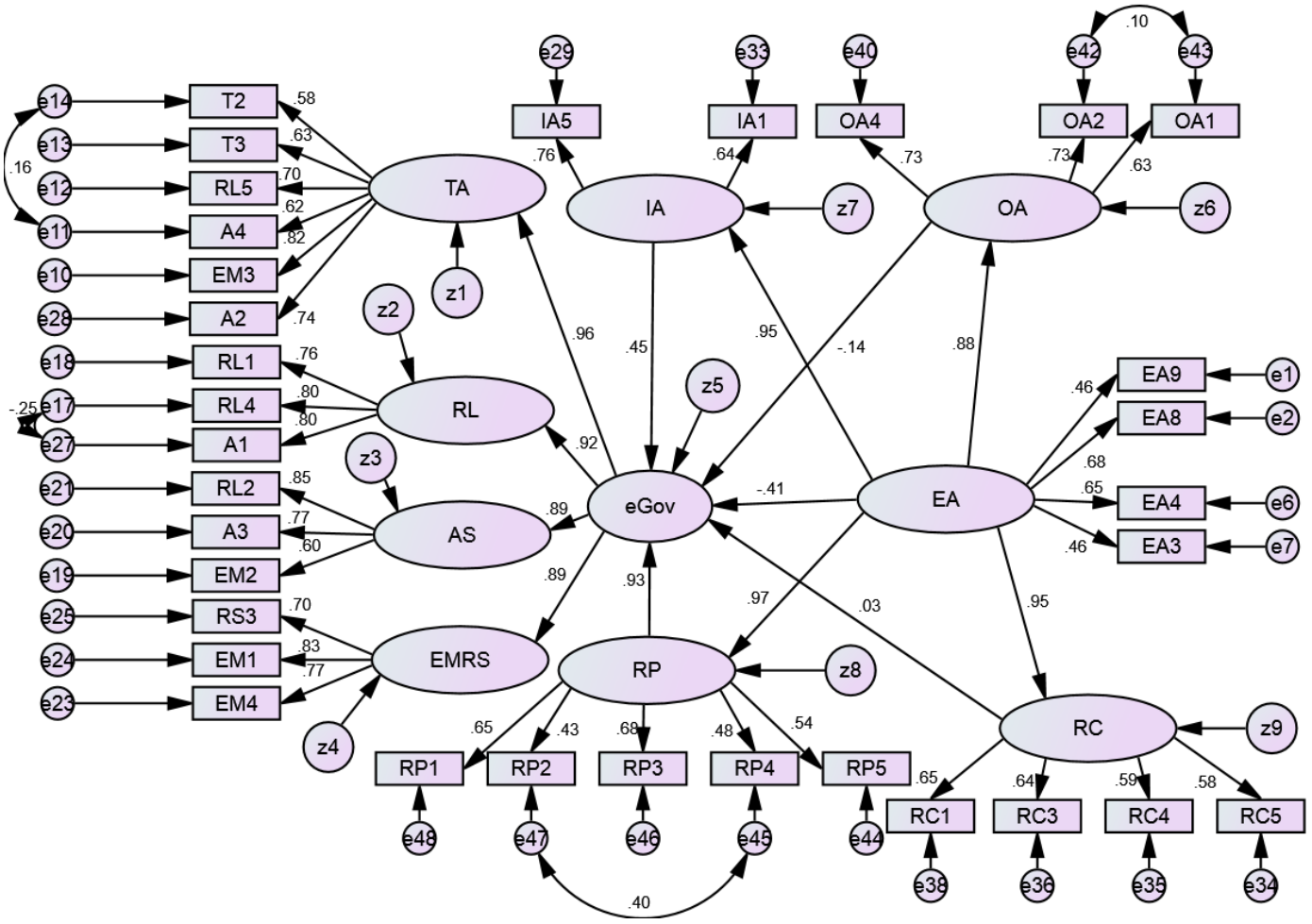


Figure 7.9. Standarised Estimates for the Final Structural Equation Model

7.11 Mediator Analysis of the Model

7.11.1 An Overview of Simple Mediation Analysis using SEM

Mediation analysis is a statistical technique to investigate how one factor affects another assisted by a third factor (Hayes, 2013; Iacobucci, 2008). This means *"an independent variable has an effect on the mediator, which then affects the outcome variable"* (Coffman, 2011, p. 357). Iacobucci (2012) proves that SEM is a poweful tool to analyse such causal relations in mediation analysis.

A causal relationship in mediation analysis can be modeled as one variable each for the causal, effect and mediator. It is called the simple mediation model. The simple mediaton analysis is depicted by two relationships as seen in Figure 7.10 (Hayes, 2013; Iacobucci, 2008). Part 1 shows a direct relationship from a causal variable (*X*) to an effect variable (*Y*). The loading of this relationship is measured by *path c*. Part 2 shows the relationship between *X* and *Y* mediated by *M*. The direct effect of *X* on *Y* is measured through *path c'*. The indirect relationship between *X* and *Y* is via mediator *M*. The indirect relationship is measured through *path a* for the *X*→*M* and *path b* for the *M*→*Y*.

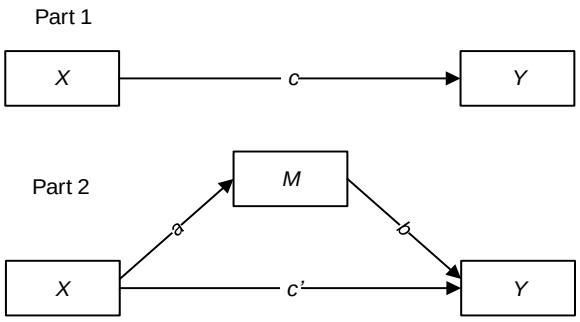


Figure 7.10. Conceptual Diagram of Simple Mediation Model (Hayes, 2013, p. 87; Iacobucci, 2008, p. 2)

The simple mediation analysis using SEM is deemed relevant to this study. The causal relationship between EA (a high-level document) (Lankhorst, 2009) and e-Government Performance, as depicted in the research framework in Chapter 3, is affected by four mediators. Simple mediation analysis for each mediator should exclude the influence of other mediators (Gaskin, 2013; Kenny, 2014; Kenny et al., 1998). Thus, four simple mediation analyses were used to validate the effect of EA on e-Government Performance. Hence, the result of each mediator analysis can be used to answer the hypotheses in this study.

To conduct mediation analysis, the study modified its structural model. The standard estimates for each model are available in Appendix K. This study further confirmed that the GOF of the modified model with and without each mediator was still within the acceptable cut-off values as seen in Table 7.26.

Table 7.26. The GOF for Mediation Analysis

Indices	EA-OA-eGov	EA-IA-eGov	EA-RP-eGOV	EA-RC-eGOV	No Mediator
χ2	435.855	387.721	550.370	441.146	312.630
df	199	180	242	221	145
χ2/df	2.19	2.154	2.274	1.996	2.156
SRMR	0.036	0.033	0.036	0.033	0.033
RMSEA	0.046	0.045	0.048	0.042	0.045
CFI	0.959	0.963	0.950	0.962	0.967
IFI	0.959	0.963	0.950	0.962	0.967
TLI	0.952	0.957	0.942	0.957	0.961

7.11.2 Results for Mediation Analysis of the Model

Baron and Kenny (1986) introduced procedures for how to validate the presence of mediators in a causal effect model by using the result of its regression analysis. Since then, there have been several critiques and suggestions for Baron and Kenny's

mediation analysis procedure (Hayes, 2009; Mathieu et al., 2008; Shrout & Bolger, 2002).

Bootstrapping has proven to be a salient means for valid mediation analysis in SEM (Hayes, 2013; Iacobucci, Saldanha, & Deng, 2007; Mathieu et al., 2008; Shrout & Bolger, 2002). The use of bootstrapping can improve the level of confidence in the estimated coefficients (Hair et al., 2010).

Zhao et al. (2010) combined the mediation analysis procedure from Baron and Kenny (1986) and bootstrapping. They referred to the three steps for mediation analysis from Baron and Kenny (1986, p. 1176) as follows:

> *A variable functions as a mediator when it meets the following conditions: (1) variations in levels of the independent variable significantly account for variations in the presumed mediator (i.e., Path a), (2) variations in the mediator significantly account for variations in the dependent variable (i.e., Path b), and (3) when Paths a and b are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path c is zero.*

Prior to validating the model throuh mediation analysis, path *c* in Figure 7.10 should satisfy the significance test (Baron & Kenny, 1986; Zhao et al., 2010). All paths in Figure 7.10 were estimated using the following equations (Zhao et al., 2010):

$$M = i_1 + aX + e_1 \quad (1)$$

$$Y = i_2 + c'X + e_2 \quad (2)$$

$$Y = i_3 + cX + bM + e_3 \quad (3)$$

Using Baron and Kenny's equations, Zhao et.al. (2010, p.200) suggests three types with mediation and two types without mediation as follows:

1. *Complementary mediation: Mediated effect (a x b) and direct effect (c) both exist and point in the same direction.*

2. *Competitive mediation: Mediated effect (a x b) and direct effect (c) both exist and point in opposite directions.*
3. *Indirect-only mediation: Mediated effect (a x b) exists, but no direct effect.*
4. *Direct-only nonmediation: Direct effect (c) exists, but no indirect effect.*
5. *No-effect nonmediation: Neither direct effect nor indirect effect exists.*

This study used 500 bootstrapping samples, similar to the number of data samples (Shrout & Bolger, 2002). The first step for mediation analysis begins with validating the confidence level of the dependent variable (e-Gov) on the independent variable (EA). Figure 7.11 shows that the standarised estimates for direct effect of EA on e-Gov is significantly different from zero at 0.769 and p=0.004 two-tailed.

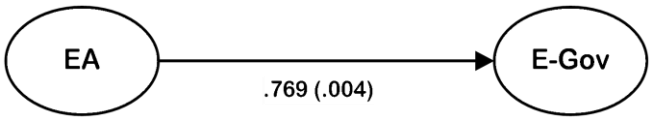


Figure 7.11. Direct Effect of EA on e-Government without mediators

The second step led this study to validate the effect of each of the mediators (OA, IA, RP and RC) on the causal relationship between EA and e-Gov. The significance of the relationships between EA → M and M → e-Gov were investigated for each M in OA, IA, RP, and RC. Table 7.27 indicates a positive effect of EA on each mediator. Similarly, Table 7.27 shows the significance of the mediator on e-Government performance.

Table 7.27. The Effect of Each Mediator on e-Government Performance

	OA	IA	RP	RC
EA -> Med (*path a*)	.793(.004)	.892(.004)	.884(.004)	.835(.004)
Med -> e-Gov (*path b*)	.239(.024)	.732(.004)	.834(.004)	.502(.004)

The next step of Baron and Kenny's mediation analysis procedure resulted in the calculation of the signficance of the direct effect of EA on e-Gov with and without each mediator. This study also investigated the significance of the indirect effect of EA on e-Gov. As seen in Table 7.28, the indirect effect (*a x b*) for each of the mediators was significant. Whilst the direct effect (*c'*) of EA on e-Gov for the two mediators IA and RP were not significant, for the other two mediators, OA and RC, the direct effect was significant.

Referring to Zhao et.al. (2010), this study found that the IA and RP mediators were statistically proven to be fully mediating the positive effect of EA on e-Gov in the Indonesian Treasury. The OA and RC mediators were statistically shown to be partially mediating the positive effect of EA on e-Gov in the Indonesian Treasury. Table 7.28 suggests that although the hypotheses of this study are all considered supported, the extent to which they are supported is different. This is discussed in Section 8.6.

Table 7.28. The Significance of Mediator Effect

Relationship	Direct Effect (EA to eGov)		Indirect Effect	Interpretation
	Without Mediator	With Mediator		
EA-OA-eGov	.769(.004)	.580(.024)	.189(.024)	Sig., Mediated by OA (Partial)
EA-IA-eGov	.769(.004)	.119(.646)	.653(.004)	Sig., Mediated by IA (Full)
EA-RP-eGov	.769(.004)	.035(.864)	.737(.004)	Sig., Mediated by RP (Full)
EA-RC-eGov	.769(.004)	.350(.024)	.419(.004)	Sig., Mediated by RC (Partial)

7.12 Conclusion and Summary

The objective of this chapter was to conduct the quantitative analysis of this study. It includes the preparation of the research instrument, data management, and preliminary data analysis. The study also assessed the validity and reliability of its data. As a result, some observed variables were excluded from further analysis. The study refined the SERVQUAL for its e-Government dimension. This was consistent with other studies adopting SERVQUAL in the Information Systems field.

To ensure the GOF of the overall model, the GOF for each dimension was measured. Using the modification indices from the AMOS output, the study dropped some observed variables and correlated residuals to improve the GOF. Similarly, the study modified the overall model by using these two approaches. The study could not modify the relationship between dimensions in the model because it referred to the CFA. Thus, only dropping variables and defining covariance between residuals in the same factor were permissible (Byrne, 2010; Garson, 2013b; Kline, 2011). The final model was considered fit based on its propensity indicators.

Mediation analysis was carried out to validate the study's hypotheses. All hypotheses made in Chapter 3 were statistically proven to be supported. Furthermore, using procedures from Zhao et al. (2010), the study identified the type of mediators contained in the data of this study. Mediators IA and RP were considered to be fully mediating the causal relationship between EA and e-Government. Mediators OA and RC were considered as complementary or partially mediating the relationship. To complete the analysis, all findings in Chapter 6 and Chapter 7 are discussed and mixed in the next chapter.

Chapter 8
DISCUSSION

8.1 Overview

This chapter presents a synthesis of the study and its outcomes. The results from both the qualitative and quantitative analysis are mixed and discussed. The results of the descriptive analysis is added to enhance and to fill in the gaps in interpreting the findings. As a final point, this chapter presents the role of mediators in intervening in the effect of EA on the Indonesian Treasury e-Government system performance.

8.2 EA contributions to e-Government

Similar to Shekkerman's (2004) study, this study perceived that there is correlation between EA initiatives and e-Government progression. As presented in Section 2.4, although four developed countries, namely Australia, the Republic of Korea, Singapore and the United Kingdom, adopted EA in different years, it can be perceived that they demonstrated similar trends in their e-Government progress. Therefore, this study aimed to further understand the effect of EA on e-Government.

8.3 The Effect of EA on e-Government

The study built its research model on the EABM (Tamm et al., 2011). Having reviewed relevant literature, Chapter 3 elucidates how the study built its research model. The study revealed that EA, a high-level document influenced by organisational theory and systems theory (Bernard, 2012), does not have a direct effect on e-Government performance. The relationship between EA and e-Government performance is intervened by four enablers: organisational alignment, information availability, resource portfolio optimisation and resource complementarity.

In its model, this study used EA maturity to measure the quality of EA. The study proposed an alternative maturity model by using the meta synthesis approach as presented in Section 3.5. The study also altered the EABM to measure e-Government performance by using SERVQUAL. The findings in quantitative analysis led the study to propose a novel dimensionality of SERVQUAL as seen in Section 7.9.3. The study collected its empirical evidence of the model in its case study starting from investigating the presence of EA in the Indonesian Treasury.

8.4 The Presence of EA in the Indonesian Treasury

A mixed method approach was employed to collect empirical evidence in the Indonesian Treasury. A number of research techniques were used in its qualitative and quantitative approaches. The use of two approaches improved the quality of findings (Creswell, 2009; Venkatesh et al., 2013).

This study infers that there is no artefact demonstrating the presence of EA in the Indonesian Treasury. As presented in Chapter 6, some interviewees stated:

> *"To date such documents are not available."* (Respondent 1).
>
> *"The direction of existing e-Government systems remains unclear as to how they should be developed because there is no architecture as its guidance."* (Respondent 3)

Hence, the Indonesian Treasury relies on its ICT people for the e-Governement systems development, as Respondent 4 stated:

> *"We never had any ICT related architecture documents. We do not know what we are going to develop within the next five years. Even at the technical level, we do not have proper documentation as to how ICT is developed. Technical documentation for the e-Government systems are also absent. Thus, e-Government systems development is controlled by only a few people."*

Consistent with the results of the interviews, this study was not able to find any document as an evidence of the existence of EA artefacts in the Indonesian Treasury.

Notwithstanding the findings mentioned above, this study found that the results of a descriptive analysis for three of nine observed variables for the EA factor were different than others. As seen in Appendix I, mode and median for EA1, EA2 and EA7 variables were 5 and 4. This indicates that the Indonesian Treasury have mechanisms to let users be involved in designing and improving the systems. Similar to responses to the EA7 variable, meetings of high-level officials, as stated by Respondent 2, could be used to not only improve the quality of reports, but also to let the Indonesian Treasury exchange its data with other government institutions.

8.5 The Indonesian Treasury e-Government Performance

The Indonesian Treasury has not achieved the expected performance from its e-Government systems. Repondent 1 stated:

> *"The Indonesian Treasury e-Government performance is better than the manual one. However, if I look at the spending in its ICT investment, the systems should deliver more. One of the issues that I would like addressed is the improvement of the systems reliability."*

Respondent 1 further mentioned that the e-Governement systems had not delivered what the high-level officials expected. As several interviewees stated in Chapter 6, extra effort was needed in order to present information to people at the strategic levels.

Additionally, Respondent 12 argued that he found significant backdoors in the existing e-Government systems. As such, he argued that the quality of data could be harmed. Respondent 12 further discussed:

> *"Since there is no architectural documentation, both at the Ministry of Finance level and the Indonesian Treasury, as an e-Government systems development framework, we do not know how ICT will be utilised in the future. Thus, to some extent I think our investment in ICT is not efficient."*

The findings were considered consistent with the results of descriptive analysis for final SERVQUAL congeneric models as seen in Appendix I. This study then combined all congeneric models for all dimensions into a structural equation model to answer the hypotheses raised in Section 3.7.

8.6 Answers to Hypotheses

To enhance the rigor of these discussions, the study triangulated the results of the quantitative analysis with the qualitative findings. Using statistical results in Chapter 7, this study illustrated a causal effect of EA on e-Government performance for each hypothesis.

The use of simple mediation analysis for each of the performance enablers is deemed important as revealed in Chapter 3. Otherwise, the aims of this study, to investigate the effect of EA on e-Government performance could be obscured. Measuring the effect of EA on performance enablers and the effect of performance enablers on e-Government performance is considered to be distracting from the aims of this study.

Nonetheless, the presence of performance enablers in the model remain important to understand the degree of influence of each mediator as an intervening variable (Kenny et al., 1998) by measuring its effect loading (β) and significance (p-value). Stastitical significance is presented in symbols. The following symbols were used: * to denote significance at the $p<.05$ level; ** to denote significance at the $p<.01$ level; *** to denote significance at the $p<.001$ level.

8.6.1 H1: Organisational Alignment Mediates the Positive Effect of EA on e-Government Performance

This study found that organisational alignment partially mediated the positive effect of EA on e-Government Performance. Figure 8.1 illustrates the standardized regression coefficient between all dimensions, i.e., EA and e-Gov, EA and OA, and OA and e-Gov were statistically significant. The standardized indirect effect was 0.189. As stated earlier in Chapter 7, the study tested the significance of this indirect effect using bootstrapping procedures of 500 bootstrapped samples, and a 95% confidence interval was computed by determining the indirect effects at the 2.4th and 97.6th percentiles. Thus, the indirect effect was statistically significant. As such, this means the quantitative data from the Indonesian Treasury has supported the first hypothesis in the study.

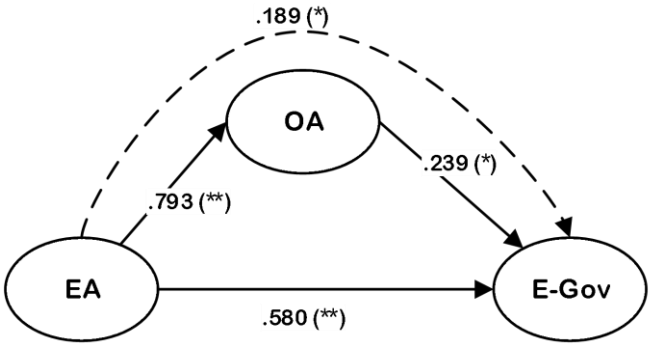


Figure 8.1. The Effect of OA as Mediator

In this study, organisational aligment reflects the extent to which the Indonesian Treasury respondents share common understanding of its strategic objectives. This means the absence of EA has been affecting the Indonesian Treasury e-Government performance and its organisational alignment. As stated in Chapter 6, the study found that the Indonesian Treasury adopted a balanced score card (BSC) to help align its

organisational structure and its objectives. BSC was also further used to measure performance through KPIs.

Notwithstanding, the use of BSC to govern its organisation, the effectiveness of BSC was not measured in this study. Lankhorst (2009) argues that EA could be used together with BSC. The presence of EA could therefore improve the quality of BSC to ensure organisational alignment. At the same time, the presence of EA could enchance e-Government performance in the Indonesian Treasury.

The above findings were consistent with the qualitative findings as stated in Chapter 6, Respondent 4 argued:

> *"Alignment was a long way away*."

Similarly, Respondent 10 stated

> *"Common understanding of the Indonesian Treasury vision and mission can be seen from the e-Government systems development which is considered to be partial. Users can only see their roles and responsibilities by overlooking others. The need for a common framework to bring them to the same viewpoint is needed".*

Such findings in the qualitative analysis are considered similar to the findings in the quantitative analysis. As seen in Appendix I, the mean, mode and median for the OA1, OA2 and OA4 variables is below three. Hence, the Indonesian Treasury has yet to achieve a common understanding of its strategic goals as Bernard (2012) and van Steenbergen et al. (2011) suggested.

In addition, another interviewee said:

> *"up to now we have developed the systems based on partial needs. They were not combined into one integrated systems"* (Respondent 15).

Respondent 14 supported the statements by saying:

"When the existing e-Government systems were launched, it was found that they were not a complete fit with the business process requirements".

These findings are considered in line with the responses for OA3 and OA5. It can be perceived that the Business-ICT alignment has not been attained. As Lankhorst (2004) and Ross et al. (2006) argue, the presence of EA can lead to the Business-ICT alignment. Having Business-ICT aligned, communication issues between the business and ICT technical parties can be reduced (Kappelman, 2010; Pereira & Sousa, 2005) in developing the e-Government systems.

Both approaches suggest complete and sound findings. The results presented in Table 7.28 suggest that the effect of EA is partially mediated by Organisation Alignment. This study can therefore demonstrate that the first hypothesis is considered to be fairly supported wherein the absence of EA has been affecting the underperforming of e-Government systems in the Indonesian Treasury. The relationship tends to be somewhat intervened by organisational alignment issues.

8.6.2 H2: Information Availability Mediates the Positive Effect of EA on e-Government Performance

The study found that information availability (IA) fully mediated the positive effect of EA on e-Government Performance. Figure 8.2 illustrates that the standardized regression coefficient between EA and IA was statistically significant. The standardized regression coefficient between IA and e-Gov was also statistically significant. The standardized indirect effect was 0.653. As stated earlier in Chapter 7, the study tested the significance of this indirect effect using bootstrapping procedures of 500 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 0.4^{th} and 99.6^{th} percentiles. Thus, the indirect effect was statistically significant. However, the standardized regression coefficient between EA and e-Gov was not statistically significant. This indicates when IA is a

mediator, it affected the relationship between EA and e-Gov. Hence, it can be inferred that IA fully mediates the effect of EA on e-Gov. As such, this indicates the quantitative data from the Indonesian Treasury are considered to have supported the second hypothesis in this study.

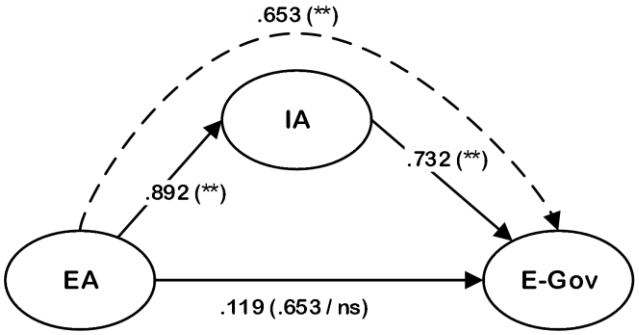


Figure 8.2. The Effect of IA as Mediator

In this study, information availability is used to measure the extent of high-quality information generated from the Indonesian Treasury e-Government systems. This study found that the Indonesian Treasury requires additional effort in generating high-quality information, as Respondent 11 confirmed:

> *"Causing extra effort and processes to bring together the data into valuable information in the form of reports"*

However, the results from the quantitative study shows that respondents perceived the data to be manageable. The presence of an ICT supervisor in all treasury offices (TSOs, TROs), as stated in Appendix G, could lead to this perception. Staff who hold such roles were given regular training for any updates to the systems (Respondent 6).

Descriptive analysis on responses for the IA1, IA3 and IA5 variables in the questionnaire suggested that high-quality information is not easy to accomplish. These findings were similar to the following interview responses:

> *"I found some discrepancies when comparing data from the Treasury Service Offices and the headquarters"* (Respondent 12).
>
> *"The Indonesian Treasury business units separately managed their own data. This led to multiple stages of data consolidation."* (Respondent 2).

These findings are consistent with the notion that the presence of EA could improve the quality of information generated by the systems (Bernard, 2012; Finkelstein, 2006; Venkatesh et al., 2007) and data management (Finkelstein, 2006; Ross et al., 2006; Spewak & Hill, 1993).

Such conditions have been causing difficulties for high-level officials to generate their own reports. However, descriptive analysis on responses for question IA4 showed that most respondents perceived that high-level officials were able to generate their own reports. Respondents might refer to the fact that the Indonesian Treasury headquarters have been investing in software, such as data warehousing and business intelligence, to assist high-level officials (Respondent 3).

Nevertheless, Respondent 11 stated:

> *"Not all leaders in the Indonesian Treasury are aware of what ICT can deliver, such as being able to create their own customised reports directly from the systems".*

Supporting this, the number of requests for reports, data and reconcilation, as presented in Figure 6.7, is considered to be consistently growing since 2006. As such, this study can infer that the second hypothesis is supported that the absence of EA facilitated by lack of information availability could have been significantly contributing to the underperforming e-Government systems.

8.6.3 H3: Resource Portfolio Optimisation Mediates the Positive Effect of EA on e-Government Performance

This study found that resource portfolio optimisation (RP) fully mediated the positive effect of EA on e-Government Performance. Figure 8.3 illustrates that the standardized regression coefficient between EA and RP was statistically significant. The standardized regression coefficient between RP and e-Gov was also statistically significant. The standardized indirect effect was 0.737. As stated earlier in Chapter 7, the study tested the significance of this indirect effect using bootstrapping procedures of 500 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 0.4^{th} and 99.6^{th} percentiles. Thus, the indirect effect was statistically significant. However, the standardized regression coefficient between EA and e-Gov was not statistically significant. This indicates that when RP is used as mediator, it affects the relationship between EA and e-Gov. Hence, it can be inferred that RP fully mediates the effect of EA on e-Gov. As such, this means the quantitative data from the Indonesian Treasury has supported the third hypothesis in the study.

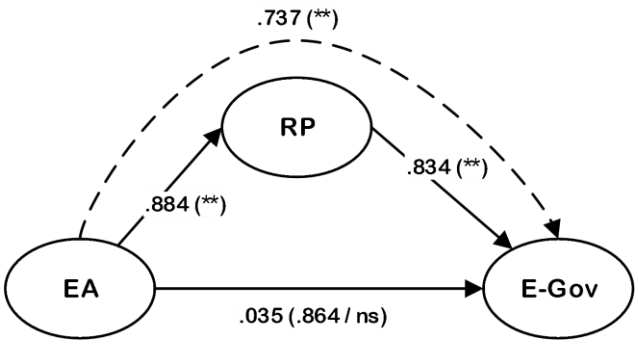


Figure 8.3. The Effect of RP as Mediator

In this study, resource portfolio optimisation refers to the extent to which the Indonesian Treasury makes the most of its existing resources, invests in relevant

resources to close performance gaps, and minimises duplicated resources. Descriptive analysis on responses to the variables used in the quantitative approach indicated that respondents perceived that the Indonesian Treasury still faced duplication of resources (Pereira & Sousa, 2005; Zachman, 1997).

These findings are considered consistent with the results of the qualitative findings. The following responses as presented in Chapter 6 suggest similar circumstances:

> *"When I was working in the TRO, I found that on the one hand some TSOs received new computers when there was no need for additional computers, and on the other hand other offices who were really in need of new computers did not receive any"* (Respondent 13).

This study also found that Respondent 12 argued that there was no clear direction as to how and where to invest in ICT because ICT was still viewed as a tool. This was consistent with the responses on RP3 in the questionnaire. This means, the Indonesian Treasury still has difficulties in reducing the cost of unnecessary ICT investment (Perks & Beveridge, 2002; Ross et al., 2006; Spewak & Hill, 1993). All in all, highly mediated by resource portfolio optimisation, a difficulty from the absence of EA has an effect on its e-Government performance. That said, this study determines that the third hypothesis is supported.

8.6.4 H4: Resource Complementarity Mediates the Positive Effect of EA on e-Government Performance

This study found that resource complementarity (RC) partially mediated the positive effect of EA on e-Government Performance. Figure 8.4 illustrates that the standardized regression coefficient between all dimensions, i.e., EA and e-Gov, EA and RC, and RC and e-Gov were statistically significant. The standardized indirect effect was 0.419. As stated earlier in Chapter 7, the study tested the significance of this

indirect effect using bootstrapping procedures of 500 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 0.4th and 99.6th percentiles. Thus, the indirect effect was statistically significant. As such, this means the quantitative data from the Indonesian Treasury has supported the fourth hypothesis in this study.

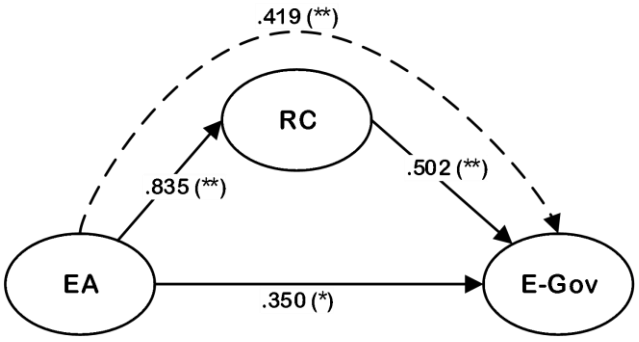


Figure 8.4. The Effect of RC as Mediator

In this study, resource complementarity refers to the extent to which the Indonesian Treasury's resources synergistically support its strategic goals. According to descriptive analysis on responses to the questions for the RC factor, as presented in Appendix I, only responses to the RC2 variable were considered different to the other variables. Respondents perceived that the need for ICT resources was still high. This finding was consistent with the fact that the number of obselete resources in the Indonesian Treasury, as seen in Figure 5.7, is considered to be high.

Using responses to RC1, RC4 and RC5 the Indonesian Treasury seem to be struggling in integrating its resources (Bernard, 2012; Spewak & Hill, 1993; Zachman, 1997). The findings were consistent with the responses from some interviewees, such as:

> *"We might not need to have high-end specification computers to run the business"* (Respondent 5).

> *"There were no control as to what computer specifications should be purchased and how the PCs should be used. We were inclined to purchase the most sophisticated computers without knowing the real needs"* (Respondent 7).

> *"We bought data warehousing and, business intelligence software. Having obtained them we realised that we did not have qualified staff to make the most of it"* (Respondent 3).

The absence of qualified resources to run data warehousing and business intelligence software could harm interoperabilty. Ross et al. (2006) argued that the presence of EA could promote interoperability to achieve systems integration. Hence, the problems in resources complementarity could slightly have intervened the negative effect of the absence of EA on e-Government performance.

8.7 Conclusion and Summary

This chapter triangulated the findings of the qualitative approach and the results of quantitative analysis. Each hypothesis was discussed by using the statistical figures, responses from the interviews and document analysis. Both approaches indicate that the absence of EA has been causing e-Government underperformance. Furthermore, the effect was mediated by each of the mediators, i.e., OA, IA, RP and RC. Hence, it can be considered that the use of mixed methods to obtain a complete picture of the Indonesian Treasury e-Government systems in this study was attained. The following chapter discusses the contributions, limitations, policy implication and future research arising from this study.

Chapter 9
CONCLUSIONS AND FURTHER RESEARCH

9.1 Overview

This chapter concludes the study by presenting the key contributions made. It begins by outlining the research aims, summarising the results, and presenting the academic contributions. It then probes implications and limitations of the study. Finally, it suggests potential further research arising from this study.

9.2 Research Aims and Objectives

This study sought to improve e-Government performance in developing countries through Enterprise Architecture (EA) by using the Indonesian Treasury as its case study. It aimed to achieve the following objectives:

1. Understanding how the Indonesian Treasury e-Government systems were developed.
2. Understanding the effect of design artefacts such as EA on e-Government performance.
3. Proposing a model to define the causal relationship between EA and e-Government performance. Investigating the role of mediators in such a relationship.
4. Empirically validating the proposed model using simultaneous mixed method approach from several employee roles in the Indonesian Treasury.
5. Offering suggestions and strategies to draw relevant policies in developing e-Government systems.

9.3 Summary of the results

As stated in Chapter 1, the study investigated e-Government performance in developing countries. Developing countries were selected because most of them were not able to demonstrate sustainable e-Government systems development. The United Nations reported that the maturity of e-Government for developing countries has remained identical for more than a decade. A review of the literature for this study found that improving e-Government performance entails more than just technological solutions. A holistic view of e-Government is needed. This can be achieved through EA.

Similar to Shekkerman's (2004) study, this study perceived that there was a strong correlation between EA activities and e-Government system development. Nevertheless, the study was not able to find any developing countries adopting EA as part of their e-Government. Moreover, the study discovered a lack of e-Government studies using EA as its lens. Therefore, this study was motivated to fill the gap in the e-Government studies in developing countries through an EA perspective.

The Indonesian Treasury was used as its case study. The Treasury was selected because it is the heart of the public financial institutions and could provide a significant impact to e-Government development in Indonesia. In order to shift to the next level in the UN maturity model, it should demonstrate an online financial transaction capability. To achieve this, the Indonesian Treasury should have reliable e-Government systems. Furthermore, the Indonesian Treasury e-Government systems should be ready for seamless interoperability with other government systems.

To understand this complex phenomenon, this study decided to divide the study into several stages. First, the study conducted in-depth study to understand the

relationship between EA and e-Government performance. Building upon the EABM, this study managed to refine the EABM for its research framework model. The proposed model has six dimensions, i.e., EA, organisational alignment, information availability, resource portfolio optimisation, resource complementarity and e-Government performance. The e-Government performance was measured by using SERVQUAL.

Second, the study decided to conduct empirical studies in Indonesia, a country which is considered to have underdeveloped e-Government systems. It then narrowed down its investigation to the Indonesian Treasury. According to the Indonesian financial laws, the Treasury is the core of its public finances. The complexity of the Indonesian Treasury e-Government systems ought to be high. Thus, the selection of the Indonesian Treasury government systems is deemed sufficient to validate the framework in the study.

The study used a mixed method to obtain a complete picture of the effect of EA on e-Government performance in the Indonesian Treasury. Both approaches, qualitative and quantitative, were performed simultaneously. Purposive sampling was used in selecting interviewees for the qualitative approach because this study required valid responses from high-level officials who really knew the Indonesian Treasury e-Government systems. The selection was based on current and previous roles held by the respondents. Respondent's profiles were attained through publicly available sources such as the Internet. Audio recorded interview responses were then compiled into text. The study conducted context and thematic analysis of the transcripts using NVivo 10.

This study used paper-based questionnaires to obtain responses from different groups of respondents for its quantitative approach. Achmad (2012) adopted more than one media in his research at the Indonesian Treasury. He revealed that paper-based questionnaires had the highest response rate. Hence, this study decided to use paper-based only. This study sent three sets of questionnaires, together with a postage paid, self addressed envelope, to all vertical offices in the Indonesian Treasury. Three groups of people were sampled in each office. The study had more than a 90 percent response rate.

Collected data and the proposed model were analysed using Structural Equation Modelling (SEM) approach using AMOS version 22. The findings indicated that the structural model and data fulfilled several fit indices used in the study. All dimensions in the model satisfied construct reliability, convergence and discriminant validity. Causal effects of the relationships were assessed using simple mediation analysis.

This study found that the effect of EA on e-Government performance was mediated by four mediators. This means the effect of EA on e-Government performance was either reduced by the mediator or fully controlled through the mediator. Hence, no changes could be immediately envisaged.

In light of the above, the study found that there is a problem in the Indonesian Treasury e-Government system perfomance. Using the model developed in this research, the study shows that:

1. The absence of EA has been affecting the e-Government performance;
2. Each of the mediators used in the model to some extent mediate the effect of EA on e-Government Performance;

3. The level of mediation effect for each mediator used in the research are different;
4. SERVQUAL dimensions are considered unstable and required alteration; and
5. Culture is considered to have contributed to the findings significantly.

These were substantiated by both a qualitative and quantitative analysis of data collected from the Indonesian treasury.

9.4 Answers to Research Questions

As stated in Section 1.4, the main research question in the study is the extent to which EA can be used to improve the Indonesian Treasury e-Government system performance. To answer this question the study developed four questions.

Q1. Internationally, has EA implementation demonstrated benefits to e-Government performance?

The study perceived that EA implementation has demonstrated positive effects on e-Government performance as discussed in Section 2.4.

Q2. How can the quality or the process of EA development affect e-Government performance?

The results of in-depth literature review on EA and e-Government showed that the EABM was the appropriate model to depict such a relationship. However, this study suggested an alteration to the EABM by using EA maturity to measure EA and the SERVQUAL to measure e-Government performance. Four performance enablers in the EABM, i.e., organisational alignment, information availability, resource portfolio optimisation and resource complementarity, remained the same. Chapter 3

discussed in detail the model development. The model was used as the research framework.

Q3. What is the current state of the Indonesian Treasury e-Government systems? How can it be improved?

The Indonesian Treasury e-Government systems is briefly outlined in Chapter 5. Additionally, the results of qualitative analysis in Chapter 6 exposed a more comprehensive picture. Most interviewees confirmed that the Indonesian e-Government Treasury systems has not delivered expected value. The study found that generating high-quality information required additional effort such as through meetings and comparing multiple sources of data. Investment in ICT was considered not to have long term vision.

A smaller number of interviewees considered current systems to be satisfactory. They argued that valuable information could still be generated within an acceptable time frame. Another interviewee contended that the Indonesian Treasury e-Government systems were satisfactory. However, there were low expectations of the systems' outcomes. He further claimed that current systems were surely better than manual processes but that the systems had not been delivering the value they should have been.

Although internationally accepted standards such as BSC, SDLC, ITIL and ISO 20000:2011 were adopted in the regulations, this study found that the Indonesian Treasury was struggling to cope with its Business-ICT alignment, unnecessary investment, duplication of resources, and integration among resources. Hence, the adoption of internationally accepted standards had not improved the Indonesian e-Government performance. Such findings were considered similar to the results of

quantitative analysis presented in Chapter 7 and Appendix I. All in all, it can be determined that the Indonesian Treasury e-Government is under performing.

Q4. How can EA be used to improve the quality of the Indonesian Treasury e-Government systems?

This study found that there is a relationship between EA and e-Government performance. It found that EA was absent in the e-Government systems development in the Indonesian Treasury. The results of qualitative analysis in Chapter 6 show that the Indonesian Treasury did not have any direction what would be developed in the future. As such, the findings were consistent with the results of quantitative analyses in Chapter 7. This study found that the factor loading (β) is 0.769 with 0.004 significance level for direct relationships between EA and e-Government without imposing any mediator.

The use of simple mediation analysis is deemed sufficient to achieve the aims of this study. The relationship of EA and e-Government is intervened by each of the mediators. This indicates the effect of EA on e-Government performance should be gradual. The following mediators: organisational alignment, information availability, resource portfolio optimisation and resource complementarity could impact the relationship between EA and e-Government. Mediated by each of the mediators, the absence of EA could have an effect on the Indonesian Treasury e-Government system performance.

9.5 Contributions of the Study

The results of this study contributes in the understanding of ways to improve e-Government performance in developing countries through Enterprise Architecture. Unlike previous e-Government studies that adopted mainly a technology perspective

(Alzahrani, 2014; Sharif et al., 2013; Susanto, 2012) this study adopted an EA perspective. An EA perspective is important because government requires a holistic approach in developing its e-Government systems (Saha, 2010a). Unfortunately, this study found that e-Government studies in developing countries using EA as its focus remains limited.

This study began by proposing a model to illustrate the relationship between EA and e-Government. The study integrated well-known theory, SERVQUAL, to the model. Supported by a literature review and empirical evidence, the study contributed the following:

1. This study refines the EA Benefit Model (EABM) from Tamm et.al. (2011) and extends it by using SERVQUAL to measure e-Government performance in its final research framework.
2. The main contribution of this study provides a better understanding of improving e-Government performance in developing countries through EA, particularly in Indonesia. This study validated the model by using the Indonesian Treasury as its case study. Although, the EABM and SERVQUAL were developed in the Western culture, the findings confirm that the model can be applied in an Asian culture.
3. Once the model was defined, the study developed measures to validate five of six dimensions in the model. The study found the measures satisfied the normality of data. The normality of data is essential before conducting stuctural equation modeling (SEM) analysis (Hair et al., 2010). Consequently, the novel measures in the study contributed to metodhological progression in the field of e-Government development through EA. The study modified SERVQUAL congeneric models to

measure e-Government performance in the Indonesian Treasury as seen in Table 9.1.

This is consistent with other studies suggesting the unstable dimensionality of the SERVQUAL (see Jiang et al., 2002; Landrum et al., 2009; Myerscough, 2002). In its final model as depicted in Figure 7.3, the study combined the empathy and responsiveness factors. Other factors were kept with their original names. Respondents in the Indonesian Treasury might see that empathy should be demonstrated.

Table 9.1. Final SERVQUAL Congeneric Models

Factor	Observed Variables
TANGIBLE (TA)	My office has visually appealing physical facilities.
	Neat appearance of IS employees.
	IS units record users problems accurately.
	Users feel secure when using the systems.
	Knowledgeable IS employees.
	IS units act in best interest of users
RELIABILITY (RL)	Information Systems (IS) units always fulfil promises.
	IS units provide timely services.
	IS units' staff are instilling confidence.
ASSURANCE (AS)	IS units show sufficient interest to solve user's problems.
	Courteous interaction with IS users.
	Proper behaviour towards users.
EMPATHY AND RESPONSIVENESS (EMRS)	IS staff available to respond to user requests.
	Individual attention to users.
	IS staff understands users' needs.

4. This study employed simple mediation analysis using SEM. CFA was used to validate measurement in its SEM. This study also adopted a bootstrapping procedure to estimate the confidence level of indirect effect in mediation analysis (Hayes, 2013; Hayes & Preacher, 2010). The use of mediation

analysis using SEM in the field of e-Government studies is considered limited. This study has shown that mediation analysis can be used to enrich the findings. Hence, it can suggest more useful implications.

9.6 Policy Implications

E-Government is more than just making public services available online. It involves multiple processes before reaching the final user interface. Since most information-intensive processes take place in the back office of government agencies (Dawes, 2008) such as the Indonesian Treasury, the e-Government systems in such agencies should be reliable and sustainable. The systems could therefore present high-quality information, interoperable with other agencies. Hence, the Indonesian Treasury should have a holistic design in its e-Government systems.

The use of a design artefact such as Enterprise Architecture is often neglected in developing e-Government systems, particularly in developing counties. It is evident from this study that the absence of EA in the Indonesian Treasury has been causing significant under performance of e-Government systems. The Indonesian Treasury should start adopting an EA in its e-Government development strategy.

The study also found that the impact of EA on e-Government performance would be mediated by four mediators, i.e. organisational alignment, information availability, resource portfolio optimisation and resource complentarity. Hence the Indonesian Treasury e-Government performance may not immediately benefit from EA adoption. Rather the EA adoption could assist e-Government implementation to be more robust, reliable, interoperable, and resource effective.

Other developing countries and other Indonesian government agencies may find similarities from this in-depth study of the Indonesian Treasury e-Government

systems. Hence, instead of reinventing the wheel, this study could be replicated to further justify whether or not EA would be a fit to improve e-Government performance.

9.7 Limitations and Further Research

The study concentrated on Indonesian Treasury e-Government systems. This study pertains primarily to changes that occurred to the systems since the enactment of the Indonesian financial laws from 2004 to 2013. Data is gathered from Indonesian Treasury officials. The scope of this study is limited to the specific roles of Treasury in managing the public expenditure. Therefore, other Treasury functions such as debt management and asset management were excluded. These functions are run by units outside of the Indonesian Treasury.

Interpretation of the results should be take into account several limitations. First, with a limited time frame, the findings should be seen as an initial in-depth analysis of e-Government practices in a developing country by using a single case study. Although data from 561 responses from the Indonesian Treasury that has been neglecting EA in its e-Government systems development generated thoughtful results, further investigation from more government agencies could further validate the model and its measures. Sub-group analysis based on different agencies could also be useful and enrich comparison between agencies.

Second, as EA maturity and e-Government systems across countries vary, extended research in other countries could enrich applicability of the findings. This study contributes to the EA and e-Government performance relationships, which was formerly immature. Further research by involving more respondents from different

cultures and agencies, who may have diverse conceptions, could lead to more established measures.

A longitudinal study that examines how maturity evolves and different important factors in each phase is needed to analyse the drivers of maturity on different types of government organisations e.g. national and regional. Wide ranges of respondents could also create more profound results. It will be useful to conduct follow-up research after the Indonesian Treasury has adopted EA for its e-Government systems. Hence, generalisability of the model could be attained.

9.8 Conclusion and Summary

This study provides a distinctive theoretical contribution from EA and e-Government perspectives. Using relevant literature in developing the model to empirically validate theories, this study found that the relationships between EA and e-Government system performance are not direct. They are mediated by at least four factors. This study also reveals that in addition to well-known standards such as BSC, ITIL, and SDLC that have been adopted to improve the organizational alignment, information availability, and resource management, the government still requires an EA as a baseline to improve performance and to ensure sustainability and interoperability of its e-Government systems.

In addition, this study refines the SERVQUAL to measure e-Government performance. Therefore, this study provides an important theoretical contribution to the e-Government literature by offering an alternative means for measuring e-Government systems. Furthermore, this study suggests the critical role of Enterprise Architecture in improving the quality of e-Government systems in developing countries.

Given that governments are forced to work collaboratively, the presence of EA becomes critical. However, government should not view EA as a magic formula that can instantly lift e-Government system performance to another level. Hence, in addition to EA adoption, government is still required to assign adequate attention on several factors such as organisation, information and resources in its policy.

This novel theoretical contribution based on far-reaching investigation in conjunction with its measures could be used as a potential underpinning for future research in the area of e-Government and Enterprise Architecture.

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Appendix A.

ETHICS APPROVAL, LETTER OF INTRODUCTION, INVITATION TO RESEARCH, AND CONSENT FORM

FINAL APPROVAL NOTICE

Project No.:	**6205**
Project Title:	Improving the Indonesian Treasury e-Government Performance
Principal Researcher:	Mr Mochamad Ali Hanafiah
Email:	ali.hanafiah@flinders.edu.au
Address:	GPO Box 2100 Adelaide SA 5001

Approval Date:	15 August 2013	Ethics Approval Expiry Date:	**31 July 2015**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1. **Participant Documentation**
   Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.
- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialling codes for all telephone and fax numbers listed for all research to be conducted overseas.
- the SBREC contact details, listed below, are included in the footer of all letters of introduction and information sheets.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 'INSERT PROJECT No. here following approval'). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au.

2. Annual Progress / Final Reports

In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research (March 2007)* an annual progress report must be submitted each year on the **15 August** (approval anniversary date) for the duration of the ethics approval using the annual / final report pro forma available from Annual / Final Reports SBREC web page. *Please retain this notice for reference when completing annual progress or final reports.*

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please submit either (1) a final report; or (2) an extension of time request and an annual report.

Student Projects

The SBREC recommends that current ethics approval is maintained until a student's thesis has been submitted, reviewed and approved. This is to protect the student in the event that reviewers recommend some changes that may include the collection of additional participant data.

Your first report is due on **15 August 2014** or on completion of the project, whichever is the earliest.

3. Modifications to Project

Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such matters include:

- proposed changes to the research protocol;
- proposed changes to participant recruitment methods;
- amendments to participant documentation and/or research tools;
- change of project title;
- extension of ethics approval expiry date; and
- changes to the research team (addition, removals, supervisor changes).

To notify the Committee of any proposed modifications to the project please submit a Modification Request Form to the Executive Officer. Download the form from the website every time a new modification request is submitted to ensure that the most recent form is used. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

Change of Contact Details

Please ensure that you notify the Committee if either your mailing or email address changes to ensure that correspondence relating to this project can be sent to you. A modification request is not required to change your contact details.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Ethics Committee on 08 8201-3116 or human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforseen event occurs that may affect the ethical acceptability of the project.

Dr. Robert Goodwin
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GPO Box 2100
Adelaide SA 5001
Tel: +61 8 8201 3113
Fax: +61 8 8201 2904
robert.goodwin@flinders.edu.au
http://www.flinders.edu.au/people/robert.goodwin

Adelaide, 9 September 2013

Subject : Data Collection Support

To whom it may concern.

Dear Sirs or Madams,

Please allow me to introduce one of my research students:

Name	: Mochamad Ali Hanafiah
Student ID	: 2077690
Faculty/School	: Faculty of Science and Engineering School of Computer Science, Engineering and Mathematics
Program	: PhD in Computer Science
Research Title	: Improving the Indonesian Treasury e-Government Performance

He joined my research group in August 2011. Since then he has published three international papers one of which will be published as a book chapter. In the latest paper he successfully developed a new theory. He used the theory as his research framework. In order to validate his framework, it is important for him to collect the data from your organisation because his research theme is related to the Indonesian Treasury e-Government systems.

He proposed the following time and location for his research:

Time Estimate	: 2 September 2013 – 31 January 2014
Research Location	: The Indonesian Treasury Headquarter, Regional Offices (Kanwil), and Treasury Service Offices (KPPN)

In collecting his data, he will employ the following methods:

1. **Survey**. His targeted respondents are coming from Kanwil and KPPN only. He is expecting three different levels, namely Echelon 3, Echelon 4 and Staff in each office to give their responses to his questionnaire. It will take less than 30 minutes to finish the questionnaire.
2. **Interview**. He also developed six questions suitable for interviews. He will invite Echelon 3 and above in headquarters and some Kanwils to participate in the interviews. Interviewees will be selected based on their current or previous roles in the Indonesian Treasury e-Government development and/or deployment. It will take approximately 30 minutes to finish one interview.
3. **Field Observation**. He will visit some KPPNs and Kanwils to capture the e-Government performance by understanding how the Indonesian Treasury users interact with the system that they are using.
4. **Document analysis.** To get a complete picture, he will need to review the Indonesian treasury e-Government systems related documents.

His research instruments (survey questionnaire and list of interview questions) are ready; the ethics approval no. 6205 for the instruments has been received.

With this letter, I would like to request your support for my student to conduct his research in the Indonesian Treasury. The data that he will be gathering during his research will be used for this research purposes only. He will obey all rules and regulations during his research in your organisation.

I strongly believe that his research will not only enrich the field of Information systems but also may significantly enhance the Indonesian Treasury e-Government performance. Your support is invaluable to his research.

Sincerely yours,

R D Goodwin

Dr. Robert Goodwin
Enterprise ICT and e-Government
Research Program Lead

inspiring achievement

Dr. Robert Goodwin
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http://www.flinders.edu.au/people/robert.goodwin
CRICOS Provider No. 00114A

INFORMATION SHEET

Title: Improving the Indonesian Treasury e-Government Performance

Investigator:
M. Ali Hanafiah
School of Computer Science, Engineering and Mathematics
Bedford Park Campus
GPO Box 2100
Adelaide SA 5001
Tel: +61 8 8201 7980
Fax: +61 8 8201 2904
ali.hanafiah@flinders.edu.au

Description of the study:
This study is part of the project entitled '*Improving the Indonesian Treasury e-Government Performance*'. This project will investigate factors affecting the Indonesian Treasury e-Government Performance and will discover how to improve it. This project is supported by Flinders University School of Computer Science, Engineering and Mathematics.

Purpose of the study:
This project aims to find out if *Enterprise Architecture (EA) affects the Indonesian Treasury e-Government Performance*. To achieve this, this project:

- Proposes an alternative EA maturity model by analysing current EA maturity models. This research has published an alternative Enterprise Architecture (EA) maturity model. This model depicted a clearer and yet comprehensive EA maturity model.
- Investigates the relations between EA maturity and e-Government performance. This research has reviewed relevant literature and submitted an article to show this relationship. This article is expected to be published as a book chapter by the end of this year.
- Assesses e-Government initiatives in a major developing country. Indonesian treasury is one major government institution which has a big impact on the whole government in Indonesia. The result of this evaluation will certainly give a better view on how e-Government initiatives in developing countries can be improved.

- Discovers how EA can foster effective e-Government in the Indonesian Treasury. Extensive fieldwork is needed to gather the data and find out what was missing in the treasury's e-Government implementation process and how it can be enhanced.

What will I be asked to do?
You are invited to attend a one-on-one interview with a researcher who will ask you a few questions about your views about the Indonesian Treasury e-Government Performance. The interview will take about 30 minutes. The interview will be recorded using a digital voice recorder to help with looking at the results. Once recorded, the interview will be transcribed (typed-up) and stored as a computer file and then destroyed once the results have been finalised. This is voluntary.

What benefit will I gain from being involved in this study?
This research will contribute knowledge to the information systems and e-Government disciplines by developing a theory that shows how to improve e-Government performance. This study is important because governments in either developed or developing countries are still struggling to improve their e-Government performance. Therefore this study may result in the improvement of e-Government performance in the Indonesian Treasury.

Will I be identifiable by being involved in this study?
We do not need your name and you will be anonymous. Once the interview has been typed-up and saved as a file, the voice file will then be destroyed. Any identifying information will be removed and the typed-up file stored on a password protected computer that only the coordinator (Dr. Robert Goodwin) will have access to. Your comments will not be linked directly to you.

Are there any risks or discomforts if I am involved?
Other group members may be able to identify your contributions even though they will not be directly attributed to you.
The investigator anticipates few risks from your involvement in this study. However, possible risks exist for participants in relation to responding to questions about their employers. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the investigator.

How do I agree to participate?
Participation is voluntary. You may answer 'no comment' or refuse to answer any questions and you are free to withdraw from the interview at any time without effect or consequences. A consent form accompanies this information sheet. If you agree to participate please read and sign the form and send it back to me at the above address or e-mail to ali.hanafiah@flinders.edu.au or robert.goodwin@flinders.edu.au. Verbal consent is also acceptable.

How will I receive feedback?
All interviewees will receive a copy of the summary report. Outcomes from the project will be summarised on completion of the study and given to you by the investigator.

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number No. 6205). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

Flinders
UNIVERSITY

CONSENT FORM FOR PARTICIPATION IN RESEARCH

(by interview)

Improving the Indonesian Treasury e-Government Performance

I .....

being over the age of 18 years hereby consent to participate as requested in the ..... for the research project on .....

1. I have read the information provided.
2. Details of procedures and any risks have been explained to my satisfaction.
3. I agree to audio/video recording of my information and participation.
4. I am aware that I should retain a copy of the Information Sheet and Consent Form for future reference.
5. I understand that:
   - I may not directly benefit from taking part in this research.
   - I am free to withdraw from the project at any time and am free to decline to answer particular questions.
   - While the information gained in this study will be published as explained, I will not be identified, and individual information will remain confidential.
   - Possible risks exist for participants in relation to responding to questions about their employers.
   - I may ask that the recording/observation be stopped at any time, and that I may withdraw at any time from the session or the research without disadvantage.
6. I agree/do not agree* to the tape/transcript* being made available to other researchers who are not members of this research team, but who are judged by the research team to be doing related research, on condition that my identity is not revealed. ** delete as appropriate*
7. I have had the opportunity to discuss taking part in this research with a family member or friend.

Participant's signature.....Date.....

I certify that I have explained the study to the volunteer and consider that she/he understands what is involved and freely consents to participation.

Researcher's name.....

Researcher's signature.....**Date**.....

NB: Two signed copies should be obtained. The copy retained by the researcher may then be used for authorisation of Items 8 and 9, as appropriate.

8. I, the participant whose signature appears below, have read a transcript of my participation and agree to its use by the researcher as explained.

Participant's signature.....**Date**.....

9. I, the participant whose signature appears below, have read the researcher's report and agree to the publication of my information as reported.

Participant's signature.....**Date**.....

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INFORMATION SHEET

Title: Improving the Indonesian Treasury e-Government Performance

Investigator:
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- Investigates the relations between EA maturity and e-Government performance. This research has reviewed relevant literature and submitted an article to show this relationship. This article is expected to be published as a book chapter by the end of this year.
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- Discovers how EA can foster effective e-Government in the Indonesian Treasury. Extensive fieldwork is needed to gather the data and find out what was missing in the treasury's e-Government implementation process and how it can be enhanced.

What will I be asked to do?
You are invited to respond to a questionnaire about the Indonesian Treasury e-Government performance and some factors that may affect it. Completion of the questionnaire will take about 30 minutes. This is voluntary.

What benefit will I gain from being involved in this study?
This research will contribute knowledge to the information systems and e-Government disciplines by developing a theory that shows how to improve e-Government performance. This study is important because governments in either developed or developing countries are still struggling to improve their e-Government performance. Therefore this study may result in the improvement of e-Government performance in the Indonesian Treasury.

Will I be identifiable by being involved in this study?
We do not need your name and you will be anonymous. Once the questionnaires has been filled-in and saved as an electronic file, the response file will then be destroyed. The electronic file will be password protected on a computer that only the researcher (M. Ali Hanafiah) and supervisor (Dr. Robert Goodwin) will have access to.

Are there any risks or discomforts if I am involved?
Other group members may be able to identify your contributions even though they will not be directly attributed to you.
The investigator anticipates few risks from your involvement in this study. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the investigator.

How do I agree to participate?
Participation is voluntary. You may refuse to answer any questions and you are free to withdraw from the research at any time without effect or consequences. Your completion of the questionnaire will be taken as your consent to take part in the survey.

How will I receive feedback?
Outcomes from the project will be summarised and given to you on completion of the study by the investigator if you would like to see them. Further details may be obtained from the researcher supervisor (Dr. Robert Goodwin).

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number No. 6205). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix B.
QUESTIONNAIRE

The Questionnaire for
Improving e-Government Performance Research

Research Purpose

This research investigates whether there is a relationship between Enterprise Architecture, an instrument used to design a holistic approach in the Information Systems field, and the performance of e-Government which is the use of Information and Communication Technologies (ICTs) to achieve better government. The case study for this research is the Indonesian Treasury e-Government systems.

Declaration

All information provided is for research purposes only. Although your responses **will not affect your career and/or private life**, they may **result in improvement of e-Government performance** in the Indonesian Treasury. All information given will be treated confidentially. It will not be possible for anyone to identify the respondent based on information given.

Direction to the Checklist

Please select one number (from 1 to 6) only for each item.

Section 1

This section measures the performance of e-Government.

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1. Up-to-date hardware and software applied immediately.	①	②	③	④	⑤	⑥
2. Information Systems (IS) units always fulfil promises.	①	②	③	④	⑤	⑥
3. Prompt service to users.	①	②	③	④	⑤	⑥
4. IS units' staff are instilling confidence.	①	②	③	④	⑤	⑥
5. My office has visually appealing physical facilities.	①	②	③	④	⑤	⑥
- = < o O o > = -						
6. Knowledgeable IS employees.	①	②	③	④	⑤	⑥
7. IS units act in best interest of users	①	②	③	④	⑤	⑥
8. Users feel secure when using the systems.	①	②	③	④	⑤	⑥
9. IS units record users problems accurately.	①	②	③	④	⑤	⑥
10. Neat appearance of IS employees.	①	②	③	④	⑤	⑥

The Questionnaire for
Improving e-Government Performance Research

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
11. Frequent termination of unfinished tasks.	①	②	③	④	⑤	⑥
12. Convenient IS support operating hours.	①	②	③	④	⑤	⑥
13. Physical facilities align with service provided.	①	②	③	④	⑤	⑥
14. Proper behaviour towards users.	①	②	③	④	⑤	⑥
15. IS units show sufficient interest to solve users problems.	①	②	③	④	⑤	⑥
16. Courteous interaction with IS users.	①	②	③	④	⑤	⑥
- = < o O o > = -						
17. Willingness to help users.	①	②	③	④	⑤	⑥
18. IS units provide timely services.	①	②	③	④	⑤	⑥
19. I am highly dependent on IS units.	①	②	③	④	⑤	⑥
20. IS staff available to respond to user requests.	①	②	③	④	⑤	⑥
21. Individual attention to users.	①	②	③	④	⑤	⑥
22. IS staff understands users' needs.	①	②	③	④	⑤	⑥

Section 2

This section measures factors that contribute to the performance of e-Government.

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1. Indonesian Treasury's mission is clear.	①	②	③	④	⑤	⑥
2. Current system can directly generate useful information.	①	②	③	④	⑤	⑥
3. ICT investment relies on existing resources.	①	②	③	④	⑤	⑥
4. Data management in the existing systems is simple.	①	②	③	④	⑤	⑥
5. There are no idle resources.	①	②	③	④	⑤	⑥
6. Existing business process has significantly represented the strategic goals.	①	②	③	④	⑤	⑥

This research is supported by Australian Leadership Award from AusAID

The Questionnaire for
Improving e-Government Performance Research

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
7. Locally purchased resources always align with headquarters' investment.	①	②	③	④	⑤	⑥
8. Current system needs significant adjustment.	①	②	③	④	⑤	⑥
9. There are no duplicated resources.	①	②	③	④	⑤	⑥
10. Although budget is available, no additional resources are needed because current systems are already optimised.	①	②	③	④	⑤	⑥
- = < o O o > = -						
11. The changes in organizational structure align with the strategic mission.	①	②	③	④	⑤	⑥
12. The intention of ICT investment is solely to support Indonesian treasury's strategic mission.	①	②	③	④	⑤	⑥
13. High-level officials can customize their own reports.	①	②	③	④	⑤	⑥
14. Data are easy to access.	①	②	③	④	⑤	⑥
15. Complementarity resources improve service delivery.	①	②	③	④	⑤	⑥
- = < o O o > = -						
16. Information on existing resources is accessible for the system architect and/or high-level officials.	①	②	③	④	⑤	⑥
17. The system has fully complied with Indonesian treasury business.	①	②	③	④	⑤	⑥
18. Investment policies are targeted to fill target performance gaps.	①	②	③	④	⑤	⑥
19. Unnecessary resources are rarely purchased.	①	②	③	④	⑤	⑥
20. High-quality information can be easily generated from the existing system.	①	②	③	④	⑤	⑥

Section 3

This section measures the enterprise entities alignment.

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1. I am involved in the process of designing information systems.	①	②	③	④	⑤	⑥
2. Frequently requested to suggest ways to optimise the system.	①	②	③	④	⑤	⑥
3. ICT Standard(s) is/are already available.	①	②	③	④	⑤	⑥

The Questionnaire for
Improving e-Government Performance Research

Items	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
4. Enterprise attributes (such as business, ICT, people) have fully aligned with the strategic missions.	①	②	③	④	⑤	⑥
5. Mechanisms are available to propose enterprise enhancement.	①	②	③	④	⑤	⑥
6. Contribute to some parts of information system development only e.g. system testing, training.	①	②	③	④	⑤	⑥
7. Data are interchangeable with other government institutions.	①	②	③	④	⑤	⑥
8. ICT infrastructures always comply with the approved standard(s).	①	②	③	④	⑤	⑥
9. Enterprise performance indicators affect budget allocation.	①	②	③	④	⑤	⑥

Respondent profiles (Please tick (√) one for each item)

This variable is intended to elucidate respondent profiles. The respondents come from Indonesian treasury offices namely the regional offices and the treasury offices. Headquarters are excluded because most system users are not working there. Work area in the table represents provinces within identified islands. Thus treasury service offices in islands like Madura, Bangka, Belitung, Nias, Batam, and Biak should select the closest identified island.

Items	Responses
Gender	☐ Male ☐ Female
Age group (in years old)	☐ Below 25 ☐ 25 – 30 ☐ 30 – 35 ☐ 36 – 40 ☐ 41 – 45 ☐ 46 – 50 ☐ More than 51
Work period (in years)	☐ Below 5 ☐ 5 – 9 ☐ 10 – 14 ☐ 15 – 19 ☐ 20 – 24 ☐ More than 25
Work place	☐ Regional Office ☐ Treasury Service Office
Role	☐ Head Office ☐ Division head ☐ Section head ☐ Staff
Educational Background	☐ Postgraduate ☐ Undergraduate ☐ Diploma ☐ Others: .....
Working Area	☐ Java/Bali ☐ Sumatera/ Borneo ☐ Celebes/ Papua ☐ Other areas

-=[Thank you very much for participating in this research]=-

Flinders UNIVERSITY
ADELAIDE • AUSTRALIA

Kuesioner

Penelitian Peningkatan Kinerja e-Government

Pendahuluan

Semua informasi yang Bapak/Ibu berikan semata-mata untuk keperluan penelitian dari studi Doktoral. Jawaban yang Bapak/Ibu berikan **TIDAK akan berpengaruh** terhadap karir dan/atau kehidupan pribadi Bapak/Ibu. Jawaban yang diberikan akan dapat **digunakan untuk meningkatkan kinerja** Sistem Informasi (*e-Government*) yang digunakan oleh Direktorat Jenderal Perbendaharaan. Partisipasi dalam studi ini bersifat sukarela. Oleh karena itu dimohon untuk dapat memberikan jawaban secara **jujur, berdasarkan kondisi aktual yang ada dan tanpa tekanan/paksaan**. Kuesioner ini telah melalui proses **pengujian yang ketat** dari pihak universitas sehingga seluruh informasi yang Bapak/Ibu berikan akan **dijamin kerahasiaannya**. Tidak ada responden yang bisa teridentifikasi secara individual dalam penelitian ini.

Petunjuk Pengisian

Silahkan Bapak/Ibu memilih jawaban yang anggap paling sesuai menurut pendapat Bapak/Ibu, dengan cara memberi tanda (x) atau (√) pada angka 1 - 6 yang telah tersedia.

Bagian 1

Kelompok pertanyaan berikut digunakan untuk mengukur kinerja dari e-Government.

Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
1. Perangkat TIK (contoh: Perangkat Keras, Perangkat Lunak, dan Perangkat Jaringan) diremajakan secara berkala dan dapat langsung digunakan.	①	②	③	④	⑤	⑥
2. Instansi TIK (contoh: Dit. SP, Dit. TP dan Pusintek) selalu memenuhi janjinya.	①	②	③	④	⑤	⑥
3. Instansi TIK selalu meyelesaikan permasalahan dengan cepat.	①	②	③	④	⑤	⑥
4. Staf pada Instansi TIK dapat menumbuhkan rasa percaya diri akan kehandalan sistem yang ada.	①	②	③	④	⑤	⑥
- = < o O o > = -						
5. Penampilan kantor sangat menarik dan dilengkapi peralatan modern.	①	②	③	④	⑤	⑥
6. Staf pada instansi TIK memiliki pengetahuan TIK yang memadai.	①	②	③	④	⑤	⑥
7. Instansi TIK selalu mengutamakan kebutuhan pengguna TIK.	①	②	③	④	⑤	⑥

inspiring achievement

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Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
8. Permasalahan yang ditemukan oleh pengguna TIK dicatat secara akurat oleh instansi TIK.	①	②	③	④	⑤	⑥
9. Saya yakin terhadap kualitas keamanan sistem aplikasi yang ada.	①	②	③	④	⑤	⑥
10. Pada umumnya penampilan pegawai dari instansi TIK sangat meyakinkan.	①	②	③	④	⑤	⑥
11. Saya tidak dapat mengetahui perkembangan permasalahan TIK yang telah saya sampaikan kepada instansi TIK terkait.	①	②	③	④	⑤	⑥
- = < o O o > = -						
12. Saya dapat menyampaikan permasalahan TIK kapanpun saya perlukan.	①	②	③	④	⑤	⑥
13. Peralatan yang tersedia sudah sejalan dengan jenis/bentuk layanan yang diberikan.	①	②	③	④	⑤	⑥
14. Staf pada instansi TIK tidak pernah merendahkan / melecehkan pengguna TIK.	①	②	③	④	⑤	⑥
15. Instansi TIK menempatkan permasalahan yang dihadapi oleh pengguna TIK sebagai prioritas utama yang harus diselesaikan .	①	②	③	④	⑤	⑥
16. Interaksi yang baik dan santun antara instansi TIK dengan pengguna TIK.	①	②	③	④	⑤	⑥
- = < o O o > = -						
17. Saya merasakan adanya keinginan yang kuat dari instansi TIK untuk membantu pengguna TIK.	①	②	③	④	⑤	⑥
18. Instansi TIK selalu menyelesaikan tugas tepat pada waktu yang telah dijanjikan.	①	②	③	④	⑤	⑥
19. Tanpa dukungan dari instansi TIK di kantor pusat, kantor saya tidak dapat memberikan layanan dengan baik.	①	②	③	④	⑤	⑥
20. Saya tahu bagaimana dan kepada siapa saya harus menghubungi ketika menemukan permasalahan TIK.	①	②	③	④	⑤	⑥
21. Saya merasakan perhatian yang cukup dari instansi TIK terkait.	①	②	③	④	⑤	⑥
22. Staff pada Instansi TIK memahami apa yang dibutuhkan pengguna TIK.	①	②	③	④	⑤	⑥

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Bagian 2

Bagian ini digunakan untuk mengukur faktor-faktor yang dapat mempengaruhi kinerja dari e-Government.

Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
1. Saya memahami / mengetahui dengan jelas apa yang ingin dicapai oleh Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥
2. Saya dapat langsung memperoleh informasi berkualitas dari sistem aplikasi yang ada.	①	②	③	④	⑤	⑥
3. Informasi mengenai keadaan dan jumlah perangkat TIK selalu menjadi dasar dalam pengadaan perangkat TIK.	①	②	③	④	⑤	⑥
4. Tidak diperlukan keahilan yang khusus dalam mengelola data pada sistem aplikasi yang ada.	①	②	③	④	⑤	⑥
5. Di kantor saya tidak ada perangkat TIK yang menganggur.	①	②	③	④	⑤	⑥
- = < o O o > = -						
6. Visi dan Misi dari Ditjen Perbendaharaan sudah sepenuhnya tertuang dalam proses bisnis yang ada.	①	②	③	④	⑤	⑥
7. Pengadaan perangkat TIK yang dibiayai melalui DIPA kantor saya selalu sejalan dengan pengadaan dari kantor pusat.	①	②	③	④	⑤	⑥
8. Perlu adanya perbaikan/penyesuaian pada sistem aplikasi yang ada.	①	②	③	④	⑤	⑥
9. Tidak ada perangkat TIK yang rangkap/ganda sehingga tidak termanfaatkan.	①	②	③	④	⑤	⑥
10. Meskipun anggaran sudah tersedia di dalam DIPA, pengadaan/penambahan perangkat TIK tidak dilakukan karena sistem yang ada sudah optimal.	①	②	③	④	⑤	⑥
- = < o O o > = -						
11. Reorganisasi yang dilakukan sudah sejalan dengan visi dan misi Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥
12. Menurut saya pengadaan perangkat TIK semata-mata ditujukan untuk mendukung tercapainya visi dan misi Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥
13. Kantor pusat Ditjen Perbendaharaan tidak pernah meminta laporan yang spesifik karena dapat menyusun sendiri.	①	②	③	④	⑤	⑥

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Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
14. Basis data dari sistem aplikasi yang ada dapat diakses dengan mudah dari kantor lain (misal: kantor pusat) dan/atau melalui perangkat dengan platform beragam (misal: Unix, MacOS, Windows).	①	②	③	④	⑤	⑥
15. Perangkat TIK tambahan selalu meningkatkan kualitas layanan.	①	②	③	④	⑤	⑥
16. Kantor pusat dapat dengan mudah mengakses untuk mengetahui kondisi dan jumlah dari perangkat TIK yang ada di kantor saya.	①	②	③	④	⑤	⑥
- = < o O o > = -						
17. Sistem aplikasi yang ada sudah sepenuhnya sesuai dengan ruang lingkup tupoksi Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥
18. Menurut saya, pengadaan perangkat TIK selalu ditujukan untuk meningkatkan kinerja sistem.	①	②	③	④	⑤	⑥
19. Pengadaan perangkat TIK yang tidak/kurang dibutuhkan sangat jarang terjadi.	①	②	③	④	⑤	⑥
20. Sistem aplikasi yang ada dapat menghasilkan informasi/laporan yang bermutu dengan mudah.	①	②	③	④	⑤	⑥

Bagian 3

Bagian ini digunakan untuk mengukur peran pengguna dalam menciptakan atau menjaga keselarasan entitas Sistem informasi pada Ditjen Perbendaharaan.

Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
1. Saya selalu dilibatkan dalam proses perancangan sistem aplikasi agar sesuai dengan kebutuhan pengguna.	①	②	③	④	⑤	⑥
2. Sering dimintai pendapat/masukan/saran untuk meningkatkan kinerja sistem yang ada oleh instansi TIK.	①	②	③	④	⑤	⑥
3. Ditjen Perbendaharaan pernah menerbitkan Standar TIK dalam bentuk PerDirjen dan masih berlaku sampai sekarang.	①	②	③	④	⑤	⑥
4. Atribut organisasi seperti proses bisnis, TIK, SDM sudah sepenuhnya selaras dengan visi dan misi Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥

Daftar Pernyataan / Pertanyaan	Sangat Tidak Setuju	Tidak Setuju	Agak Tidak Setuju	Agak Setuju	Setuju	Sangat Setuju
5. Saya mengetahui tata cara menyampaikan pendapat/saran untuk peningkatan kualitas layanan termasuk layanan TIK di Ditjen Perbendaharaan.	①	②	③	④	⑤	⑥
6. Saya hanya dilibatkan pada bagian tertentu dari pengembangan sistem seperti pengujian dan pelatihan sistem aplikasi.	①	②	③	④	⑤	⑥
7. Data yang dihasilkan oleh kantor saya dapat dipertukarkan dengan esselon I atau kementerian lainnya dengan mudah tanpa melalui proses perubahan atau penyesuaian terlebih dahulu.	①	②	③	④	⑤	⑥
8. Perangkat TIK Ditjen Perbendaharaan selalu memenuhi standar TIK yang ada.	①	②	③	④	⑤	⑥
9. Capaian indikator kinerja berpengaruh terhadap alokasi anggaran.	①	②	③	④	⑤	⑥

Profil Responden

Daftar pertanyaan dibawah ini digunakan untuk mengetahui profil dari responden. Untuk lokasi kantor seperti di pulau Madura, Bangka, Belitung, dan sebagainya silahkan dipilih pulau terdekat yang ada didalam daftar. Untuk lokasi kantor di sekitar ambon, nusa dan tenggara silahkan dipilih lokasi lainnya. Silahkan memberi tanda (x) atau (√) pada kotak jawaban yang tersedia sesuai dengan keadaan Bapak/Ibu.

Informasi	Jawaban
Jenis Kelamin	☐ Laki-laki ☐ Perempuan
Kelompok Usia (dalam tahun)	☐ Belum 25 ☐ 25 – 30 ☐ 30 – 35 ☐ 36 – 40 ☐ 41 – 45 ☐ 46 – 50 ☐ lebih dari 51
Masa Kerja (dalam tahun)	☐ Belum 5 ☐ 5 – 9 ☐ 10 – 14 ☐ 15 – 19 ☐ 20 – 24 ☐ Lebih dari 25
Tempat Bekerja	☐ Kantor Wilayah (Kanwil) ☐ KPPN
Jabatan	☐ Kepala Kantor ☐ Kepala Bagian / Bidang ☐ Kepala Seksi ☐ Pelaksana
Pendidikan terakhir	☐ S2 / S3 ☐ D4 / S1 ☐ D1 – D3 ☐ Lainnya: .....
Lokasi Kantor	☐ Jawa/Bali ☐ Sumatera/ Kalimantan ☐ Sulawesi/ Papua ☐ Lokasi lainnya

-= Terima kasih atas partisipasi bapak/ibu dalam penelitian ini =-

Appendix C.
LIST OF INTERVIEW QUESTIONS

The List of Questions for
Improving e-Government Performance Qualitative Research

Declaration

All information provided is for research purposes only. Although your responds **will not affect your career and/or private life**, they may **result in improvement of e-Government performance** in the Indonesian Treasury. All information given will be treated confidentially. It will not be possible for anyone to identify the respondent based on information given.

The List of Questions

1. What is your opinion regarding the current and previous performance of the e-Government in terms of tangibility, reliability, responsiveness, assurance and empathy in the Indonesian Treasury?
2. Does your organization share a common understanding of the strategic goals of e-Government, and contribute towards achieving these goals?
3. To what extent does e-Government in the Indonesian treasury provide useful, high-quality information which is accessible to organizational decision makers?
4. In deciding what and where to invest in ICT related resources, does the Indonesian treasury consider leveraging its existing resources, investing in resources that target performance gaps, and minimizing unnecessary investment in duplicated resources?
5. In your understanding to what extent do the Indonesian treasury's resources synergistically support the pursuit of its strategic goals?
6. In developing and deploying e-Government, what instruments did the Indonesian treasury use to ensure different parts of the organization shared a common understanding in business processes, technologies and people?

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Daftar Pertanyaan untuk Penelitian Peningkatan Kinerja e-Government pada Ditjen Perbendaharaan

Pernyataan Kerahasian

Semua informasi yang Bapak/Ibu berikan semata-mata untuk keperluan penelitian dari studi Doktoral. Jawaban yang Bapak/Ibu berikan **TIDAK akan berpengaruh** terhadap karir dan/atau kehidupan pribadi Bapak/Ibu. Jawaban yang diberikan akan dapat **digunakan untuk meningkatkan kinerja** Sistem Informasi (e-Government) yang digunakan oleh Direktorat Jenderal Perbendaharaan. Partisipasi dalam studi ini bersifat sukarela. Oleh karena itu dimohon untuk dapat memberikan jawaban secara **jujur dan tanpa tekanan/paksaan**. Daftar pertanyaan ini telah melalui proses **pengujian yang ketat** dari pihak universitas sehingga seluruh informasi yang Bapak/Ibu berikan akan **dijamin kerahasiaannya**. Tidak ada responden yang bisa teridentifikasi secara individual dalam penelitian ini.

Daftar Pertanyaan

1. Menurut pendapat bapak/ibu bagaimanakah kinerja dari e-Government (Sistem Informasi) yang saat ini digunakan oleh Ditjen Perbendaharaan?
2. Menurut bapak/ibu apakah seluruh organisasi di Ditjen Perbendaharaan sudah memiliki pemahaman yang sama terkait keselarasan antara e-Government dengan visi dan misi dari Ditjen Perbendaharaan? Apakah wujud dari kontribusi yang telah kantor Bapak/Ibu berikan untuk menuju pemahaman tersebut?
3. Sejauh mana e-Government (Sistem Informasi) di Ditjen perbendaharaan dapat menghasilkan informasi yang bermutu dan dapat langsung digunakan oleh para pengambil keputusan?
4. Dalam memutuskan apa dan dimana investasi TIK harus dilakukan, apakah Ditjen Perbendaharaan mempertimbangkan untuk mendayagunakan perangkat TIK yang sudah ada sehingga investasi baru tersebut dapat efisien dan meminimalisir duplikasi investasi pada perangkat TIK sejenis?
5. Dalam pandangan bapak/ibu sejauh mana perangkat TIK pada Ditjen Perbendaharaan saling bersinergi sehinggga dapat medorong tercapainya tujuan organisasi?
6. Dalam pengembangan dan implementasi e-Government (Sistem Informasi) pada Ditjen Perbendaharaan, apakah instrumen atau alat yang digunakan sehingga seluruh unit organisasi dapat memiliki kesamaan pemahaman terkait dengan proses bisnis, perangkat TIK dan sumber daya manusia?

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Appendix D.
LIST OF REGULATIONS

No.	Regulation Number	Date	Purpose
1	260/KMK.01/2009	24/07/2009	Policy for Management of Information and Communication Technology in the Ministry of Finance
2	512/KMK.01/2009	28/12/2009	Policies and Standards for Password Usage, Electronic Mail, and the Internet in the Ministry of Finance
3	274/KMK.01/2010	24/06/2010	Policies and Standards for Electronic Data Exchange in the Ministry of Finance
4	350/KMK.01/2010	27/08/2010	Policies and Standards for Electronic Data Management in the Ministry of Finance
5	479/KMK.01/2010	13/12/2010	Policies and Standards for Information Security Management System within the Ministry of Finance
6	330/KMK.01/2011	4/10/2011	Policy and Project Management Standards for Information and Communication Technology in the Ministry of Finance
7	351/KMK.01/2011	25/10/2011	the Policy and Standard of Information Systems Development Cycle within the Ministry of Finance
8	414/KMK.01/2011	9/12/2011	Policies and Standards for Service Management Areas of Information and Communication Technology Service Support in the Ministry of Finance
9	64/KMK.01/2012	1/03/2012	Policies and Standards for Service Management Information and Communication Technology Service Delivery Areas in the Ministry of Finance
10	129/KMK.01/2012	30/04/2012	Integration of Information and Communication Technology Devices in the Ministry of Finance
11	337/KMK.01/2012	18/10/2012	Use of Domain Names in the Ministry of Finance
12	338/KMK.01/2012	18/10/2012	Direction of the Information and Communication Technology development in the Ministry of Finance
13	83/KMK.01/2013	18/03/2013	Management Policy of Information and Communication Technology Services Based on ISO 20000:2011
14	KEP-10/PB/2008	16/01/2008	Standard of Hardware and Software

Appendix E.
SQL QUERY SYNTAX

```
SELECT DISTINCT LEFT
(p.posUnit,1),u.unitNama, Count(i.mailId)
FROM
djpb_year.mail_in AS i
INNER JOIN djpb_year.mail_inpos AS p ON i.mailId = p.posId
INNER JOIN djpb_year.mail_unit AS u ON LEFT (p.posUnit, 1) = u.unitId
WHERE
i.mailSubject LIKE '%criteria%'
GROUP BY LEFT (p.posUnit, 1)
```

The Indonesian Treasury identified its mailing administration systems database by year. The study replaced the year in the syntax accordingly.

Appendix F.
EXTRACTS FROM MAILING ADMINISTRATION SYSTEMS

The Indonesian Treasury continuously evolves over time. As such, the Indonesian Treasury reorganises its organisational structures. Some organisations have no value in some columns as seen in Table A. 1, Table A. 2 and Table A. 3 below mean they no longer existed in the Indonesian Treasury headquarters.

Table A. 1. The Number of Request for Reports

Unit	Nama Unit	2006	2007	2008	2009	2010	2011	2012	2013
0	Direktorat Jenderal Perbendaharaan	19	28	39	51	66	51	82	85
1	Sekretariat Direktorat Jenderal Perbendaharaan	43	102	127	178	325	298	610	562
2	Direktorat Pelaksanaan Anggaran	19	12	6	17	19	7	19	14
3	Direktorat Pengelolaan Kas Negara	8	39	36	48	274	25	38	28
4	Direktorat Pengelolaan Barang Milik/ Kekayaan Negara	18							
5	Direktorat Pengelolaan Surat Utang Negara								
6	Direktorat Pengelolaan Pinjaman Dan Hibah Luar Negeri	9	3						
7	Direkorat Pengelolaan Penerusan Pinjaman	7	64						
8	Direktorat Informasi Dan Akuntansi	20	11						
9	Direktorat Pengelolaan Dana Investasi								
10	Direktorat Pembinaan Pengelolaan Keuangan Badan Layanan Umum			8	5	8	15	24	14
11	Direktorat Akuntansi Dan Pelaporan Keuangan			89	42	81	58	89	91
12	Direktorat Sistem Perbendaharaan			16	30	24	9	32	40
13	Direktorat Transformasi Perbendaharaan				4	3	13	12	17
14	Direktorat Sistem Manajemen Investasi				8	14	17	49	65
15	Lain-lain								
	Total	143	259	321	383	814	493	955	916

Table A. 2. The Number of Request for Data

Unit	Unit Name	2006	2007	2008	2009	2010	2011	2012	2013
0	Direktorat Jenderal Perbendaharaan	109	130	163	192	195	242	335	373
1	Sekretariat Direktorat Jenderal Perbendaharaan	580	730	924	1454	1665	1868	2962	2321
2	Direktorat Pelaksanaan Anggaran	97	92	76	90	98	81	160	259
3	Direktorat Pengelolaan Kas Negara	39	72	134	519	707	219	423	285
4	Direktorat Pengelolaan Barang Milik/ Kekayaan Negara	47							
5	Direktorat Pengelolaan Surat Utang Negara	4							
6	Direktorat Pengelolaan Pinjaman Dan Hibah Luar Negeri	83	5						
7	Direkorat Pengelolaan Penerusan Pinjaman	19	82						
8	Direktorat Informasi Dan Akuntansi	144	93						
9	Direktorat Pengelolaan Dana Investasi								
10	Direktorat Pembinaan Pengelolaan Keuangan Badan Layanan Umum			8	41	18	19	43	36
11	Direktorat Akuntansi Dan Pelaporan Keuangan			125	115	91	241	144	182
12	Direktorat Sistem Perbendaharaan			157	101	94	146	284	303
13	Direktorat Transformasi Perbendaharaan				18	18	51	210	51
14	Direktorat Sistem Manajemen Investasi				163	180	133	136	226
15	Lain-lain			1					
	Total	1122	1204	1588	2693	3066	3000	4697	4036

Table A. 3. The Number of Request for Data or Report Reconcilation

Unit	Nama Unit	2006	2007	2008	2009	2010	2011	2012	2013
0	Direktorat Jenderal Perbendaharaan	30	76	130	206	278	280	395	404
1	Sekretariat Direktorat Jenderal Perbendaharaan	463	714	542	1534	2452	1880	2613	2558
2	Direktorat Pelaksanaan Anggaran	78	91	26	41	68	57	25	32
3	Direktorat Pengelolaan Kas Negara	84	202	244	1031	2191	1189	1840	1611
4	Direktorat Pengelolaan Barang Milik/ Kekayaan Negara	17	8						
5	Direktorat Pengelolaan Surat Utang Negara								
6	Direktorat Pengelolaan Pinjaman Dan Hibah Luar Negeri	33	4						
7	Direkorat Pengelolaan Penerusan Pinjaman	64	619						
8	Direktorat Informasi Dan Akuntansi	389	100						
9	Direktorat Pengelolaan Dana Investasi								
10	Direktorat Pembinaan Pengelolaan Keuangan Badan Layanan Umum				5	32	47	285	253
11	Direktorat Akuntansi Dan Pelaporan Keuangan			527	1113	720	978	605	982
12	Direktorat Sistem Perbendaharaan			160	527	657	288	260	222
13	Direktorat Transformasi Perbendaharaan				12	5	3	2	5
14	Direktorat Sistem Manajemen Investasi				95	100	123	353	259
15	Lain-lain						1		
	Total	1158	1814	1629	4564	6503	4846	6378	6326

Appendix G.
THE INDONESIAN TREASURY ORGANISATION

The Indonesian Treasury is an organisation under the Ministry of Finance and is led by an Echelon 1 Director General. As of 2014, the Director General of the Indonesian Treasury is directly assisted by the following Echelon 2 staff: one secretary, seven directors, one treasury analyst and thirty three heads of regional offices. Each Echelon 2 is assisted by at least five Echelon 3 staff. Each Echelon 3 is assisted by at least three Echelon 4. Each Echelon 4 is assisted by at least two staff.

The Indonesian Treasury runs its business through its headquarters, 33 Treasury Regional Offices (TROs) and 177 Treasury Service Offices (TSOs). Most TSOs are located on the islands of Java, Sumatera and Borneo.

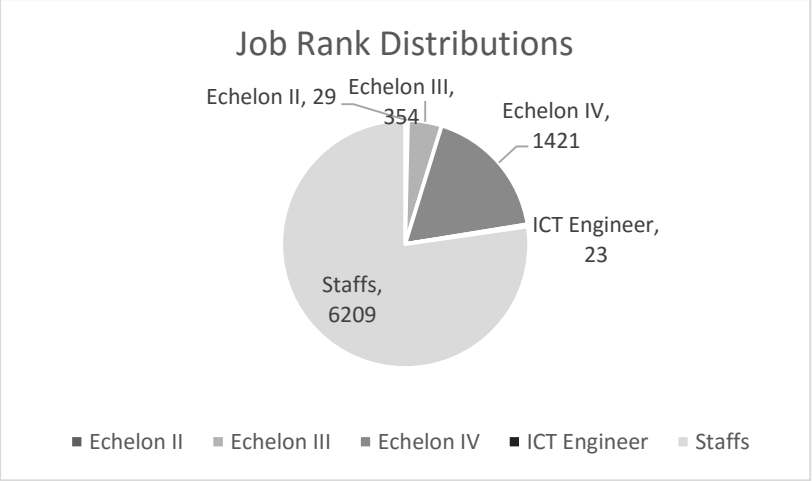


Figure A. 1. Job Rank Distribution

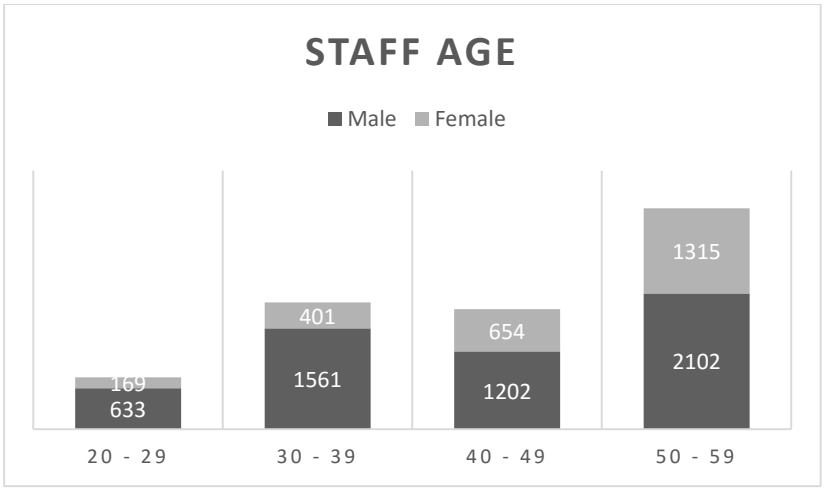


Figure A. 2. The Indonesian Treasury Staff Age

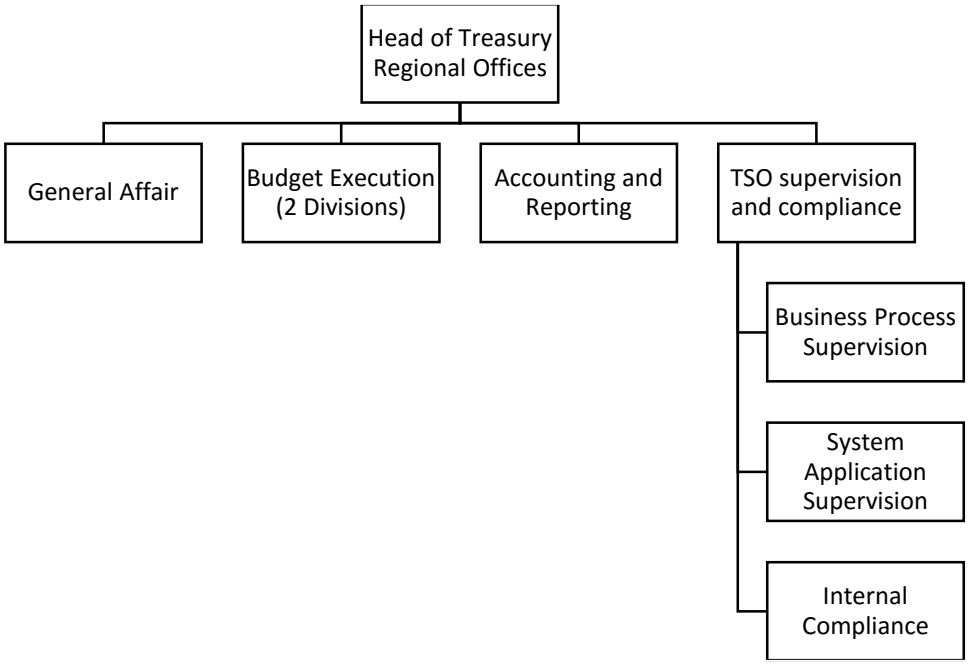


Figure A. 3. Organisational Structure of Treasury Regional Office

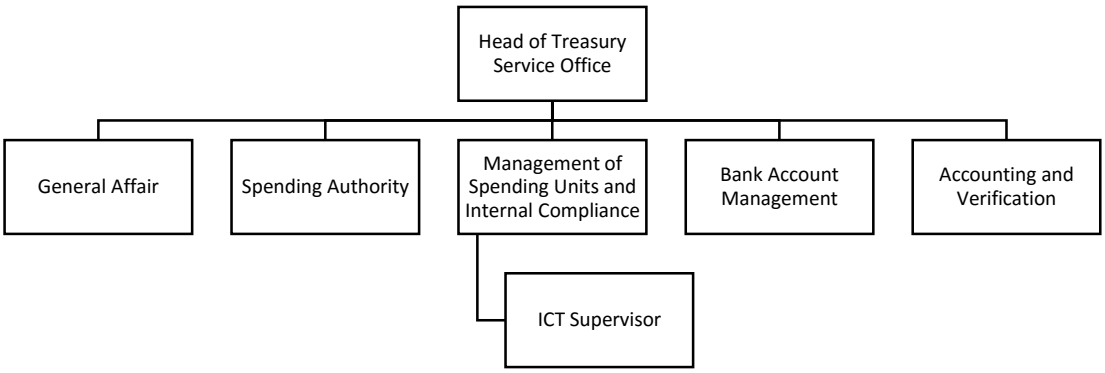


Figure A. 4. Organisational Structure of Treasury Service Office Type A1

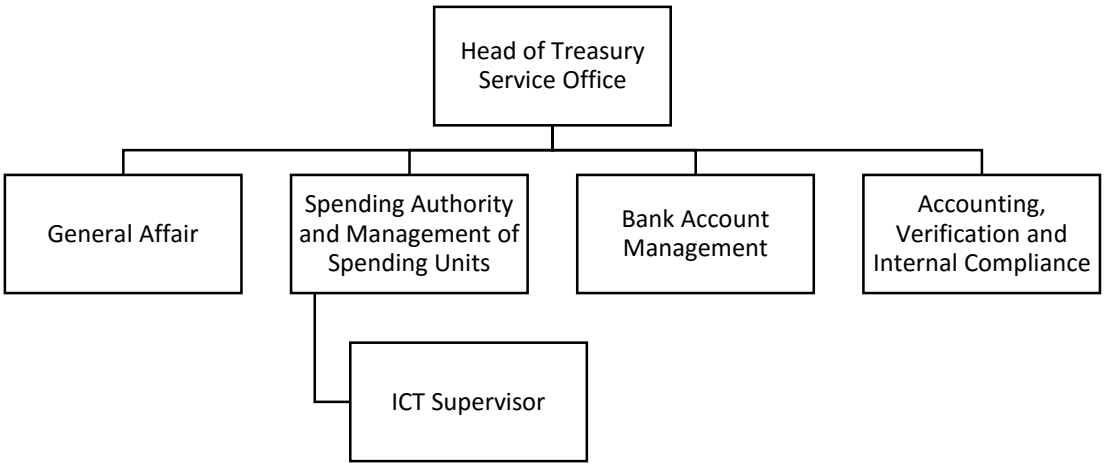


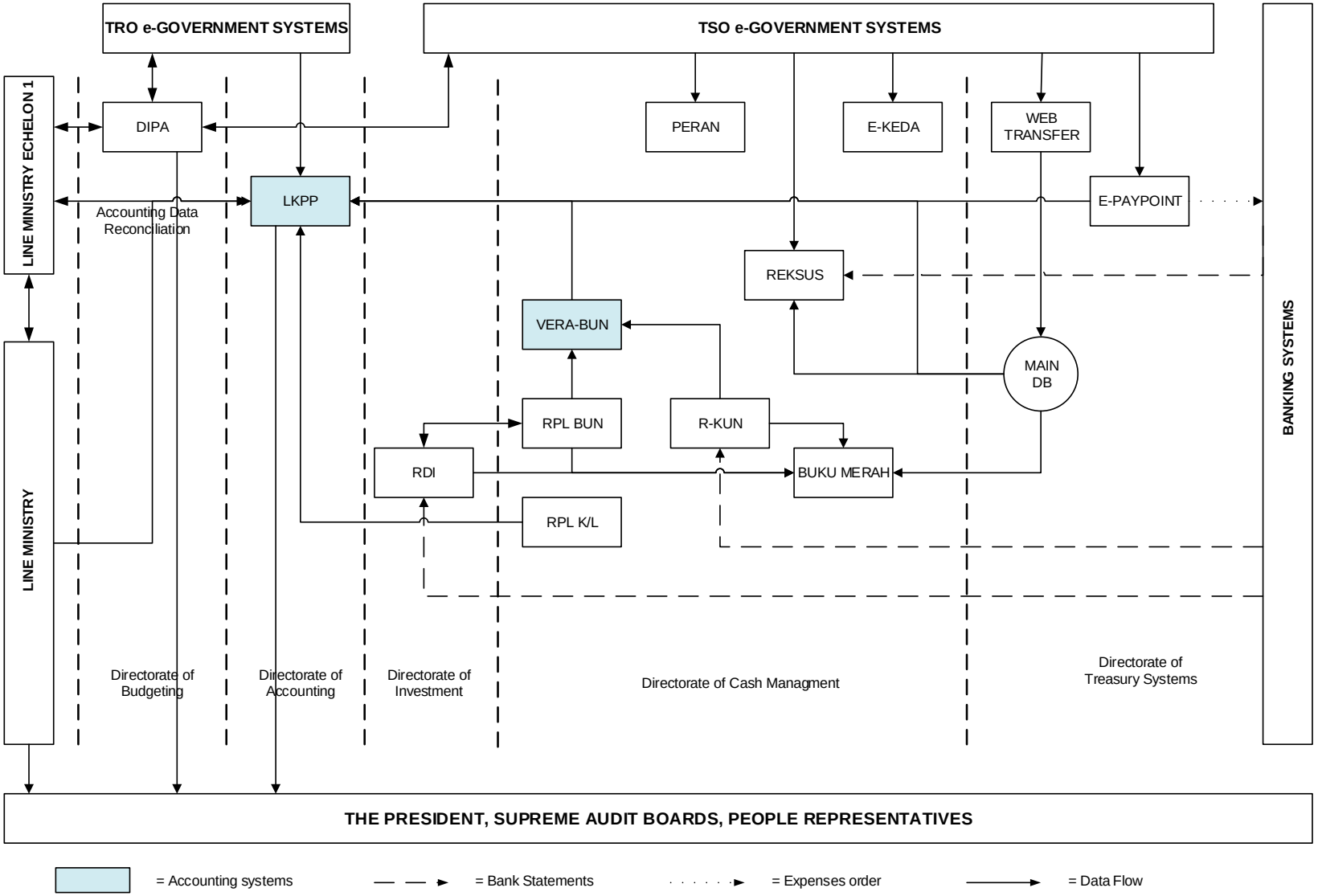
Figure A. 5. Organisational Structure of Treasury Service Office Type A2

Appendix H.
THE INDONESIAN TREASURY E-GOVERNMENT SYSTEMS BASIC CONFIGURATION

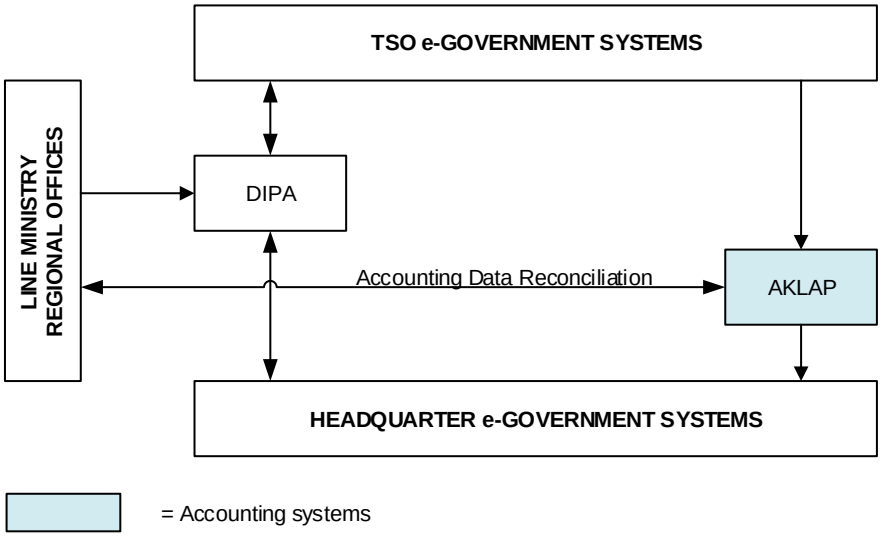
Table A. 4. Main Systems Used for Treasury Function

No	Systems Name	System's Description	Software	Database	User(s)
1	AKLAP	Accounting and Reporting	Ms. FoxPro	Oracle	TRO
2	BENDUM	Treasury book keeping	Ms. FoxPro	Ms. FoxPro	TSO
3	BUKU MERAH	Government Managerial Report	Ms. FoxPro	MySQL	TSO
4	DIPA	Budget allocation and allotment	Ms. FoxPro	Ms. FoxPro	TRO,TSO,SU,HQ
5	e-KEDA	Fund Needs Systems	Ms. FoxPro	Ms. FoxPro	TSO,HQ
6	e-PAYPOINT	Expenses Systems	Ms. FoxPro	Ms. FoxPro	TSO,HQ
7	GAJI	Salary	Ms. FoxPro	MySQL	SU, TSO
8	INTERFACE	Decoding Revenue data	Ms. FoxPro	Ms. FoxPro	TRO
9	LKPP	Government Accounting Report	Ms. FoxPro	Oracle	HQ
10	PERAN	Estimating budget execution	Ms. FoxPro	Ms. FoxPro	TRO,SU
11	PERSEDIAAN	Inventory	Ms. FoxPro	MySQL	SU
12	RDI	Government Investment	Ms. FoxPro	Ms. FoxPro	HQ
13	REKSUS	Special Account Transaction Systems	Ms. FoxPro	Ms. FoxPro	TSO,HQ
14	R-KUN	Government Accounts Type 2	Ms. FoxPro	Ms. FoxPro	HQ
15	RPL K/L	Government Accounts Type 3	Ms. FoxPro	Ms. FoxPro	HQ
16	RPLBUN	Government Accounts Type 1	Ms. FoxPro	Ms. FoxPro	HQ
17	SAKPA	Spending Unit (SU) Financial Accounting Systems	Ms. FoxPro	Ms. FoxPro	SU
18	SAPPAW	SU Financial Accounting Systems at Regional Level	Ms. FoxPro	Ms. FoxPro	SU
19	SAPPAE1	SU Financial Accounting Systems at Echelon 1 Level	Ms. FoxPro	Ms. FoxPro	SU
20	SAPA	SU Financial Accounting Systems at the Ministry Level	Ms. FoxPro	Ms. FoxPro	SU
21	SAU	Government General Accounting Systems	Ms. FoxPro	Ms. FoxPro	HQ
22	SAKUN	Government Cash Accounting Systems	Ms. FoxPro	Ms. FoxPro	HQ
23	SIMAK-BMN	Assets accounting	Ms. FoxPro	MySQL	SU
24	SP2D	Spending authority	Ms. FoxPro	MySQL	TRO
25	SPM	Spending order	Ms. FoxPro	Ms. FoxPro	SU
26	SPM-PP	Return Spending Order	Ms. FoxPro	Ms. FoxPro	TSO
27	VERA	Accounting and Verification	Ms. FoxPro	Ms. FoxPro	TSO
28	WEB Transfer	Data Transfer and Monitoring	PhP	MySQL	HQ

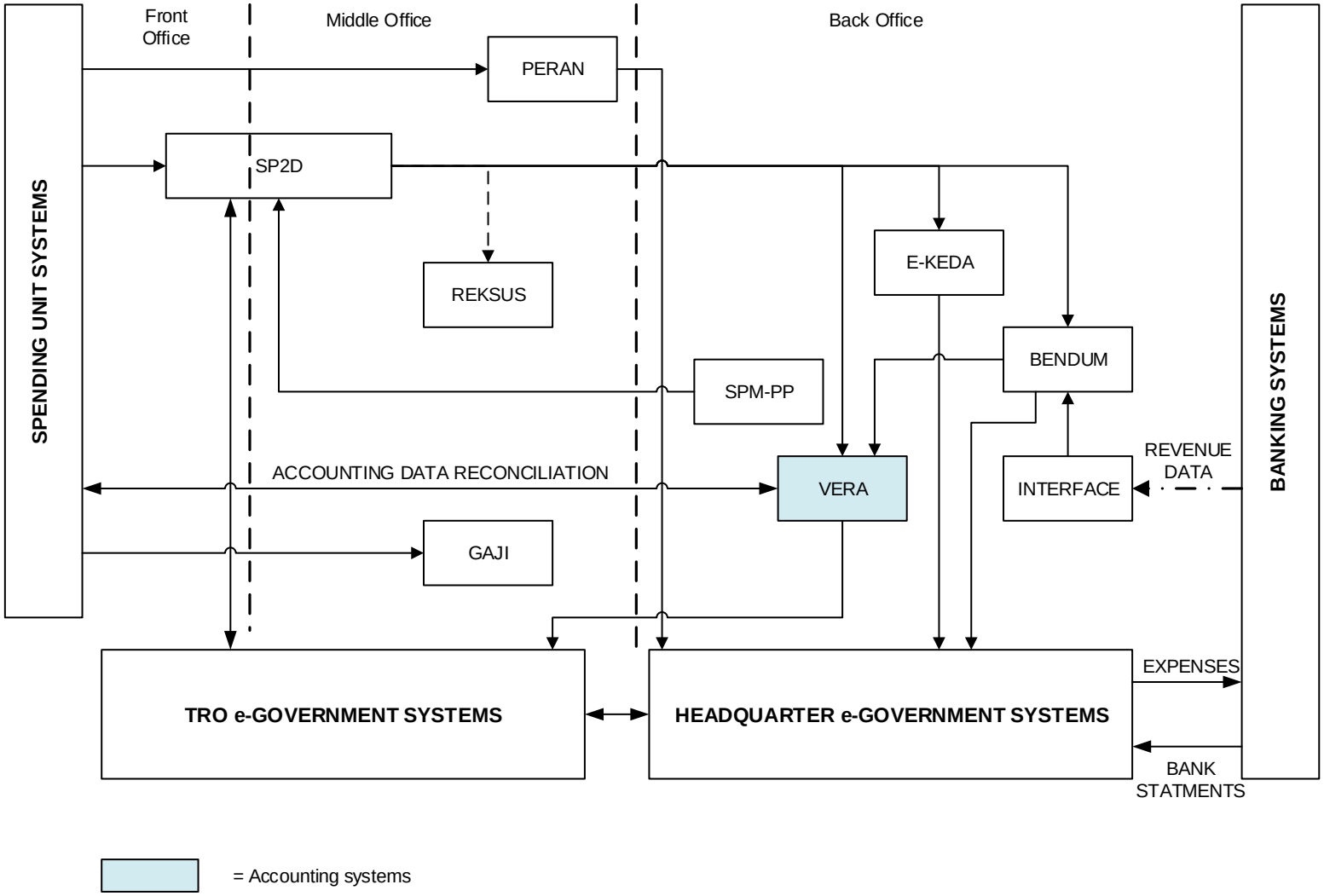
e-Government Systems at the Indonesian Treasury Headquarters



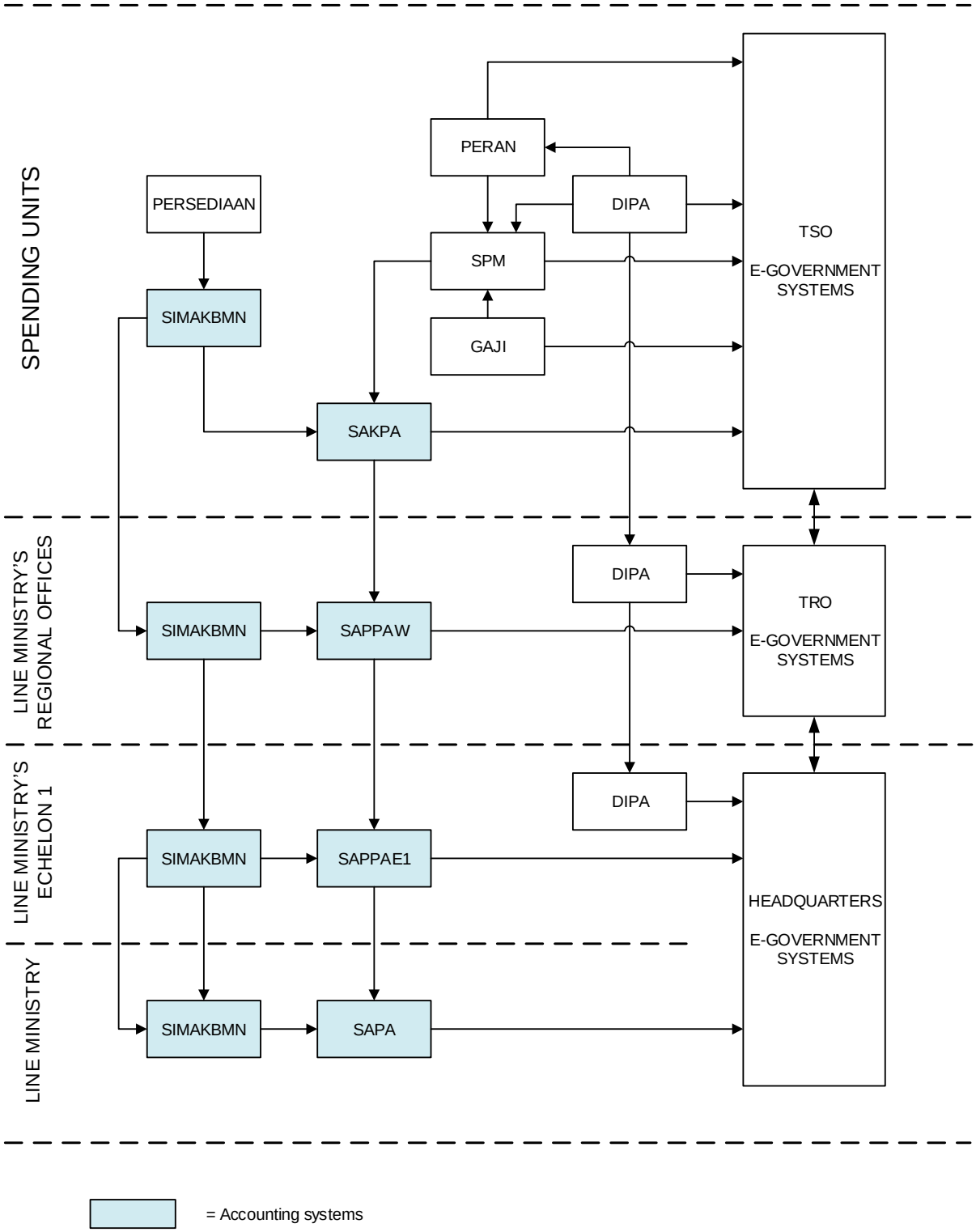
e-Government Systems at the Treasury Regional Offices



e-Government Systems at the Treasury Service Offices



Treasury Related e-Government Systems at the Spending Units to Line Ministry



Appendix I.
DESCRIPTIVE STATISTICS OF THE OBSERVED VARIABLES

Enterprise Architecture

		EA1	EA2	EA3	EA4	EA5	EA6	EA7	EA8	EA9
N	Valid	546	558	541	556	551	557	541	558	519
	Missing	15	3	20	5	10	4	20	3	42
Mean		4.05	3.62	2.53	2.46	2.69	2.82	3.77	2.46	2.45
Median		4	4	2	2	2	2	4	2	2
Mode		5	5	2	2	2	2	5	2	2
Std. Deviation		1.278	1.295	1.062	0.922	1.09	1.235	1.35	0.891	1.137
Skewness		-0.452	-0.071	1.094	0.967	1.011	1	-0.042	0.964	1.183
Kurtosis		-0.644	-1.041	0.797	1.503	0.405	0.031	-1.061	1.229	1.03

Organisational Alignment

		OA1	OA2	OA3	OA4	OA5
N	Valid	544	547	550	546	548
	Missing	17	14	11	15	13
Mean		2.01	2.15	2.54	2.28	1.74
Median		2	2	2	2	2
Mode		2	2	2	2	2
Std. Deviation		0.776	0.889	0.979	0.991	0.641
Skewness		1.26	1.428	0.951	1.324	0.709
Kurtosis		3.263	3.482	0.896	2.378	1.825

Information Availability

		IA1	IA2	IA3	IA4	IA5
N	Valid	557	556	542	547	554
	Missing	4	5	19	14	7
Mean		2.31	3.89	2.88	3.77	2.24
Median		2	4	2	4	2
Mode		2	5	2	4	2
Std. Deviation		0.84	1.36	1.309	1.287	0.904
Skewness		1.215	-0.245	0.684	-0.074	1.142
Kurtosis		2.513	-1.018	-0.563	-0.956	1.738

Resource Portfolio Optimisation

		RP1	RP2	RP3	RP4	RP5
N	Valid	544	545	557	556	552
	Missing	17	16	4	5	9
Mean		2.3	2.41	1.95	2.4	3.01
Median		2	2	2	2	3
Mode		2	2	2	2	2
Std. Deviation		0.952	1.185	0.724	1.058	1.222
Skewness		1.041	1.216	1.448	1.238	0.469
Kurtosis		1.12	0.927	4.866	1.477	-0.651

Resource Complementarity

		RC1	RC2	RC3	RC4	RC5
N	Valid	556	547	556	558	545
	Missing	5	14	5	3	16
Mean		2.16	3.66	2.48	2.09	2.49
Median		2	4	2	2	2
Mode		2	5	2	2	2
Std. Deviation		0.876	1.292	1.021	0.805	1.04
Skewness		1.134	-0.132	1.001	1.113	1.174
Kurtosis		1.758	-1.045	0.984	2.211	1.292

e-Government Performance using Initial SERVQUAL Congeneric Models

Tangible Factor

		T1	T2	T3	T4
N	Valid	557	561	542	551
	Missing	4	0	19	10
Mean		2.39	2.24	2.52	2.4
Median		2	2	2	2
Mode		2	2	2	2
Std. Deviation		1.226	0.922	0.837	0.927
Skewness		0.966	0.775	0.819	1.05
Kurtosis		0.352	0.694	0.731	1.644

Reliability Factor

		RL1	RL2	RL3	RL4	RL5
N	Valid	561	550	561	550	560
	Missing	0	11	0	11	1
Mean		2.8	2.32	1.97	2.87	2.64
Median		3	2	2	3	2.5
Mode		2	2	2	3	2
Std. Deviation		1.035	0.837	0.908	0.968	1.037
Skewness		0.533	0.62	1.142	0.494	0.726
Kurtosis		-0.055	0.756	1.589	0.227	0.558

Responsiveness Factor

		RS1	RS2	RS3	RS4
N	Valid	536	559	551	557
	Missing	25	2	10	4
Mean		2.87	2.14	2.36	3.23
Median		3	2	2	3
Mode		3	2	2	3
Std. Deviation		1.043	0.792	0.945	1.229
Skewness		0.439	1.224	0.897	0.467
Kurtosis		-0.165	3.224	0.944	-0.8

Assurance Factor

		A1	A2	A3	A4
N	Valid	559	552	561	549
	Missing	2	9	0	12
Mean		2.6	2.62	2.09	2.22
Median		2	2	2	2
Mode		2	2	2	2
Std. Deviation		0.933	0.954	0.702	0.785
Skewness		0.761	0.694	0.892	1.229
Kurtosis		0.479	0.255	2.134	2.723

Empathy Factor

		EM1	EM2	EM3	EM4	EM5
N	Valid	559	557	561	554	559
	Missing	2	4	0	7	2
Mean		2.44	1.96	2.47	2.42	2.39
Median		2	2	2	2	2
Mode		2	2	2	2	2
Std. Deviation		0.807	0.685	0.892	0.788	0.929
Skewness		0.704	1.329	0.794	0.888	1
Kurtosis		0.748	4.773	0.749	1.629	0.853

Appendix J.

COVARIANCE MODELS FOR VALIDITY TESTS

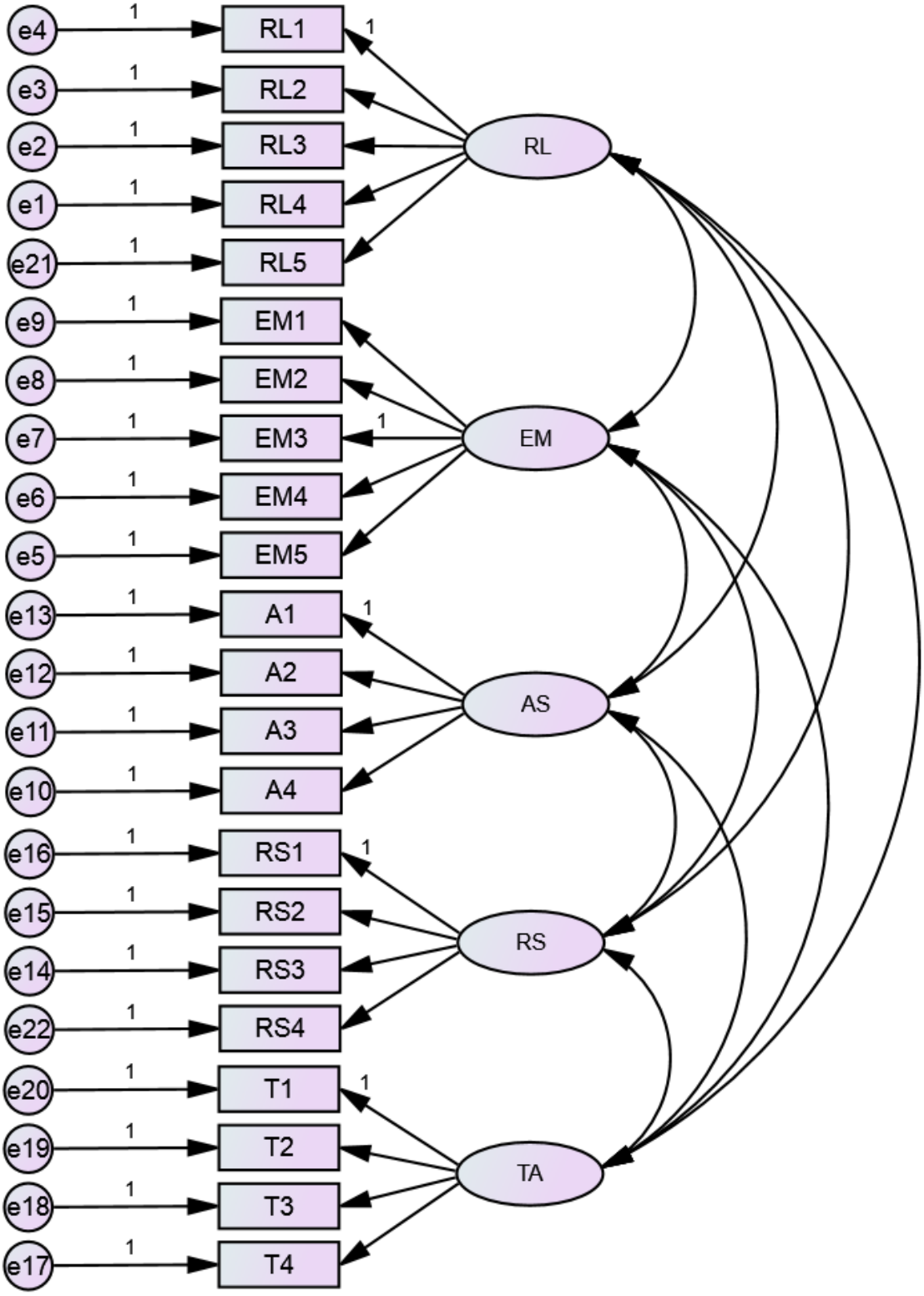


Figure A. 6. Initial e-Government Performance Covariance Models

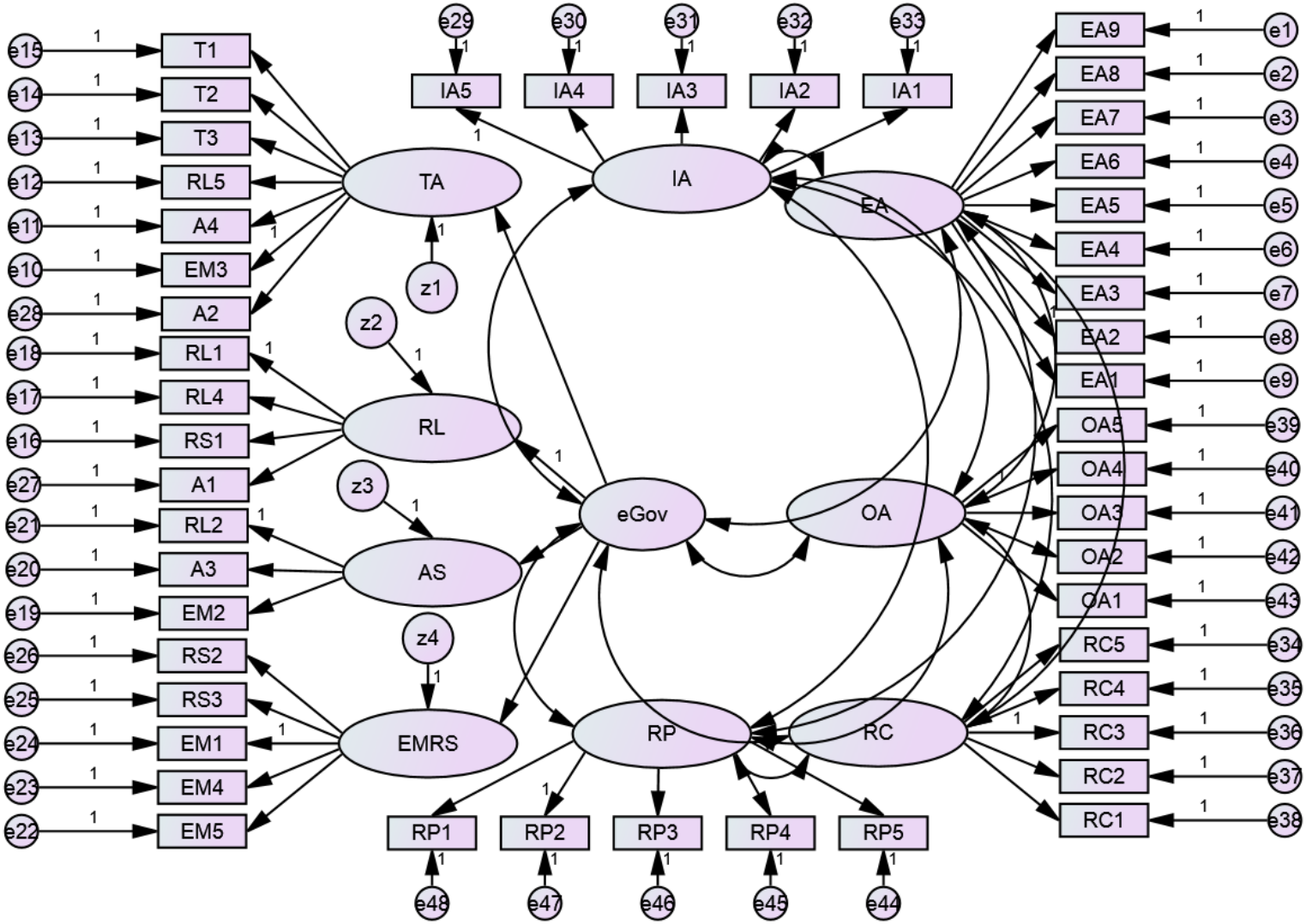


Figure A. 7. Covariance Model for All Dimensions

Appendix K.

STRUCTURAL EQUATION MODELS

E-Government Dimension

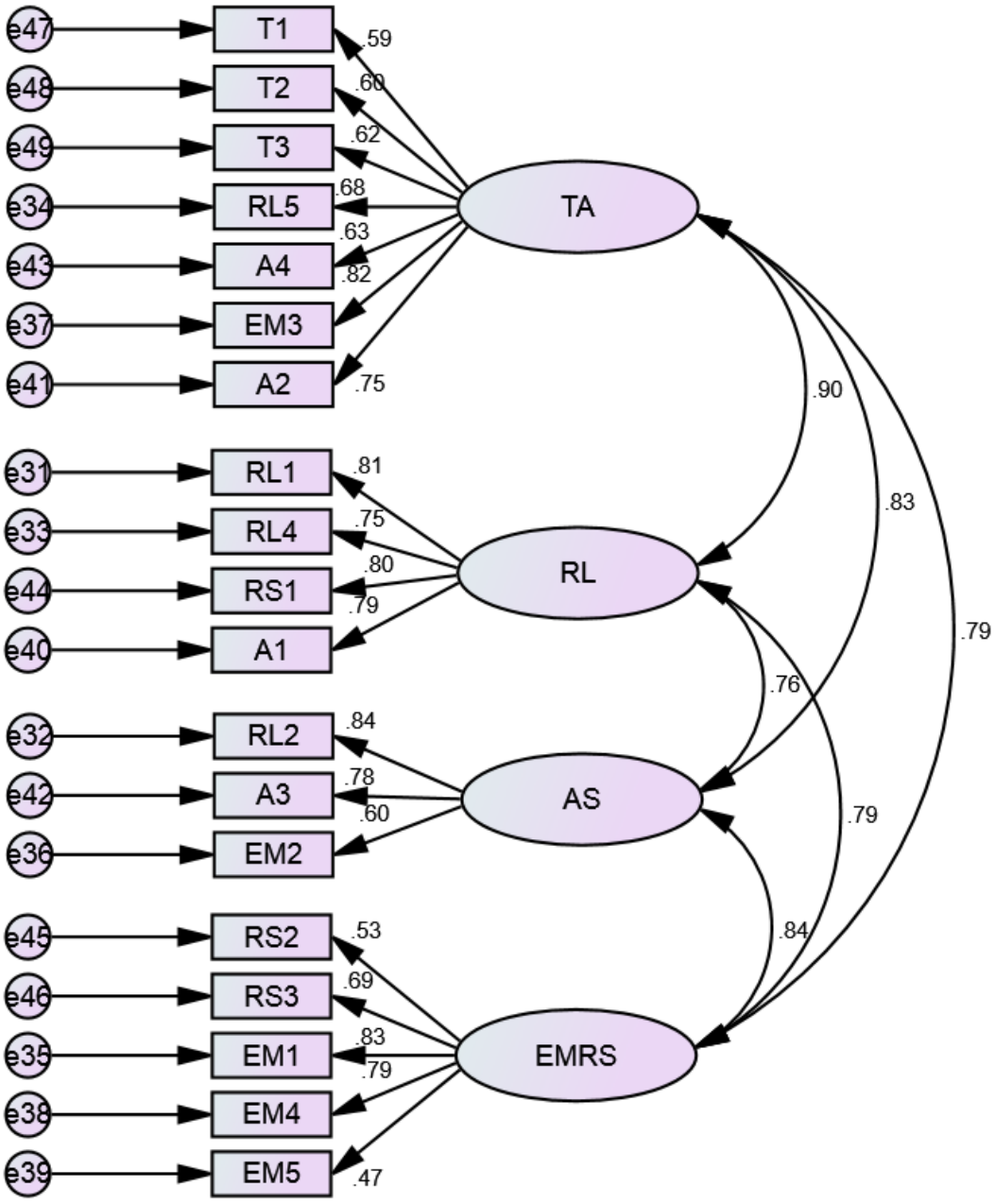


Figure A. 8. Initial e-Government Standarised Estimates

The Overall Model

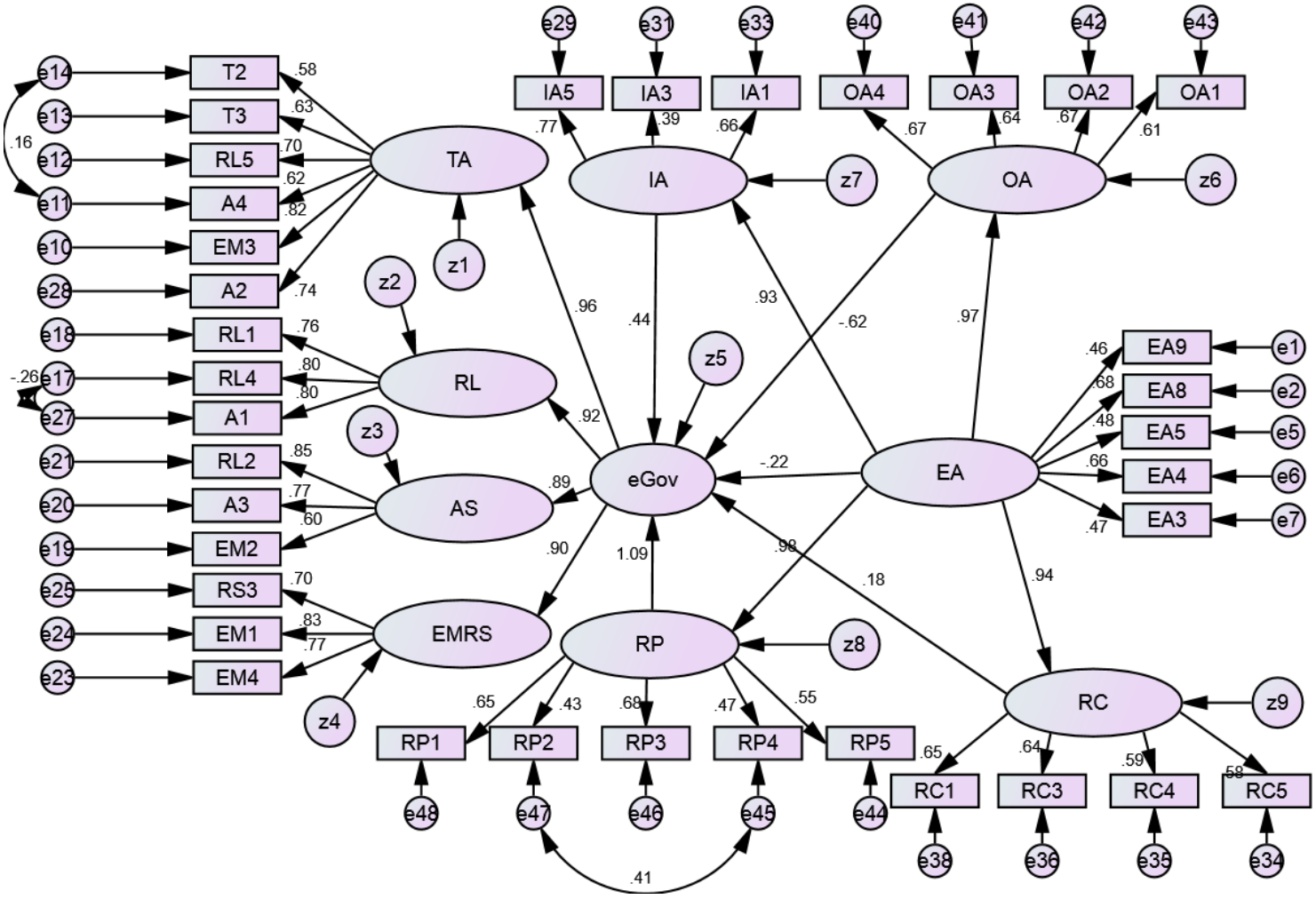


Figure A. 9. Standarised Estimates for the Initial Model

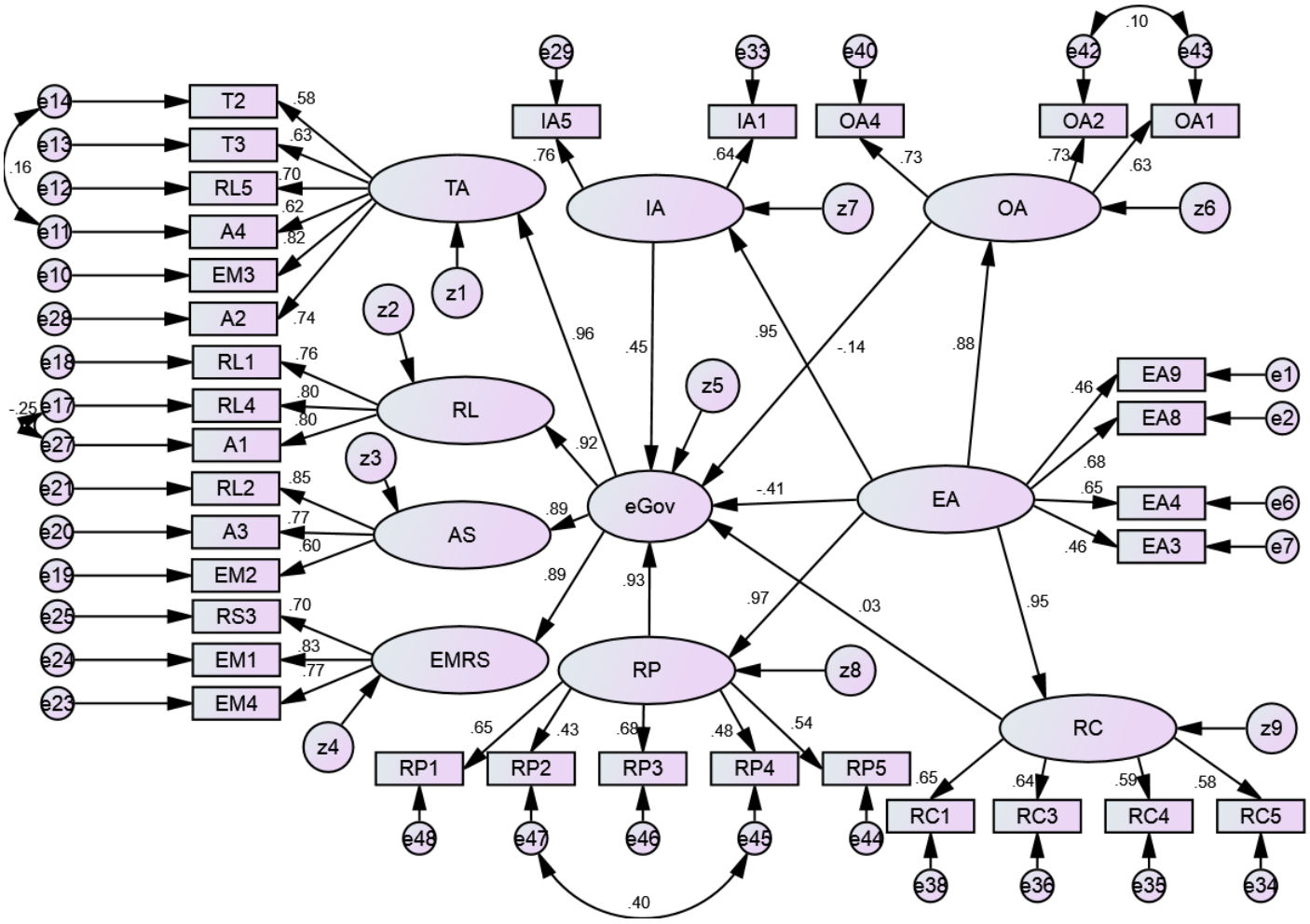


Figure A. 10. Standarised Estimates for the Final Overall Model

The Simple Mediator Models

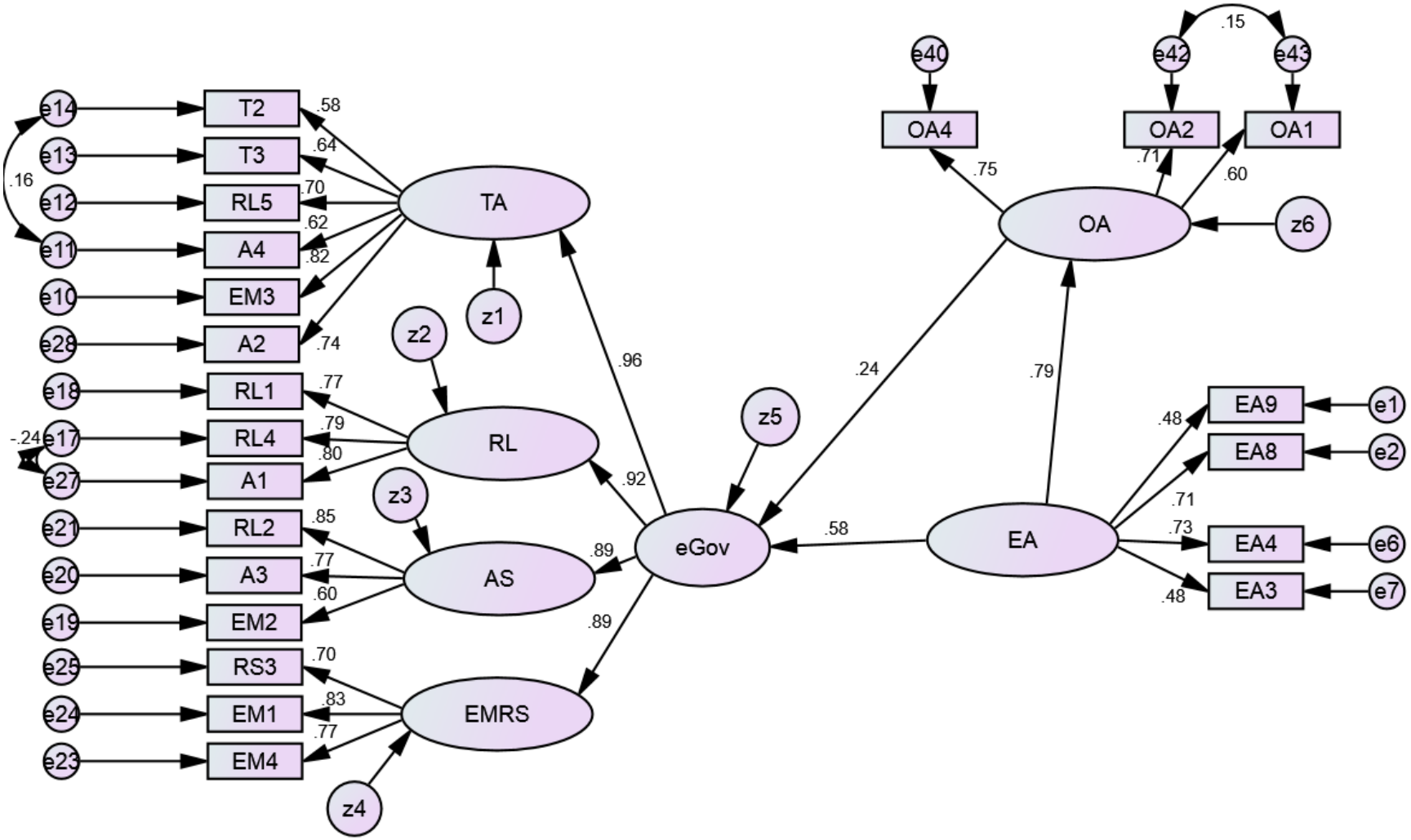


Figure A. 11. Standarised Estimates for the OA Dimension as Mediator

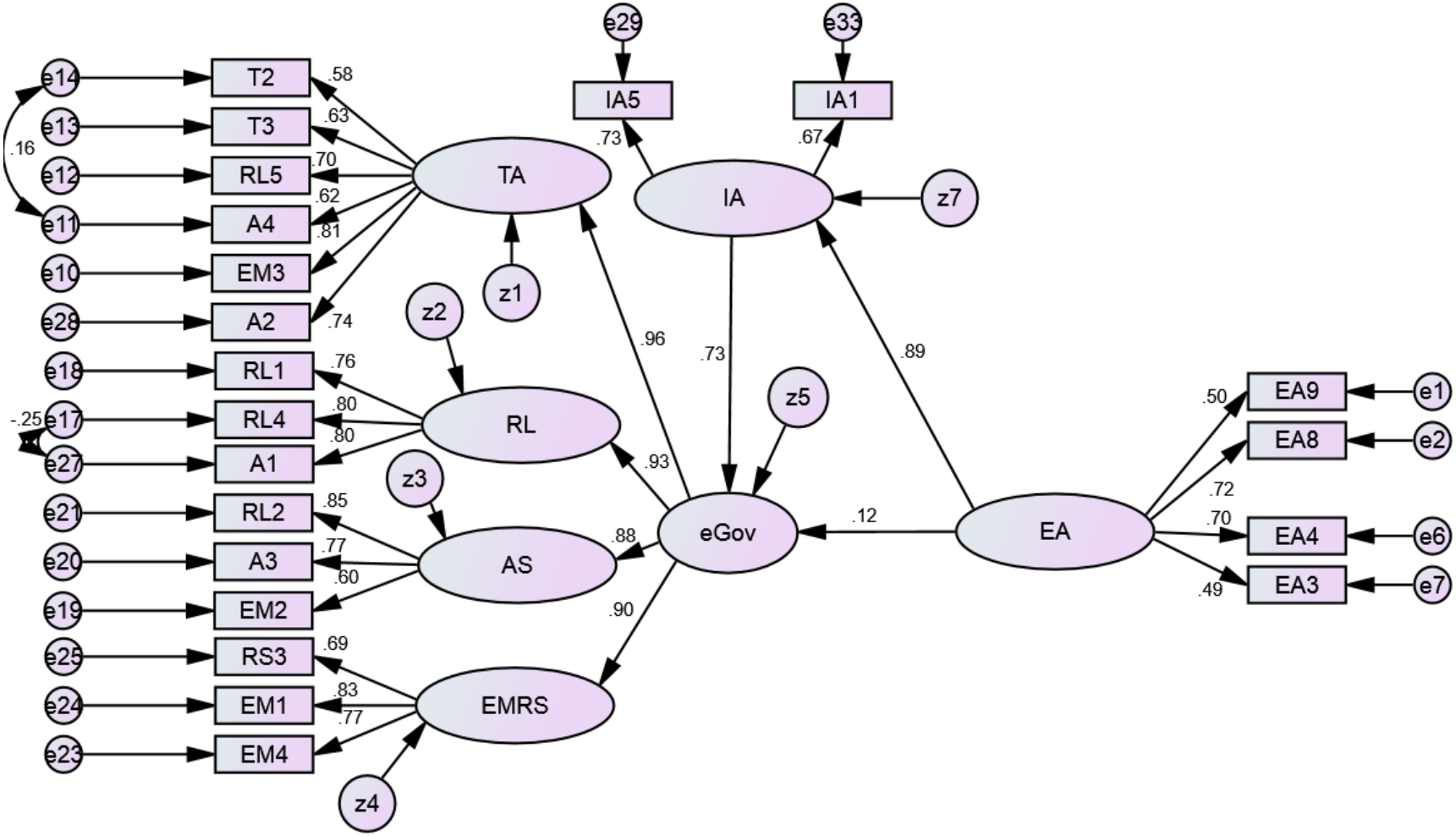


Figure A. 12. Standarised Estimates for the IA Dimension as Mediator

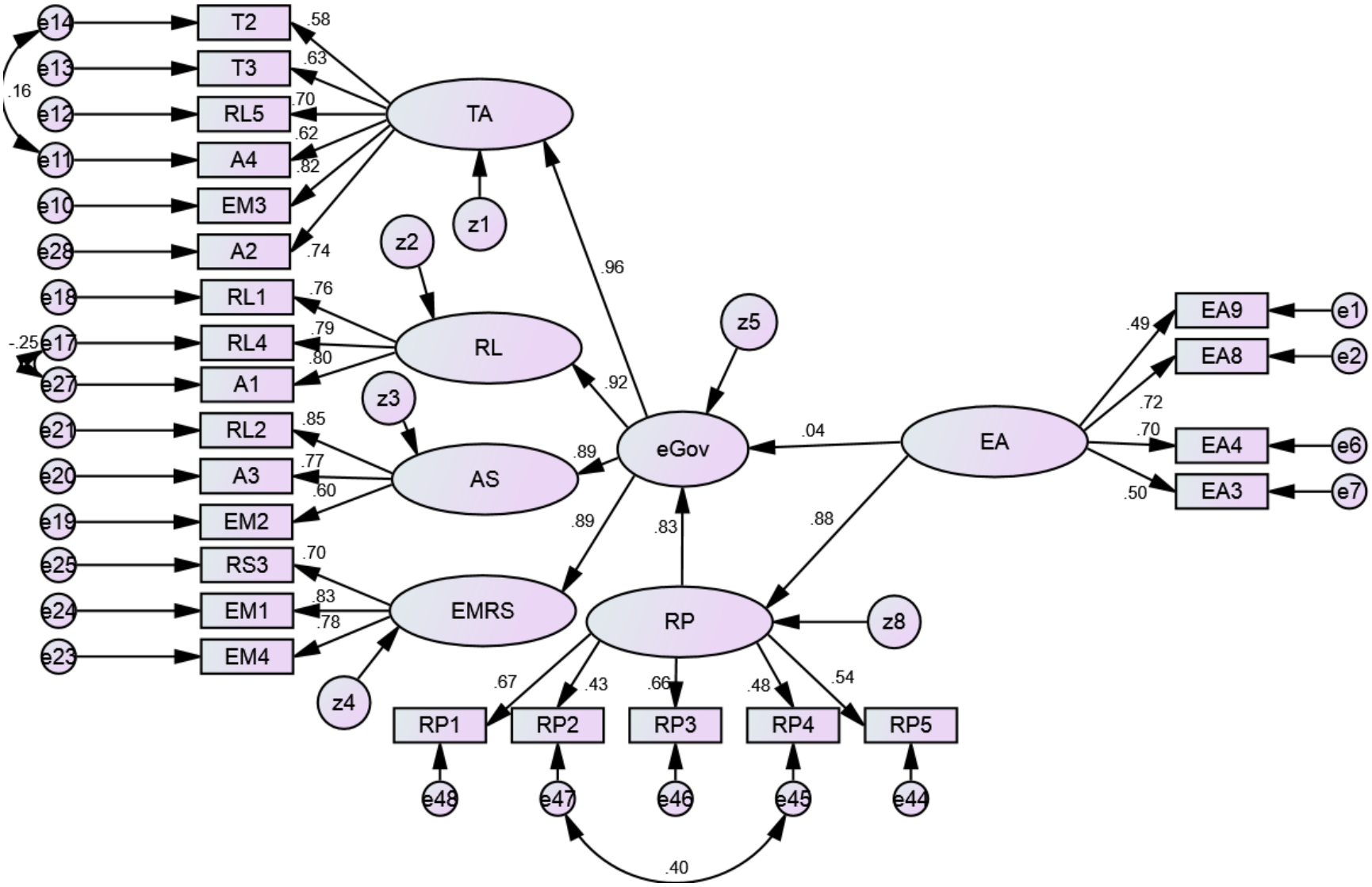


Figure A. 13.Standarised Estimates for the RP Dimension as Mediator

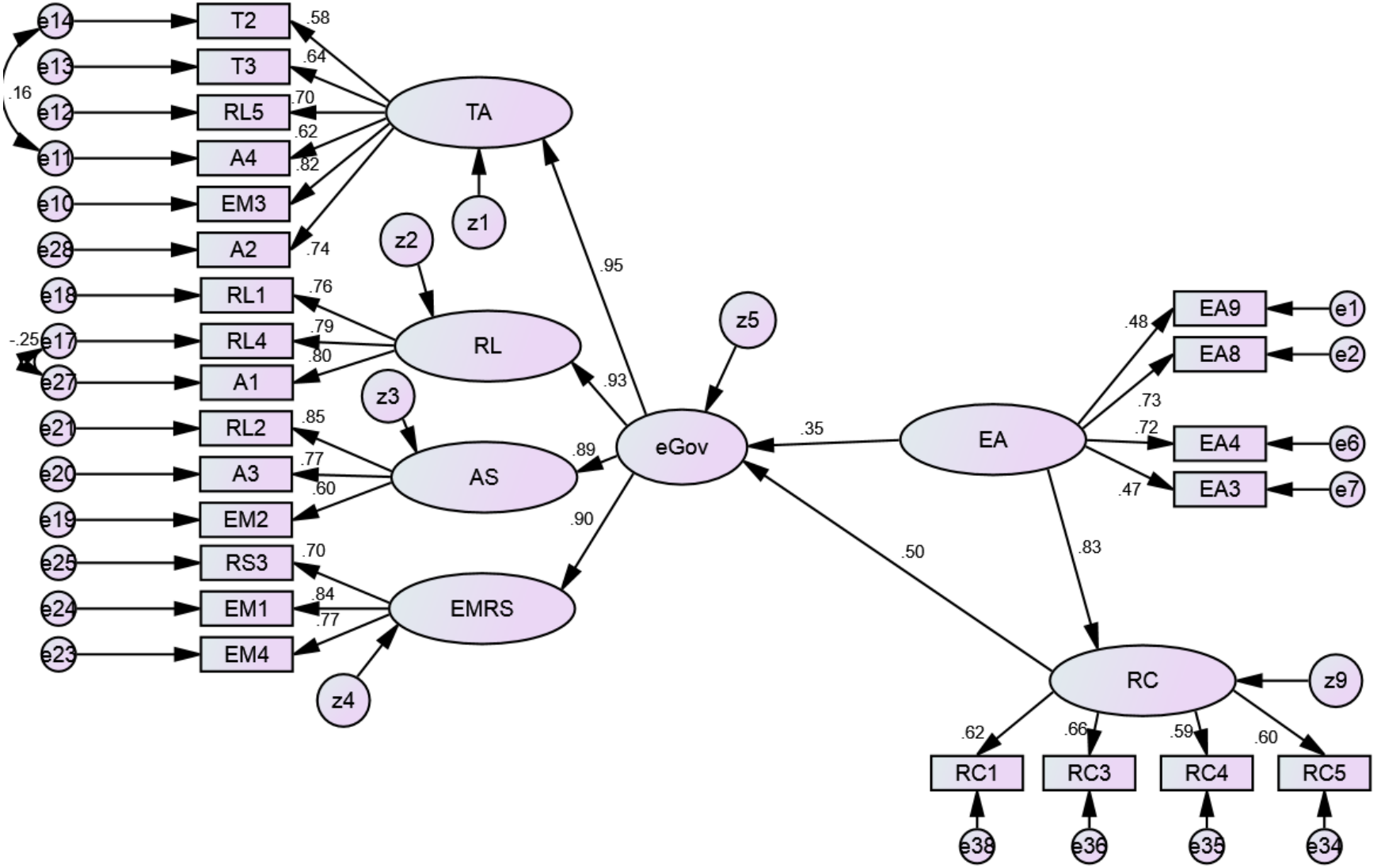


Figure A. 14. Standarised Estimates for the RC Dimension as Mediator

Appendix L.
STATISTICAL EQUATIONS

CHI-SQUARE (χ^2)

$$X^2 = \sum[(O_i - E_i)^2/E_i]$$

DEGREES OF FREEDOM (df)

$$\text{df} = d = p - q$$

SRMR

$$SRMR = \sqrt{\left(\frac{2\sum_{I=1}^{P}\sum_{j=1}^{i}\left[\left(\frac{S_{ij} - \hat{\sigma}_{ij}}{S_{ii}S_{jj}}\right)^2\right]}{p(p+1}\right)}$$

RMSEA

$$RMSEA = \sqrt{\frac{\widehat{F_0}}{d}}$$

CFI

$$CFI = 1 - \frac{\max(F_{min} - d_{min}, 0)}{\max(F_i - d_i, 0)}$$

IFI

$$\text{IFI} = \Delta_2 = \frac{\hat{C}_b - \hat{C}}{\hat{C}_b - d}$$

TLI

$$\text{TLI} = \rho_2 = \frac{\frac{\hat{C}_b}{d_b} - \frac{\hat{C}}{d}}{\frac{\hat{C}_b}{d_b} - 1}$$